REPORT TO

JOHNSTAFF PROJECT PTY LTD

ON

STAGE 2 ENVIRONMENTAL SITE ASSESSMENT

FOR

PROPOSED NEW MULTI-STOREY CAR PARK

AT

LIVERPOOL HEALTH + ACADEMIC PRECINCT

ELIZABETH STREET, LIVERPOOL, NSW

Date: 29 January 2020

Ref: E32465BDrpt5

JKEnvironments

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Executive Summary

Johnstaff Projects Pty Ltd on behalf of Health Infrastructure NSW ('the client') commissioned JK Environments (JKE) to undertake a Stage 2 Environmental Site Assessment (ESA) for the proposed new multi-storey car park (MSCP) at Liverpool Health + Academic Precinct (Liverpool Hospital), Elizabeth Street, Liverpool, NSW. The site location is shown on Figure 1 and the assessment was confined to the site boundaries as shown on Figure 2.

This report has been prepared for the proposed MSCP development and supports the lodgement of the associated Sate Significant Development Application (SSDA).

JKE have previously undertaken an intrusive environmental assessment for a large portion of Liverpool Hospitals western campus. The assessment was undertaken to inform the client of potential contamination issues for consideration in future development of the hospital. The results are presented in a Stage 2 ESA report prepared by JKE in October, 2019[1] which was primarily prepared for the proposed civil infrastructure works, which are captured under a separate planning pathway.

This Stage 2 ESA report presents the results for the assessment area ('the site'). The assessment area includes the proposed MSCP development area ('MSCP site'). The site assessment area and the MSCP site area are shown on Figure 2. Recommendations and conclusions specific to the MSCP and additional commentary have been included in this report where applicable.

The primary aims of the assessment were to: identify potential contamination sources and contaminants of concern; assess the soil and groundwater contamination conditions; provide a preliminary waste classification for off-site disposal of in-situ soil; assess the potential for acid sulfate soils; assess the potential for dryland salinity; and comment on site suitability for the proposed development.

The following potential contamination sources/areas of environmental concern have been identified at the site: Fill material (imported from an unknown source/s); Historical agricultural use at the (grazing, markets gardens and a piggery); Hazardous building materials (demolition activities) and former on-site and off-site fuel storage, mechanical workshops, dry cleaning and printing in the area.

The potential on-site human receptors that were identified included site users (including adults and children), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users and recreational water users. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas), and freshwater ecology in the Georges River.

To assess the risk the scope of works included collection soil samples from 40 sampling locations (JKE101 to JKE140) drilled in accessible areas of the site. Four groundwater monitoring wells (MWJKE102, MWJKE108, MWJKE122 and MWJKE135) were installed. Twenty three sampling locations (JKE111 to JKE132) of the 40 sampling locations were positioned generally within the MSCP site area and groundwater monitoring well MWJKE122 was located within the MSCP site area.

Fill material was encountered at the surface or beneath the pavement in all boreholes. Selected soil samples were analysed for contaminants of potential concern, potential acid sulfate soils and potential saline soils. Groundwater samples were analysed for contaminants of potential concern and salinity parameters. The results were compared against the selected site assessment criteria.

Some of the total recoverable hydrocarbons results for fill soils samples obtain from east section of the MSCP site were above the adopted ecological site assessment criteria. The copper and zinc results of all groundwater sample obtained from MWJKE122 were above adopted the ecological criteria. The sampling locations and contamination data are shown in Figures 4. Following a detailed review of the conceptual site model, laboratory results and proposed development details, JKE were of the opinion that risk to the human and ecological receptors was low.

[1] Report to Johnstaff Projects Pty Ltd, on Stage 2 Environmental Site Assessment, for Proposed Liverpool Hospital – Civil and Infrastructure Works, at Elizabeth Street, Liverpool, NSW (JKE ref: E32465BDrpt4, dated 10 October 2019)

Based on review of the results, the risk to receptors associated with the proposed MSCP development was considered to be low. However, the extent of AF/FA (friable asbestos) impacted fill soil requires further assessment, including in the west section of the proposed MSCP development area (beneath the existing P2 MSCP), due to the refusal encountered in the fill material in this area. The additional asbestos assessment should be undertaken following demolition of the existing P2 MSCP (to allow access to suitable machinery for sampling purposes) and the assessment undertaken in accordance with the WA DoH 2009 Guidelines (endorsed in NEPM 2013).

Based on the findings of the assessment, JKE are of the opinion that the MSCP site can be made suitable from a contamination view point for the proposed development MSCP development, provided that the following recommendations are implemented:

- Following demolition of the existing P2 MSCP, an additional asbestos assessment is undertaken beneath the P2 MSCP building footprint to address the data gap identified in Section 8.5;
- A Remediation Action Plan (RAP) is prepared, if required and based on the results of the additional asbestos assessment;
- An Acid Sulfate Soil Management Plan (ASSMP) is prepared, should the proposed MSCP development include works (e.g. piling) which have the potential to disturb potential ASS beneath groundwater and/or the ASS detected in the extremely weathered siltstone sample JKE116 (15.4-15.6m);
- A Salinity Management Plan (SMP) is prepared; and
- A Construction Environmental Management Plan (CEMP) is prepared by the appointed contractor. The CEMP should include an unexpected finds procedure for contamination.

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

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Abbreviations

Asbestos Fines/Fibrous Asbestos	**AF/FA**
Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Above-Ground Storage Tank	**AST**
Below Ground Level	**BGL**
Benzo(a)pyrene Toxicity Equivalent Factor	**BaP TEQ**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Cation Exchange Capacity	**CEC**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Development Application	**DA**
Dial Before You Dig	**DBYD**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Investigation Level	**EIL**
Environmental Investigation Services	**JKE**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Environment Protection Authority	**EPA**
Environmental Site Assessment	**ESA**
Ecological Screening Level	**ESL**
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Health Investigation Level	**HILs**
Health Screening Level	**HSL**
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International Organisation of Standardisation	**ISO**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
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Polycyclic Aromatic Hydrocarbons	**PAH**
Potential ASS	**PASS**
Polychlorinated Biphenyls	**PCBs**
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Practical Quantitation Limit	**PQL**
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Site Assessment Criteria	**SAC**
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Site Specific Assessment	**SSA**
Source, Pathway, Receptor	**SPR**
Specific Contamination Concentration	**SCC**
Standard Penetration Test	**SPT**
Standard Sampling Procedure	**SSP**
Standing Water Level	**SWL**
Trip Blank	**TB**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
United States Environmental Protection Agency	**USEPA**
Underground Storage Tank	**UST**
Virgin Excavated Natural Material	**VENM**
Volatile Organic Compounds	**VOC**
World Health Organisation	**WHO**
Work Health and Safety	**WHS**

Units

Litres	**L**
Metres BGL	**mBGL**
Metres	**m**
Millivolts	**mV**
Millilitres	**ml or mL**
Milliequivalents	**meq**
micro Siemens per Centimetre	**µS/cm**
Micrograms per Litre	**µg/L**
Milligrams per Kilogram	**mg/kg**
Milligrams per Litre	**mg/L**
Parts Per Million	**ppm**
Percentage	**%**

1 INTRODUCTION

Johnstaff Projects Pty Ltd on behalf of Health Infrastructure NSW ('the client') commissioned JK Environments (JKE) to undertake a Stage 2 Environmental Site Assessment (ESA) for the proposed new multi-storey car park (MSCP) at Liverpool Health + Academic Precinct (Liverpool Hospital), Elizabeth Street, Liverpool, NSW. The site location is shown on Figure 1 and the assessment was confined to the site boundaries as shown on Figure 2.

This report has been prepared for the proposed MSCP development and supports the lodgement of the associated Sate Significant Development Application (SSDA).

JKE have previously undertaken an intrusive environmental assessment for a large portion of Liverpool Hospitals western campus. The assessment was undertaken to inform the client of potential contamination issues for consideration in future development of the hospital. The results are presented in a Stage 2 ESA report prepared by JKE in October, 2019[2] which was primarily prepared for the proposed civil infrastructure works, which are captured under a separate planning pathway.

This Stage 2 ESA report presents the results for the assessment area ('the site'). The assessment area includes the proposed MSCP development area ('MSCP site'). The site assessment area and the MSCP site area are shown on Figure 2. Recommendations and conclusions specific to the MSCP and additional commentary have been included in this report where applicable.

A geotechnical investigation was undertaken in conjunction with this assessment by JK Geotechnics[3]. The results of the geotechnical investigation are presented in a separate report (Ref. 32160A2rpt, dated 27 November 2019[4]). This report should be read in conjunction with the JK Geotechnics report.

1.1 Proposed Development Details

The Liverpool Health + Academic Precinct (LHAP) is bisected by the Main Southern Railway, which separates the main (western) and eastern campuses. Based on the supplied information, JKE understand the proposed MSCP development will include demolition of the existing P2 multi-storey car park, on-grade car park, and roads at the north-eastern corner of the main campus, and construction of a new MSCP (seven levels), which will be oriented east-west. Extending off the eastern end of the southern side of the new MSCP will be a circular vehicle ramp structure. We understand that two additional floors may be provided to the structure at a later stage. The proposed car park structure will be supported on piles socketed into the underlying bedrock.

The ground floor level will be constructed at approximately RL10.5m and will require filling above existing grade to a maximum height of approximately 1m to achieve design subgrade level. Lifts are proposed

[2] Report to Johnstaff Projects Pty Ltd, on Stage 2 Environmental Site Assessment, for Proposed Liverpool Hospital – Civil and Infrastructure Works, at Elizabeth Street, Liverpool, NSW (JKE ref: E32465BDrpt4, dated 10 October 2019)

[3] Geotechnical consulting division of J&K

[4] Referred to as JK Geotechnics (27 November 2019)

towards the western end of the southern side of the new MSCP. We have assumed that the lift pit will require excavation to a maximum depth of approximately 2m below design subgrade level. New asphaltic concrete paved roadways and on-grade car parking areas are proposed around the new MSCP. We have not been informed if surplus material will be generated as part of the proposed development.

JKE understand that civil infrastructure works (including the demolition of the existing Ron Dunbier building, located in the east section of the MSCP site) are to occur prior to construction of the new MSCP. The civil infrastructure works are captured under a separate planning pathway.

1.2 Aims and Objectives

The primary aims of the assessment were to: identify potential contamination sources and contaminants of concern; assess the soil and groundwater contamination conditions; provide a preliminary waste classification for off-site disposal of in-situ soil; assess the potential for Acid Sulfate Soils (ASS); assess the potential for dryland salinity; and comment on site suitability for the proposed development. The objectives of the assessment were to:

- Identify areas of environmental concern (AEC)/contamination sources and contaminants of potential concern (CoPC) by review of site information;
- Assess soil and groundwater contamination, salinity and ASS conditions by implementing a sampling, analysis and quality program (SAQP);
- Prepare a conceptual site model (CSM) to identify source, pathway and receptor (SPR) linkages;
- Assess risk posed by contamination to the receptors (Tier 1 risk assessment); and
- Assess the site (including the MSCP site) suitability for the proposed development, or whether remediation is required.

1.3 Scope of Work

The assessment was undertaken generally in accordance with JKE proposal (Ref: EP50653BD2) of 6 November 2019 and written acceptance from the client of 27 November 2019. The scope of work included the following:

- Review of previous JKE reports relevant to the site;
- Review of major service identified by the 'Dial Before You Dig'(DBYD) plans;
- Preparation of a Safe Work Method Statement (SWMS) and Disruption Notice (DN);
- Walkover inspection of accessible areas of the site. Observation of conditions and likely land use at surrounding properties will be made;
- Preparation of a CSM;
- Design and implementation of a sampling, analysis and quality plan (SAQP);
- Interpretation of the analytical results against the adopted Site Assessment Criteria (SAC);
- Data Quality Assessment; and
- Preparation of a report including a Tier 1 risk assessment.

The report was prepared with reference to regulations/guidelines outlined in the table below. Individual guidelines are also referenced within the text of the report.

Table 1-1: Guidelines

Guidelines/Regulations/Documents
Contaminated Land Management Act (1997)[5]
State Environmental Planning Policy No.55 – Remediation of Land (1998)[6]
Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)[7]
Guidelines for Consultants Reporting on Contaminated Sites (2011)[8]
Guidelines for the NSW Site Auditor Scheme, 3rd Edition (2017)[9]
National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)[10]
Acid Sulfate Soil Management Advisory Committee (ASSMAC) Acid Sulfate Soil Manual (1998)[11].
Site Investigations for Urban Salinity (2002[12])

[5] Contaminated Land Management Act 1997 (NSW). (referred to as CLM Act 1997)

[6] State Environmental Planning Policy No. 55 – Remediation of Land 1998 (NSW). (referred to as SEPP55)

[7] Department of Urban Affairs and Planning, and Environment Protection Authority, (1998). *Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land*. (SEPP55 Planning Guidelines)

[8] NSW Office of Environment and Heritage (OEH), (2011). *Guidelines for Consultants Reporting on Contaminated Sites.* (referred to as Reporting Guidelines 2011)

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

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

[11] Acid Sulfate Soils Management Advisory Committee (ASSMAC), (1998). *Acid Sulfate Soils Manual* (ASS Manual 1998)

[12] Department of Land and Water Conservation (DLWC), (2002). *Site Investigations for Urban Salinity,* (referred to as DLWC 2002)

2 SITE INFORMATION

2.1 Background

2.1.1 Stage 1 Environmental Site Assessment

A Stage 1 Environmental Site Assessment for the majority of the site was completed by JKE in September 2019[13] (herein referred as the 'Stage 1 ESA'). The Stage 1 ESA included a desktop review of previous JKE environmental reports prepared for the Liverpool Hospital, provided an appraisal of the past site use(s) based on a review of historical records and a site inspection.

Previous investigations undertaken by JKE (formerly EIS) in the central and south-east section of the western campus identified Asbestos Containing Materials (ACM), elevated concentrations of lead and Polyaromatic hydrocarbons (PAHs), including benzo(a)pyrene. Remediation and validations works included excavation and off-site disposal of impacted soil during the clinical services development undertaken between 2007 and 2008. The remediation works also included the removal a formerly abandoned diesel Underground Storage Tank (UST) from an area approximately 70m to the south of the MSCP site boundary. The approximate location of the former UST is shown on Figure 2. Additional former and existing USTs, Above Ground Storage Tanks (ASTs) and other danger goods storage areas were identified by the desktop review and site inspection. The approximate locations of the known former and current dangerous good storage areas are shown on Figure 2. Further information relating to current and former dangerous goods storage at the Liverpool Hospital is available in the JKE Stage 1 ESA.

Based on the scope of work undertaken for the assessment, JKE identified the following potential contamination sources/Area of Environment Concern (AEC): Fill material (imported from an unknown source/s); Historical agricultural use of the area (grazing, markets gardens and a piggery); Hazardous building materials (demolition activities) and former off-site fuel storage, mechanical workshops, dry cleaning and printing in the area.

The report concluded that the historical land uses and potential sources of contamination identified would not preclude the proposed development. However, the following was recommended to better assess the risks associated with the CoPC and to address SEPP 55 requirements:

- A Stage 2 Environmental Site Assessment should be undertaken to characterise the soil and groundwater site contamination conditions;
- A preliminary ASS assessment should be undertaken to establish the potential for actual or potential ASS to be present, and assess the need to prepare an Acid Sulfate Soil Management Plan (ASSMP); and
- A preliminary assessment of the potential for saline soil should be undertaken to assess the need for a Salinity Management Plan (SMP).

[13] Report to Johnstaff Projects Pty Ltd, on Stage 1 Environmental Site Assessment, for Proposed Liverpool Hospital – Civil and Infrastructure Works, at Elizabeth Street, Liverpool, NSW (JKE ref: E32465BDrpt2, dated 20 September 2019)

2.1.2 Hazardous Building Material Assessment – Ron Dunbier Building

JKE have completed a Hazardous Building Material Assessment for the proposed demolition of the Ron Dunbier Building located in the north-east section of the MSCP site (JKE Ref: E32160Brpt-Hazrev, dated 2 July 2019). The Ron Dunbier Building was constructed in 1979. The building is generally constructed with brick external walls, brick and render internal walls, concrete and plaster tile ceilings and concrete floors. The building was vacant at the time of the hazardous building material inspection.

Asbestos containing materials (ACM) were identified within the interior and the exterior of the existing building and structures at the site at the time of the inspection. Both friable and non-friable ACM were encountered within the building.

Lead and Polychlorinated Biphenyls (PCBs) were not identified within the scope and limitations of the hazardous building material assessment.

2.1.3 JK Geotechnical Assessment

JK Geotechnics desktop assessment was based on numerous previous intrusive investigations undertaken at Liverpool Hospital between 1989 and 2009. Based on the available information, JK Geotechnics expected that the geotechnical model for the eastern end of the western campus comprises fill, overlying alluvial clays and sands, then shale bedrock at depths between approximately 10m below ground level (BGL) and 17mBGL. Groundwater was expected between approximately 7mBGL and 11mBGL.

2.2 Site Identification

Table 2-1: Site Identification

Current Site Owner:	Health Infrastructure NSW
Site Address:	Part of 50 Goulburn Street, Liverpool, NSW (Liverpool Hospital)
Lot & Deposited Plan:	Part of Lot 501 DP1165217 and part of Lot 1 DP596770
Current Land Use:	Hospital
Proposed Land Use:	Hospital
Local Government Authority:	Liverpool City Council
Current Zoning:	SP2 Infrastructure (Health Services Facility and Education Establishments) – Liverpool LEP 2008 (Liverpool Hospital)
Site Assessment Area (m^2):	Approximately 26,550
MSCP Site Area (m^2):	Approximately 15,000
RL (AHD in m) (approx.):	10-14

Geographical Location (decimal degrees) (approx.):	Latitude: -33.919244 Longitude: 150.932669
Site Location Plan:	Figure 1
Sample Location Plan:	Figure 2

2.3 Site Location and Regional Setting

The site is located in a predominantly residential and commercial area of Liverpool. The site is located on east side of Elizabeth Street, the south side of Northern Link Road and Liverpool Girls High School and in the east section of the Liverpool Hospital western campus. A small portion of the site is located in three separate areas in the west section of the Liverpool Hospital eastern campus. The Main Southern Railway bisects the Liverpool Hospital western and eastern campuses. Georges River is located approximately 85m to the south-east of the site.

The MSCP site is located within the north east section of the wider site area and in the north east section of the Liverpool Hospital western campus.

2.4 Topography

The regional topography is characterised by gentle slopes which generally fall to the east and south-east at approximately 1-2°. The site appears to be relatively flat and appears to have been filled to accommodate the existing hospital buildings and features. However, Elizabeth Street generally grades gently down to the east at less than 1°.

2.5 Site Inspection

A walkover inspection of the site was undertaken by JKE on 31 July 2019 and 30 August 2019. The inspection was limited to accessible areas of the site and immediate surrounds. An internal inspection of buildings was not undertaken.

A summary of the inspection findings are outlined in the following subsections:

2.5.1 Buildings, Structures and Roads

The Ron Dunbier Building located in the north-east section of the site appeared to have been constructed of brick and concrete. The building appeared to be in a dilapidated state and was currently vacant. We understand that the building was formerly occupied for temporary residential purposes. JKE have previously undertaken a Hazardous Building Material Assessment for the proposed demolition of the Ron Dunbier Building. The results of the assessment are summarised in Section 2.1.2.

A four-storey carpark (P2 car park) in the northern section of the site appeared to have been constructed of brick and concrete. The building appeared in good condition. JKE have recently completed a Hazardous Building Material Assessment for the P2 car park (JKE Ref: E32465BD2rpt HAZ, dated 5 September 2019). Hazardous building materials were not identified.

2.5.2 Fill Material and Erosion

Areas of exposed gravelly silty sand fill soils were evident in the landscaped areas adjacent to Elizabeth Street in the south section of the site, in the north-west section of the site and along the boundary of the western campus site area, adjacent to the Main Southern Railway. Landscaped fill batters were observed in the south-east section of the site along Elizabeth Street and along the hospital access drive extending onto the east section of the site. A fill batter along the hospital access driveway sloped down to the common boundary with the Main Southern Railway. The road level was up to approximately 2m higher than the adjoining rail corridor surface level.

Exposed fill material was evident on the surface of the batters and on the surface in the north-east and south sections of the site. The exposed gravelly silty sand fill material appeared to contain inclusions of igneous and ironstone gravel and minor inclusions of brick, concrete and glass.

There appeared to be no evidence of significant erosion or scalding associated with dryland salinity.

2.5.3 Visible or Olfactory Indicators of Contamination

Visible or olfactory indicators of contamination including staining and odours were not identified during the site inspection. A potential ACM[14] (sample ref: AMF1) was observed on the surface in a landscaped area to the south of sampling location JKE136. A second potential ACM was observed immediately on the surface to the east of sampling location JKE138 located to the west of the central energy building in the eastern campus. The potential ACM is shown on Figure2. Surface ACM were not identified within the MSCP site area.

2.5.4 Presence of Drums and Chemicals

Stored drums and chemicals were not observed within the site boundaries. However, stored hazardous chemicals including Ethyl Alcohol Solution, Acetone, and Xylene were identified to the north-west of the site (located immediately to the east of the existing pathology building). Additionally, a potential UST was identified to the immediate south of sampling location JKE138. The stored hazardous chemicals are further discussed in the CSM and their approximate location shown on Figure 2.

2.5.5 Drainage and Services

Stormwater drainage services were identified within the curb/gutter alignments along Elizabeth Street and within the internal roadways within the hospital grounds in the east, central and north sections of the site.

[14] ACM refers to bonded fibre cement fragments containing asbestos. For simplicity throughout this report, term ACM has been used to describe fragments of bonded fibre cement, even if laboratory analysis was not undertaken to confirm that the material contained asbestos.

Surface water is expected to flow in sympathy with the road topography before entering the stormwater system which most likely flows to the Georges River. What appeared to be a landscaped drainage swale was located in the central section of the site. The swale may have been designed to collect localised surface water flows.

2.5.6 Sensitive Environments

Sensitive environments such as wetlands, ponds, creeks or extensive areas of natural vegetation were not identified on site. However, Georges River is located approximately 85m to the south-east of the site and could be considered as a potential receptor for contaminated groundwater and/or surface water.

2.5.7 Landscaped Areas and Visible Signs of Plant Stress

Landscaped areas were located along Elizabeth Street in the south section of the site, along the batter slope in the south-east section of the site, in the central section of the site and adjacent to the Ron Dunbier building in the north-east section of the site. The landscaped areas included medium sized trees, shrubs and grass cover. The vegetation appeared relatively healthy with no signs of stress. However, grass cover was scarce in some areas.

2.6 Surrounding Land Use

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

- North – Liverpool Girls/Boys High School;
- South – TAFE NSW, beyond Elizabeth Street;
- East – Liverpool Hospital eastern campus; and
- West – Liverpool Hospital.

2.7 Underground Services

The 'Dial Before You Dig' (DBYD) plans were reviewed for the assessment in order to establish whether any major underground services exist at the site or in the immediate vicinity that could act as a preferential pathway for contamination migration.

The DBYD plans indicated that a number of services including telecommunications, electrical, gas, water, sewer and stormwater extend onto the site, particularly through the roadway or footpath along Elizabeth Street. A number of these assets service Liverpool Hospital. The gas main extended along carpark laneway in the northern section of the site. The sewer main network extends along Elizabeth Street onto the south-east section of the site, a second sewer main runs along Campbell and Forbes Street onto the north section of the site and a third sewer main runs from Goulburn Street to the west onto the west section of the western campus and through the central section of the site. The above sewer network also appears to be interconnected by pipework that runs along the entire eastern boundary of the site.

The service trench backfill could have been imported from a contaminated site and/or there is a potential for the service trenches to act as a preferential pathway for contamination migration from up gradient sources (i.e. through relatively permeable backfill). Copies of the DBYD plans are attached in the JKE Stage 1 ESA.

3 GEOLOGY AND HYDROGEOLOGY

3.1 Regional Geology

Regional geological information presented in the Lotsearch report (attached in the appendices of the Stage 1 ESA) indicated the following:

- The site is primarily underlain by Bringelly Shale of the Wianamatta Group, which typically consists of shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone, rare coal and tuff; and
- The eastern and north-eastern section of the site are underlain by clayey quartzose sand and clay.

3.2 Acid Sulfate Soil (ASS) Risk and Planning

The site is not located in an ASS risk area according to the risk maps prepared by the Department of Land and Water Conservation.

ASS information presented in the Lotsearch report (attached in the appendices of the Stage 1 ESA) indicated that the site is located within a Class 5 ASS risk area. Works in Class 5 areas that could pose an environmental risk in terms of ASS include works within 500m of adjacent Class 1,2,3,4 land which are likely to lower the water table below 1m AHD on the adjacent land.

3.3 Salinity Hazard Map

The site is located within the area of Western Sydney included in the Salinity Potential Map (2002). Based upon interpretation from the geological formations and soil groups presented on the map, the site is located in a region of moderate salinity potential.

The moderate classification is attributed to scattered areas of scalding and indicator vegetation, in areas where concentrations have not been mapped. Saline areas may occur in this zone, which have not been identified or may occur if risk factors change adversely.

3.4 Hydrogeology

Hydrogeological information presented in the Lotsearch report (attached in the appendices of the Stage 1 ESA) indicated that the regional aquifer on-site and in the areas immediately surrounding the site includes porous, extensive aquifers of low to moderate productivity. There were a total of thirty two registered bores within the report buffer of 2,000m. In summary:

- The nearest registered bore (ref: GW113069) was located approximately 136m to the south-east of the site and beyond Georges River. The bore was utilised for monitoring purposes;
- The majority of the bores were registered for monitoring purposes; and
- There were no nearby bores (i.e. within 1,618m) registered for domestic or irrigation uses; and

- The drillers log information from the closest registered bores typically identified clay soil or loamy sands to depths of approximately 18mBGL, underlain by sandstone bedrock. Standing water levels (SWLs) in the bores ranged from 1.10mBGL to 2.4mBGL, however the SWLs were generally only provided for bores registered at distances of greater than 1,500m from the site.

The information reviewed for this assessment indicated that the subsurface conditions at the site are likely to consist of residual and alluvial soils overlying relatively deep bedrock. The potential for viable groundwater abstraction and use of groundwater under these conditions is considered to be low. The groundwater may also be saline. JKE note that there is a reticulated water supply in the area and use of groundwater as a drinking water resource is highly unlikely. Use of groundwater is not proposed as part of the development.

Considering the local topography and surrounding land features, JKE would generally expect groundwater to flow towards the Georges River located approximately 85m to the south-east of the south-east section of the site.

3.5 Receiving Water Bodies

The closest surface water body is Georges River which is located approximately 85m to the south-east of the south-east section of the site. Georges River is downgradient from site and is considered to be a potential receptor of excess surface water flows.

4 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 site information (including the site inspection information) and the review of site history information presented in the JKE Stage 1 ESA. Reference should also be made to the figures attached in the appendices.

A review of the CSM in relation to source, pathway and receptor (SPR) linkages has been undertaken as part of the Tier 1 risk assessment process, as outlined in Section 8.

4.1 Potential Contamination Sources/AEC and CoPC

The potential contamination sources/AEC and CoPC are presented in the following table:

Table 4-1: Potential (and/or known) Contamination Sources/AEC and Contaminants of Potential Concern

Source / AEC	CoPC
Fill material: The site appears to have been historically filled to achieve the existing levels. Review of aerial photographs indicated that stockpiled soils were located to the east of the former maintenance building between 1961 and 1970. Additionally, a dam/water feature was located to the west of Ron Dunbier Building in 1982 and appeared to have been subsequently filled by 2009. This area is located within the east section of the MSCP site. Remediation works were undertaken immediately to the west of the south-east section of the site and partially within the south-east section of the site in 2008 for the New Clinical Services Building development. Remediation was required due to elevated concentrations of lead and PAHs (including benzo(a)pyrene) and ACM within fill material. Further details are provided in Section 2.1.1 and the JKE Stage 1 ESA. Exposed fill soils were identified during the site inspection in the south, south-east and east section of the wider site. The gravelly silty sand fill material contained inclusions of buildings rubble and ash. The fill may have been imported from various sources and could be contaminated. Verification of imported material during previous remediation was not undertaken.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs) and asbestos.
Historical agricultural use: The site appears to have been used for grazing, market garden purposes and a piggery. This could have resulted in contamination across the site via use of machinery, application of pesticides and building/demolition of various structures. Irrigation pipes made from asbestos cement may also be associated with this AEC.	Heavy metals, TRH, PAHs, OCPs, PCBs and asbestos JKE note that pesticides only became commercially available in the 1940s. Prior to this time pesticides were predominantly heavy metal compounds.

Source / AEC	CoPC
Hazardous Building Material: Both friable and non-friable asbestos have been identified within the Ron Dunbier Building construction materials, as summarised in Section 2.1.2. This building is located within the MSCP site. Potential ACM (fibre cement fragments (sample ref: AMF1 and AMF101) were identified on surface in the north-west section of the site (western campus) and in the east section of the site (eastern campus). The approximate location of the sampled ACM is shown in Figure 2. Potential surface ACM were not identified within the MSCP site. Hazardous building materials may be present at the surface or within the fill material as a result of former building and demolition activities at Liverpool Hospital.	Asbestos, lead and PCBs
Fuel storage and mechanical workshops: The location of former/current USTs, ASTs and other dangerous goods storage identified at Liverpool Hospital are shown on Figure 2. A number of USTs were formerly located within the western campus of Liverpool Hospital. The majority of the USTs were located to the west of the site. However, the former UST (identified as UST 1 on Figure 2) was located within the west section of the site and was reportedly removed as part of the remediation works between 2007 and 2008. The status of some of the former USTs to the west of the wider site have not been confirmed. JKE consider it likely that these USTs were either removed, or abandoned as part of previous development within these areas of the hospital. If present, the former UST may represent an off-site contamination source to the site and MSCP site. The 55,000L diesel UST is located immediately to the south of sampling location JKE138 (see Figure 2) and in the eastern campus of the hospital. The location of 55,000L diesel UST is considered to be down gradient for the MSCP site. Stored hazardous chemicals including Ethyl Alcohol Solution, Acetone, and Xylene were identified to the north-west of the site (located immediately to the east of the existing pathology building), the hazardous chemical storage area is shown in Figure 2. A former service station and mechanical workshops have been identified to the south-west and within 175m of the site. Spillage or discharge of stored chemicals from up-gradient locations could have occurred and has the potential to migrate onto the site via groundwater or underground services pipework/trenches which run through the site. Based on the above information, site and regional topography, the dangerous goods storage is considered to be a potential off-site source for site contamination and could represent a risk to the identified receptors.	Lead, TRH, BTEXN and PAHs

Source / AEC	CoPC
Off-site - Dry Cleaners and Printers: Former dry cleaning and printing/letterpress businesses were identified between approximately 100m and 411m to the west and up gradient of the site. Spillage or discharge of stored chemicals from up-gradient sites could have occurred and has the potential to migrate onto the site via groundwater or underground services pipework/trenches which run through the site including the MSCP site.	TRHs and VOCs, including tetrachloroethene (also known as perchloroethylene - PCE) and the breakdown products trichloroethene (TCE), cis-1,2-dichloroethene (cis-DCE) and vinyl chloride (VC).

JKE note that herbicides have not been included as CoPC as herbicides are not commonly found at residual concentrations likely to pose a risk to human health or the environment (NSW DEC 2005, *Guidelines for Assessing Former Orchards and Market Gardens*).

4.2 Mechanism for Contamination, Affected Media, Receptors and Exposure Pathways

The mechanisms for contamination, affected media, receptors and exposure pathways relevant to the potential contamination sources/AEC for the site (including the MSCP site) are outlined in the following CSM table:

Table 4-2: CSM

Potential mechanism for contamination	The potential mechanisms for contamination are most likely to include 'top-down' impacts and spills. There is a potential for sub-surface releases to have occurred if deep fill (or other buried industrial infrastructure including USTs) Impacts to the site could occur via the migration of contaminated groundwater or underground service via pipework/trenching.
Affected media	Soil and groundwater have been identified as potentially affected media. The potential for groundwater impacts is considered to be relatively low.
Receptor identification	Human receptors include site users (including adults and children), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users and recreational water users. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas), and freshwater ecology in the Georges River.
Potential exposure pathways	Potential exposure pathways relevant to the human receptors include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRH, naphthalene, BTEX and VOCs). 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 during future site use could occur via direct contact with soil in unpaved areas such as gardens, inhalation of airborne asbestos fibres during soil disturbance, or inhalation of vapours within enclosed spaces. Exposure to groundwater may occur in the Georges River through direct migration.

Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion (either from soil contamination or volatilisation of contaminants from groundwater) into service trenches and associated structures including buildings (if proposed); • Contact (dermal, ingestion or inhalation) with exposed soils in landscaped areas and, unpaved areas or during construction and earthworks; and • Migration of groundwater off-site and into nearby water bodies, including aquatic ecosystems and those being used for recreation.
Presence of preferential pathways for contaminant movement	Underground services (e.g. telecommunications, electrical, gas, water, sewer and stormwater) and the associated trench/trench backfill is considered to be a potential preferential pathway for contaminant migrations. This could occur via groundwater/seepage if present, or via soil/vapour migration through the sewer and/or trench backfill.

5 SAMPLING, ANALYSIS AND QUALITY PLAN

5.1 Data Quality Objectives (DQO)

Data Quality Objectives (DQOs) were developed for the site (overall assessment area) to define the type and quality of data required to achieve the project objectives outlined in Section 1.2. The DQOs were prepared with reference to the process outlined in Schedule B2 of NEPM (2013) and the Guidelines for the NSW Site Auditor Scheme, 3rd Edition (2017)[15]. The seven-step DQO approach for this project is outlined in the following sub-sections.

The DQO process is validated in part by the Data Quality Assurance/Quality Control (QA/QC) Evaluation. The Data (QA/QC) Evaluation is summarised in Section 7.1 and the detailed evaluation is provided in the appendices.

5.1.1 Step 1 - State the Problem

The CSM identified potential sources of contamination/AEC at the site that may pose a risk to human health and the environment. Investigation data is required to assess the contamination status of the site, assess the risks posed by the contaminants in the context of the proposed development/intended land use, and assess whether remediation is required.

An assessment is also required to evaluate the impacts of dryland salinity and ASS on the proposed development.

A waste classification is required prior to off-site disposal of material excavated for the proposed development.

The information gathered by JKE will be considered by the consent authority in exercising its planning functions in relation to the development proposal.

5.1.2 Step 2 - Identify the Decisions of the Study

The objectives of the assessment are outlined in Section 1.2. The decisions to be made reflect these objectives and are as follows:

- Did the site inspection, or does the historical information identify potential contamination sources/AEC at the site?
- Are any results above the SAC?
- Do potential risks associated with contamination exist, and if so, what are they?
- Is remediation required?
- Is an Acid Sulfate Soil Management Plan (ASSMP) required for the proposed MSCP development?
- Is a Salinity Management Plan (SMP) required for the proposed MSCP development?
- Is the site characterisation sufficient to provide adequate confidence in the above decisions?

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

- Is the site MSCP suitable for the proposed development, or can the site be made suitable subject to further characterisation and/or remediation/management?

5.1.3 Step 3 - Identify Information Inputs

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

- Existing relevant environmental data from previous reports;
- Site information, including site observations, site history documentation and ASS and salinity risk maps;
- Sampling of potentially affected media, including soil and groundwater;
- Observations of sub-surface variables such as soil type, photo-ionisation detector (PID) concentrations, odours and staining, and groundwater physiochemical parameters;
- Laboratory analysis of soils, fibre cement and groundwater for the CoPC identified in the CSM; and
- Field and laboratory QA/QC data.

5.1.4 Step 4 - Define the Study Boundary

The sampling will be confined to the site boundaries as shown in Figure 2 (spatial boundary). Sampling was completed on 31 July 2019, 1 August 2019, 2 August 2019, 5 to 9 August 2019, 16 August 2019 and 30 August 2019 (temporal boundary). The assessment of potential risk to adjacent land users has been made based on data collected within the site boundary.

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

5.1.5.1 Tier 1 Screening Criteria

The laboratory data will be assessed against relevant Tier 1 screening criteria (referred to as SAC), as outlined in Section 6. Exceedances of the SAC do not necessarily indicate a requirement for remediation or a risk to human health and/or the environment. Exceedances are considered in the context of the CSM and valid SPR-linkages.

For this assessment, the individual results have been assessed as either above or below the SAC. Statistical evaluation of the dataset via calculation of mean values and/or 95% upper confidence limit (UCL) values has not been undertaken due to the spatial distribution of the data and the number of samples submitted for analysis.

5.1.5.2 Field and Laboratory QA/QC

Field QA/QC included analysis of inter-laboratory duplicates, intra-laboratory duplicates, trip spike, trip blank and rinsate samples. Further details regarding the sampling and analysis undertaken, and the acceptable limits adopted, is provided in the Data Quality (QA/QC) Evaluation in the appendices.

The suitability of the laboratory data is assessed against the laboratory QA/QC criteria which is outlined in the attached laboratory reports. These criteria were developed and implemented in accordance with the laboratory's National Association of Testing Authorities, Australia (NATA) accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

In the event that acceptable limits are not met by the laboratory analysis, other lines of evidence are reviewed (e.g. field observations of samples, preservation, handling etc) and, where required, consultation with the laboratory is undertaken in an effort to establish the cause of the non-conformance. Where uncertainty exists, JKE typically adopt the most conservative concentration reported (or in some cases, consider the data from the affected sample as an estimate).

5.1.5.3 Appropriateness of Practical Quantitation Limits (PQLs)

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

5.1.6 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 undertaken with reference to Schedule B(3) of NEPM (2013) using the data quality assurance information collected.

Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false. The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. For this assessment, the null hypothesis has been adopted which is that, there is considered to be a complete SPR linkage for the CoPC identified in the CSM unless this linkage can be proven not to (or unlikely to) exist. The null hypothesis has been adopted for this assessment.

5.1.7 Step 7 - Optimise the Design for Obtaining Data

The most resource-effective design will be used in an optimum manner to achieve the assessment objectives. Adjustment of the assessment design can occur following consultation or feedback from project stakeholders. For this investigation, the design was optimised via consideration of the various lines of evidence used to select the sample locations, the media being sampled, and also by the way in which the data were collected.

The sampling plan and methodology are outlined in the following sub-sections.

5.2 Soil Sampling Plan and Methodology

The soil sampling plan and methodology adopted for this assessment is outlined in the table below:

Table 5-1: Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density	Samples were obtained from 40 locations from within the site as shown on the attached Figure 2. This number of locations met the minimum sampling density for hotspot identification, as outlined in the NSW EPA Contaminated Sites Sampling Design Guidelines (1995)[16] based on an assessment area of approximately 26,550m^2. The sampling density met the investigation regime for suspected asbestos as outlined in Table 1 of the Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009)[17] (endorsed in NEPM 2013). Twenty three sampling locations (JKE111 to JKE132, inclusive) of the 40 sampling locations were positioned generally within the MSCP site area. JKE note that sampling locations JKE129, JKE131 and JKE133 are technically located outside of the proposed MSCP development area. However, these sampling locations are located beneath the existing P2 MSCP and therefore were considered sufficient for inclusion of the assessment of potential contamination for the proposed MSCP development. The total number of locations for the MSCP site does not meet the minimum sampling density for hotspot identification, as outlined in the EPA Contaminated Sites Sampling Design Guidelines 1995 based on the MSCP site area of approximately 15,000m^2. An additional two sampling locations are required to meet the EPA Contaminated Sites Sampling Design Guidelines 1995 recommended sampling density. Although the number of sampling locations does not strictly meet the EPA Contaminated Sites Sampling Design Guidelines 1995, JKE are of the opinion that number of sampling locations within the MSCP is sufficient to assess site suitability for a contamination point of view. Samples for the preliminary ASS assessment were obtained from seven sampling locations (JKE102, JKE108, JKE116, JK122, JK126, JK135 and JKE140). This number of sampling locations is approximately 87.5% of the minimum sampling density recommended in the ASS Manual 1988 based on a site area of approximately 26,550m^2. Three of the ASS sampling locations were located within the MSCP site area. Samples for the preliminary salinity assessment were obtained from six sampling locations (JKE102, JKE108, JKE116, JK122, JK126, and JKE135). This number of sampling locations meets the initial investigation requirements of two to four locations per hectare recommended in the DLWC 2002. Three of the salinity sampling locations were located within the MSCP site area.
Sampling Plan	The sampling locations were generally placed on a systematic plan with a grid spacing of approximately 30m between sampling locations. However, to account for existing site features (e.g. roadways, buildings etc.) some the locations were moved slightly from the systematic grid. The sampling plan also targeted excavation areas in the eastern campus and AEC including the USTs, hazardous good storage and the former dam located to the north of the Ron Dunbier building.

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

[17] 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)

Aspect	Input
Set-out and Sampling Equipment	Sampling locations were set out using tape measure and hand held GPS unit (with an accuracy of ±2m). In-situ sampling locations were cleared for underground services by an external contractor prior to sampling in accordance with the standard sampling procedure (SSP) attached in the appendices. Samples were collected using a hand tools (hand auger, shovel and grow bar) or a drill rig equipped with spiral flight augers. Soil samples were obtained from a Standard Penetration Test (SPT) split-spoon sampler, or directly from the auger when conditions did not allow use of the SPT sampler.
Sample Collection and Field QA/QC	Soil samples were obtained between 31 July and 30 August 2019 in accordance with the SSP attached in the appendices. Soil samples were collected from the fill and natural profiles based on field observations. The sample depths are shown on the logs attached in the appendices. Samples were placed in glass jars with plastic caps and Teflon seals with minimal headspace. Samples for asbestos analysis were placed in zip-lock plastic bags. During sampling, soil at selected depths was split into primary and duplicate samples for field QA/QC analysis. Soil ASS and salinity samples were placed in plastic bags and sealed with plastic ties with minimal headspace.
Field Screening	A portable Photoionisation Detector (PID) fitted with a 10.6mV lamp was used to screen the samples for the presence of volatile organic compounds (VOCs). PID screening for VOCs was undertaken on soil samples using the soil sample headspace method. VOC data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases. PID calibration records are maintained on file by JKE. The field screening for asbestos quantification included the following: • A representative 10L sample was collected from fill at 1m intervals, or from each distinct fill profile. The bulk sample intervals are shown on the attached borehole logs; • Each 10L sample was weighed using an electronic scale; • Sand based bulk sample was passed through a sieve with a 7.1mm aperture and inspected for the presence of fibre cement or due to the cohesive nature of the soils, some samples were subsequently placed on a contrasting support (blue tarpaulin) and inspected for the presence of fibre cement. Any soil clumps/nodules were disaggregated; • The condition of fibre cement or any other suspected asbestos materials was noted on the field records; and • If observed, any fragments of fibre cement in the 10L sample were collected, placed in a zip-lock bag and assigned a unique identifier. Calculations for asbestos content were undertaken based on the requirements outlined in Schedule B1 of NEPM (2013), as summarised in Section 6.1.
Decontami-nation and Sample Preservation	Sampling personnel used disposable nitrile gloves during sampling activities. Re-usable sampling equipment was decontaminated as outlined in the SSP.

Aspect	Input
	Soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with the SSP. On completion of the fieldwork, the samples were stored temporarily in fridges in the JKE warehouse before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard chain of custody (COC) procedures.

5.3 Groundwater Sampling Plan and Methodology

The groundwater sampling plan and methodology is outlined in the table below:

Table 5-2: Groundwater Sampling Plan and Methodology

Aspect	Input
Sampling Plan	Groundwater monitoring wells were installed in JKE102 (MW102), JKE108 (MW108) JKE122 (MW122) and JKE135 (MW135). The wells were positioned to gain a snap-shot of the groundwater conditions at the site. Considering the topography and the location of the nearest down-gradient water body, MW102 and MW135 were considered to be in the up-gradient area of the site and would be expected to provide an indication of groundwater flowing onto (beneath) the site from the West. MW108 and MW122 were considered to be in the intermediate to down-gradient area of the site and would be expected to provide an indication of groundwater flowing across (beneath) the site and beyond the down-gradient site boundary. Groundwater monitoring was not undertaken in the eastern campus as the proposed works will not encounter groundwater. JKE note that groundwater monitoring well MW122 was located within the MSCP site area.
Monitoring Well Installation Procedure	The monitoring well construction details are documented on the appropriate borehole logs attached in the appendices. The monitoring wells were installed to depth of approximately 10m below ground level. The wells were generally constructed as follows: • 50mm diameter Class 18 PVC (machine slotted screen) was installed in the lower section of the well to intersect groundwater; • 50mm diameter Class 18 PVC casing was installed in the upper section of the well (screw fixed); • A 2mm sand filter pack was used around the screen section for groundwater infiltration; • A hydrated bentonite seal/plug was used on top of the sand pack to seal the well; and • A gatic cover was installed at the surface with a concrete plug to limit the inflow of surface water.
Monitoring Well Development	The monitoring wells were developed on 9 August 2019 using a submersible electrical pump or a dedicated disposable plastic bailer in accordance with the SSP. Due to the hydrogeological conditions, groundwater inflow into the wells was relatively low, therefore the wells were pumped until they were effectively dry. The field monitoring records and calibration data are attached in the appendices.
Groundwater Sampling	The monitoring wells were allowed to recharge for approximately seven days after development. Groundwater samples were obtained on 16 August 2019. Prior to sampling, the monitoring wells were checked for the presence of Light Non-Aqueous Phase Liquids (LNAPLs) using an inter-phase probe electronic dip meter. The monitoring well head space was checked for VOCs using a calibrated PID unit. The samples were obtained using a peristaltic pump/disposable plastic bailer. During sampling, the following parameters were monitored using calibrated field instruments (see SSP): • Standing water level (SWL) using an electronic dip meter; and

Aspect	Input
	• pH, temperature, electrical conductivity (EC), dissolved oxygen (DO) and redox potential (Eh) using a YSI Multi-probe water quality meter. Steady state conditions were considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%. Groundwater samples were obtained directly from the single use PVC tubing and placed in the sample containers. Duplicate samples were obtained by alternate filling of sample containers. This technique was adopted to minimise disturbance of the samples and loss of volatile contaminants associated with mixing of liquids in secondary containers, etc. Groundwater removed from the wells during development and sampling was transported to JKE in jerry cans and stored in holding drums prior to collection by a licensed waste water contractor for off-site disposal. The field monitoring record and calibration data are attached in the appendices.
Decontaminant and Sample Preservation	The decontamination procedure adopted during sampling is outlined in the SSP attached in the appendices. During development, the pump was flushed between monitoring wells with potable water (single-use tubing was used for each well). The pump tubing was discarded after each sampling event and replaced therefore no decontamination procedure was considered necessary. The samples were preserved with reference to the analytical requirements and placed in an insulated container with ice in accordance with the SSP. On completion of the fieldwork, the samples were temporarily stored in a fridge at the JKE office, before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures.

5.4 Analytical Schedule

The primary sample analytical schedule for the site (the entire assessment area including the MSCP site) is outlined in the following table:

Table 5-3: Analytical Schedule (Primary Samples)

Analyte/CoPC	Fill Samples	Natural Soil Samples	Fibre Cement Material Surface Samples	Groundwater Samples
Heavy Metals	77	22	-	3
TRH/BTEX	77	22	-	3
PAHs	77	22	-	3
OCPs/OPPs	74	20	-	-
PCBs	74	20	-	-
Asbestos	69	-	2	-
ASS (sPOCAS)	1	19	-	-

Analyte/CoPC	Fill Samples	Natural Soil Samples	Fibre Cement Material Surface Samples	Groundwater Samples
pH/CEC/Clay Content (%)	3	-	-	-
Soil - Salinity (pH, electrical conductivity (EC), soil texture, sulphate, chloride and cation exchange capacity (CEC))	-	14	-	3 (pH, EC, sulphate and chloride)
Toxicity characteristic leachate procedure (TCLP) Metals for waste classification purposes	15	-	-	-

5.4.1 Laboratory Analysis

Samples were analysed by an appropriate, NATA Accredited laboratory using the analytical methods detailed in Schedule B(3) of NEPM 2013. Reference should be made to the laboratory reports attached in the appendices for further details.

Table 5-4: Laboratory Details

Samples	Laboratory	Report Reference
All primary samples and field QA/QC samples including (intra-laboratory duplicates, trip blanks, trip spikes and field rinsate samples)	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	223302, 223661, 223661-A, 224207, 223298, 223787, 223303, 223772, 223772-A and 225210
Inter-laboratory duplicates	Envirolab Services Pty Ltd VIC, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	17672, 17738, 17738-A and 17823

6 SITE ASSESSMENT CRITERIA (SAC)

The SAC were derived from the NEPM 2013 and other guidelines as discussed in the following sub-sections. The guideline values for individual contaminants are presented in the attached report tables and further explanation of the various criteria adopted is provided in the appendices.

6.1 Soil

Soil data were compared to relevant Tier 1 screening criteria in accordance with NEPM (2013) as outlined below.

6.1.1 Human Health

- Health Investigation Levels (HILs) for a 'residential with accessible soils' exposure scenario (HIL-A);
- Health Screening Levels (HSLs) for a 'low-high density residential' exposure scenario (HSL-A & HSL-B). HSLs were calculated using the most conservative criteria (i.e. sand and 0m to 1m depth interval) to allow for an initial assessment of potential risk;
- Where exceedances of the HSLs were reported for hydrocarbons (TRH/BTEX and naphthalene), the soil health screening levels for direct contact presented in the CRC Care Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document (2011)[18] were considered; and
- Asbestos was assessed against the HSL-A criteria. A summary of the asbestos criteria is provided in the table below:

Table 6-1: Details for Asbestos SAC

Guideline	Applicability
Asbestos in Soil	The HSL-A criteria were adopted for the assessment of asbestos in soil. The SAC adopted for asbestos were derived from the NEPM 2013 and are based on WA DoH (2009) guidance. The SAC include the following: • <0.01% w/w bonded asbestos containing material (ACM) in soil; and • <0.001% w/w asbestos fines/fibrous asbestos (AF/FA) in soil. The NEPM (2013) and WA DoH (2009) also specify that the surface should be free of visible asbestos. Concentrations for bonded ACM concentrations in soil are based on the following equation which is presented in Schedule B1 of NEPM (2013): $$\textbf{\% w/w asbestos in soil} = \frac{\textbf{\% asbestos content x bonded ACM (kg)}}{\text{Soil volume (L) x soil density (kg/L)}}$$ However, we are of the opinion that the actual soil volume in a 10L bucket varies considerably due to the presence of voids, particularly when assessing cohesive soils. Therefore, each bucket sample was weighed using electronic scales and the above equation was adjusted as follows (we note that the units have also been converted to grams):

[18] Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC Care), (2011). Technical Report No. 10 - *Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document*

Guideline	Applicability
	% w/w asbestos in soil = $\frac{\text{**% asbestos content x bonded ACM (g)**}}{\text{Soil weight (g)}}$

6.1.2 Environment (Ecological – terrestrial ecosystems)

- Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for an 'urban residential and public open space' (URPOS) exposure scenario. These have been applied to all soil samples to account for cut to fill scenarios and the potential for the soil to be located within the top 2m as outlined in NEPM (2013). The criterion for benzo(a)pyrene has been increased from the value presented in NEPM (2013) based on the Canadian Soil Quality Guidelines[19];
- ESLs were adopted based on the most conservative soil texture (coarse grained); and
- EILs for selected metals were calculated using average site specific soil parameters for pH, cation exchange capacity and clay content. These data were used to select the added contaminant limit (ACL) values presented in Schedule B(1) of NEPM (2013), and published ambient background concentration (ABC) presented in the document titled Trace Element Concentrations in Soils from Rural and Urban Areas of Australia (1995)[20]. This method is considered to be adequate for the Tier 1 screening.

6.1.3 Management Limits and Direct Contact for Petroleum Hydrocarbons

Management limits for petroleum hydrocarbons (as presented in Schedule B1 of NEPM 2013) soil health screening levels for direct contact presented in the CRC Care Technical Report No. 10 – Heath screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document (2011)[21] were considered (if required) following review of the data and CSM.

6.1.4 Waste Classification

Data for the waste classification assessment were assessed in accordance with the Waste Classification Guidelines, Part 1: Classifying Waste (2014)[22] as outlined in the following table:

Table 6-2: Waste Categories

Category	Description
General Solid Waste (non-putrescible)	• If Specific Contaminant Concentration (SCC) ≤ Contaminant Threshold (CT1) then Toxicity Characteristics Leaching Procedure (TCLP) not needed to classify the soil as general solid waste; and

[19] Canadian Council of Ministers of the Environment, (1999). *Canadian soil quality guidelines for the protection of environmental and human health: Benzo(a)Pyrene (1997)* (referred to as the Canadian Soil Quality Guidelines)

[20] Olszowy, H., Torr, P., and Imray, P., (1995), *Trace Element Concentrations in Soils from Rural and Urban Areas of Australia. Contaminated Sites Monograph Series No. 4*. Department of Human Services and Health, Environment Protection Agency, and South Australian Health Commission.

[21] Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC Care), (2011). Technical Report No. 10 - *Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document*

[22] NSW EPA, (2014). *Waste Classification Guidelines, Part 1: Classifying Waste.* (referred to as Waste Classification Guidelines 2014)

Category	Description
	• If TCLP ≤ TCLP1 and SCC ≤ SCC1 then treat as general solid waste.
Restricted Solid Waste (non-putrescible)	• If SCC ≤ CT2 then TCLP not needed to classify the soil as restricted solid waste; and • If TCLP ≤ TCLP2 and SCC ≤ SCC2 then treat as restricted solid waste.
Hazardous Waste	• If SCC > CT2 then TCLP not needed to classify the soil as hazardous waste; and • If TCLP > TCLP2 and/or SCC > SCC2 then treat as hazardous waste.
Virgin Excavated Natural Material (VENM)	Natural material (such as clay, gravel, sand, soil or rock fines) that meet the following: • 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.

6.1.5 Acid Sulfate Soil

Soil data for the ASS assessment were compared to the action criteria for presented in the Acid Sulfate Soil Manual (1998)[23] as summarised below. The action criteria for 'coarse textured soils' were adopted.

Table 6-3: ASS Action Criteria

Category	Description	Criteria
Coarse Textured Soils	Sands to loamy sands	• pH - less than 5; • Total Actual Acidity (TAA)/Total Sulfide Acidity (TSA)/ Total Potential Acidity (TPA) (pH5.5) – greater than 18mol H^+/tonne; and • S_{pos} – greater than 0.03% sulfur oxidisable.
Medium Textured Soils	Sandy loams to light clays	• pH - less than 5; • TAA/TSA/TPA (pH5.5) – greater than 36mol H^+/tonne; and • S_{pos} – greater than 0.06% sulfur oxidisable.
Fine Textured Soils	Medium to heavy clays and silty clays	• pH - less than 5; • TAA/TSA/TPA (pH5.5) – greater than 62mol H^+/tonne; and • S_{pos} – greater than 0.1% sulfur oxidisable.

It is noted that where disturbance of greater than 1,000 tonnes of ASS is proposed, the action criteria for 'coarse textured soils' apply to all soil types.

Background information on ASS and the assessment process is provided in the appendices.

[23] Acid Sulfate Soils Management Advisory Committee (ASSMAC), (1998). *Acid Sulfate Soils Manual* (referred to as ASS Manual 1998)

6.2 Groundwater

Groundwater data were compared to relevant Tier 1 screening criteria in accordance with NEPM (2013), following an assessment of environmental values in accordance with the Guidelines for the Assessment and Management of Groundwater Contamination (2007)[24]. Environmental values for this assessment include aquatic ecosystems and human-health risks in non-use scenarios.

6.2.1 Human Health

- HSLs for a 'low-high density residential' exposure scenario (HSL-A/HSL-B). HSLs were calculated based on the most conservative soil type (sand) and the likely depth at which groundwater will be encountered based on the provided proposed development details; and
- The NEPM (2013) does not provided HSLs for VOCs with the exception of BTEX. On this basis, JKE have adopted the Australian Drinking Water Guidelines 2011 (updated 2018)[25] for selected VOCs.

6.2.2 Environment (Ecological - aquatic ecosystems)

Groundwater Investigation Levels (GILs) for 95% protection of freshwater species were adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[26].

6.3 Salinity

6.3.1 Soil pH Salinity and Plant Growth

The electrical conductivity (EC) of a 1:5 soil:water extract is commonly used as an indicator of soil salinity conditions as the reading is directly related to the electrolyte (salt) concentration of the extract. In order to compare the laboratory data with published salinity classes, the results are converted to equivalent saturated paste (ECe) using texture adjustment values presented in DLWC 2002.

The following table provides a summary of plant response with reference to salinity:

[24] NSW Department of Environment and Conservation, (2007). *Guidelines for the Assessment and Management of Groundwater Contamination*

[25] National Health and Medical Research Council (NHMRC), (2018). *National Water Quality Management Strategy, Australian Drinking Water Guidelines 2011* (referred to as ADWG 2011)

[26] Australian and New Zealand Governments (ANZG), (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia (referred to as ANZG 2018)

Table 6-4: Plant Response to Soil Salinity

ECe (dS/m)	Salinity Class	Plant Response[1]
<2	Non-saline	Salinity effects mostly negligible
2-4	Slightly saline	Yields of very sensitive crops may be affected
4-8	Moderately saline	Yield of many crops affected
8-16	Very saline	Only tolerant crops yield satisfactorily
>16	Highly saline	Only a few very tolerant crops yield satisfactorily

Note:

1 - Plant Response to Salinity Class has been adopted from DLWC 2002

6.3.2 Soil pH and Plant Growth

Soil pH is a measure of the acidity or alkalinity of the soils and values have been assessed as an indicator of soil fertility with respect to plant growth. The optimal pH for plant growth is between 5.5 and 7. Beyond this range, effective revegetation of exposed soil following disturbance is increasingly difficult and the potential for erosion is considered to increase.

Highly alkaline soils are commonly associated with saline and sodic soil conditions and can limit the ability of plants to take up water and nutrients. Highly acidic soils exhibit aluminium toxicity toward plants and can limit the ability of plants to take up other essential nutrients including molybdenum.

Interpretation of soil pH with respect to plant growth is undertaken using the ratings published in Bruce and Rayment (1982[27]) presented below:

Table 6-5: Plant Response to Soil pH

pH	Rating
<4.5	Extremely acidic
4.5-5.0	Very strongly acidic
5.1-5.5	Strongly acidic
5.6 – 7.3	Optimal plant growth
7.4-7.8	Mildly alkaline
7.9-8.4	Moderately alkaline
8.5-9.0	Strongly alkaline
>9.1	Very strongly alkaline

6.3.3 Cation Exchange Capacity (CEC) in Soil

The ability of soils to attract, retain and exchange cations (positively charged ions) is estimated by the calculated CEC value. CEC represents the major controlling factor in stability of clay soil structure, nutrient availability for plant growth, soil pH and the reaction of the soil to chemical applications (fertilisers, conditioners etc.).

[27] Bruce, R.C. and Rayment, G.E., (1982). *Analytical Methods and Interpretations used by the Agricultural Chemistry Branch for Soil and Land Use Surveys,* (referred to as Bruce and Rayment 1982)

High CEC soils have a greater capacity to retain nutrients, however, deficient soils require greater applications of nutrients to correct imbalances. Low CEC soils have a reduced capacity to retain nutrients and may result in leaching of nutrients from the soil in the event of excess nutrient applications.

Metson (1961[28]) developed a set of ratings for effective CEC and the most abundant cations. These are summarised below (values are in meq/100g):

Table 6-6: CEC Rating

Rating	eCEC	Exch Na	Exch K	Exch Ca	Exch Mg
Very low	<6	0-0.1	0-0.2	0-2	0-0.3
Low	6-12	0.1-0.3	0.2-0.3	2-5	0.3-1
Moderate	12-25	0.3-0.7	0.3-0.7	5-10	1-3
High	25-40	0.7-2	0.7-2	10-20	3-8
Very high	>40	>2	>2	>20	>8

Note:

CEC – Cation Exchange Capacity, Na – Sodium, K – Potassium, Ca – Calcium, Mg – Magnesium

6.3.4 Exchangeable Sodium Percentage or Sodicity (ESP%)

Exchangeable sodium is an important soil stability and salinity parameter. Excessive exchangeable sodium leads to unstable soils, increased runoff, potential salinity, dispersivity and water logging problems.

Normally the sodium content is expressed as a percentage of the CEC as other cations counteract the negative effects of sodium (known as ESP% and termed sodicity). The effect of the exchangeable sodium (exchangeable sodium percentage, ESP) varies with other soil factors such as the type of clay, the relative quantity of magnesium and the quantity of organic matter. However, Charman & Murphy (2000[29]) indicate that a soil is generally considered sodic if the ESP exceeds 6% and extremely sodic if the ESP exceeds 15%.

6.3.5 Groundwater Salinity

EC values in groundwater are dependent on numerous factors and can vary with changes in temperature and pH conditions. Suttar (1990[30]) has classed water into different types based on EC values as outlined in the table below.

Table 6-7: EC Ranges in Water

Water Type	EC (µS/cm)
Deionised Water	0.5 – 3
Pure Rainwater	<15
Freshwater Rivers	0 – 800

[28] Metson, A.J, (1961). *Methods of Chemical Analysis for Soil Survey Samples* (referred to as Metson 1961)

[29] Charman, P.E.V and Murphy, B.W (eds), (2000).*Soils: Their Management and Properties,* (referred to as Charman and Murphy 2000)

[30] Suttar, S., (1990). *Ribbons of Blue Handbook, Scitech*, Victoria (referred to as Suttar 1990)

Water Type	EC (µS/cm)
Marginal River Water	800 – 1,600
Brackish Water	1600 – 4,800
Saline Water	>4,800
Seawater	51,500
Industrial Waters	100 – 10,000

6.3.6 Recommendations for Durability with Reference to AS2159-2009

In designing for durability, reference should be made to the requirements listed in the AS2159-2009. The exposure classification for concrete and steel piles and foundations is outlined in the following tables.

Table 6-8: Exposure Classification for Concrete Piles

Exposure Conditions				Exposure Classification	
Sulphate (expressed as SO_4)		pH	Chlorides in Groundwater (ppm)	Soil Conditions A[1]	Soil Conditions B[2]
In Soil (ppm)	In Groundwater (ppm)				
<5,000	<1,000	>5.5	<6,000	Mild	Non-aggressive
5,000-10,000	1,000-3,000	4.5-5.5	6,000-12,000	Moderate	Mild
10,000-20,000	3,000-10,000	4-4.5	12,000-30,000	Severe	Moderate
>20,000	>10,000	<4	>30,000	Very severe	Severe

Notes:

1 - High permeability soils (eg sands and gravels) which are in groundwater

2 – Low permeability soils (eg silts and clays) or all soils above groundwater

Table 6-9: Exposure Classification for Steel Piles

Exposure Conditions				Exposure Classifications	
pH	Chlorides		Resistivity (ohm.cm)	Soil Conditions A[1]	Soil Conditions B[2]
	In Soil (ppm)	In Groundwater (ppm)			
>5	<5,000	<1,000	>5,000	Non-aggressive	Non-aggressive
4-5	5,000-20,000	1,000-10,000	2,000-5,000	Mild	Non-aggressive
3-4	20,000-50,000	10,000-20,000	1,000-2,000	Moderate	Mild
<3	>50,000	>20,000	<1,000	Severe	Moderate

Notes:

1 - High permeability soils (eg sands and gravels) which are in groundwater

2 – Low permeability soils (eg silts and clays) or all soils above groundwater

7 RESULTS

7.1 Summary of Data (QA/QC) Evaluation

The data evaluation is presented in the appendices. In summary, JKE are of the opinion that the data are adequately precise, accurate, representative, comparable and complete to serve as a basis for interpretation to achieve the investigation objectives.

7.2 Subsurface Conditions

A summary of the subsurface conditions encountered during the investigation is presented in the following table. Reference should be made to the borehole logs attached in the appendices for further details.

Table 7-1: Summary of Subsurface Conditions

Profile	Description
Pavement	Asphaltic Concrete (AC) or concrete pavements were encountered at the surface in boreholes JKE101, JKE102, JKE106, JKE107, JKE108, JKE109, JKE110, JKE122, JKE123, JKE124, JKE125, JKE126, JKE127, JKE128, JKE129, JKE130, JKE131, JKE132, JKE133, JKE135 and JKE137 and extended to depths of approximately 30mm to 220mm.
Fill	Fill was encountered at the surface or beneath the pavement in all boreholes and extended to depths of approximately 0.4mBGL to 4.4mBGL. JKE103, JKE105, JKE113, JKE114, JKE118, JKE119, JKE129, JKE130, JKE131, JKE132, JKE133, JKE138 and JKE139 were terminated due to obstructions in the fill at a maximum depth of approximately 1.5mBGL. The fill typically comprised of gravelly sand, sandy gravel, silty sand, clayey sand, silty clayey sand and silty clay with inclusions of ironstone, igneous, sandstone, siltstone and river gravel, root fibres, ash, slag and building rubble (asphalt, bricks, concrete and tile fragments).
Natural Soil	Natural soil was encountered in boreholes JKE101, JKE102, JKE104, JKE106, JKE107, JKE108, JKE109, JKE110, JKE111, JKE112, JKE115, JKE116, JKE117, JKE120, JKE121, JKE122, JKE123, JKE124, JKE125, JKE126, JKE127, JKE128, JKE134, JKE135, JKE136, JKE137 and JKE140 extended to depths of approximately 1.7mBGL to 15.4mBGL. The natural soil typically comprised of silty clay, silty clayey sand, sand, silty sand and clayey sand.
Bedrock	Siltstone bedrock (Bringelly Shale) was encountered in borehole JKE101 at approximately 1.7mBGL, JKE116 at approximately 15.4mBGL and JKE126 at approximately 13.2mBGL.
Groundwater	Groundwater was encountered in boreholes JKE102, JKE116, JKE122, JKE126 and JKE135 on completion of drilling at depths of between approximately 8.6mBGL to 9.35mBGL. All other boreholes remained dry on completion of drilling and a short time after.

7.3 Field Screening

A summary of the field screening results are presented in the following table:

Table 7-2: Summary of Field Screening

Aspect	Details
Field Observations	Stained or odorous soils and potential ACM were not encountered during the subsurface field work. Two potential ACM (fibre cement fragments) were observed on the surface of the site as shown in Figure 2. The potential ACM were forwarded to the laboratory for asbestos analysis.
PID Screening of Soil Samples for VOCs	PID soil sample headspace readings are presented in attached report tables and the COC documents attached in the appendices. The results ranged from 0ppm to 120ppm (fill soil sample JKE102 (1.2-1.6m) equivalent isobutylene. These results indicate PID detectable VOCs. Samples with elevated PID readings were analysed for TRH and BTEX.
Bulk Screening for Asbestos	The bulk field screening results are summarised in the attached report tables. ACM were not encountered during the soil bulk screening field works.
Groundwater Depth & Flow	Groundwater seepage was encountered in boreholes JKE116, JKE122, JKE126 and JKE135 during drilling at depths of approximately 7.9mBGL to 8.4mBGL. A standing water level (SWL) was measured in boreholes JKE102, JKE116, JKE122, JKE126 and JKE135 at depths ranging from approximately 8.6mBGL to 9.35mBGL a short time after completion of drilling. The remaining boreholes were dry during and a short time after completion of drilling. SWLs measured in the monitoring wells JKEMW102, JKEMW122 and JKEMW135 installed at the site ranged from 7.85mBGL to 8.2mBGL. Groundwater monitoring well JKEMW108 reminded dry throughout the investigation. JKE engaged Geomat Engineering Pty Ltd to survey the surface levels (Australian Height Datum (AHD)) of the groundwater monitoring wells, the survey is attached in the appendices. Groundwater RLs calculated on these measurements ranged from RL 1.70m (MWJKE122) to RL 2.99m (JKEMW135). Based on the MSCP proposed development details summarised in Section 1.1, the SWL recorded in the groundwater monitoring wells, groundwater is not expected to be encountered during the proposed development. However, deep piling may encounter groundwater. A contour plot was prepared for the groundwater levels using Surfer v11.0.642 (Surface Mapping Program) as shown on Figure 5. Groundwater flow generally occurs in a down gradient direction perpendicular to the groundwater elevation contours. The contour plot indicates that groundwater generally flow towards north-east.
Groundwater Field Parameters	Field measurements recorded during sampling were as follows: - pH ranged from 6.59 to 6.94; - EC ranged from 10,224µS/cm to 11,208µS/cm; - Eh ranged from 115.1mV to 194.3mV; and - DO ranged from 2.0ppm to 4.7ppm.
LNAPLs petroleum hydrocarbons	Phase separated product (i.e. LNAPL) were not detected using the interphase probe during groundwater sampling.

7.4 Soil Laboratory Results

The soil laboratory results are compared to the relevant SAC in the attached report tables. The soil contaminated data is shown in Figures 3 and 4. A summary of the results assessed against the SAC is presented below:

7.4.1 Human Health and Environmental (Ecological) Assessment

Table 7-3: Summary of Soil Laboratory Results – Human Health and Environmental (Ecological)

Analyte	Results Compared to SAC
Heavy Metals	All heavy metals results were below the human health SAC. All heavy metals results were below the ecological SAC.
TRH	The TRH (F2) fill soils results of 290mg/kg (JKE102 (0.3-0.5m)), 170mg/kg (JKE102 (1.2-1.6m)), 180mg/kg (JKE103 (0-0.1m)) and 160mg/kg (JKE104 (0-0.1m)) were above the human health SAC of 110mg/kg. The above TRH (F2) were also above the ecological SAC of 300mg/kg. The TRH (F3) fill soils results of 2,100mg/kg (JKE103 (0-0.1m)), 2,300mg/kg (JKE104 (0-0.1m)), 500mg/kg (JKE105 (0-0.1m)), 540mg/kg (JKE105 (0-0.1m)/laboratory replicate), 740mg/kg (JKE106 (0.08-0.2m)), 430mg/kg (JKE111 (0-0.2m)), 560mg/kg (JKE113 (0-0.2m)), 630mg/kg (JKE117 (0-0.2m)), 320mg/kg (JKE117 (0-0.2m)/laboratory replicate), 310mg/kg (JKE119 (0-0.2m)) and 420mg/kg (JKE138 (0-0.05m)/laboratory replicate) were above the ecological SAC of 300mg/kg. The fill soil samples JKE111 (0-0.2m), JKE113 (0-0.2m), JKE117 (0-0.2m) and JKE119 (0-0.2m) are located within the MSCP site. All remaining TRH results were below the human health and ecological SAC.
BTEX	All BTEX results were below the SAC.
PAHs	All PAH results were below the SAC.
OCPs and OPPs	All OCP and OPP results were below the SAC. All pesticide concentrations were below the laboratory PQLs.
PCBs	All PCB results were below the SAC. All PCB concentrations were below the laboratory PQLs.
Asbestos	The calculated AF/FA concentration of 0.0373% w/w (JKE136 (0-0.2m)) and 0.0085% w/w (JKE137 (0.04-0.2m)) were above the SAC of 0.001% w/w. Laboratory analysis confirmed that the fibre cement fragments samples (AMF1 and AMF101) obtained from the surface of the site contained asbestos fibres. All remaining asbestos soil results were below the SAC. Asbestos was not detected within the soil samples obtained and analysed for the MSCP site.
Asbestos (Bulk Screening)	ACM (e.g. fibre cement fragments) were not encountered in the subsurface soils during the bulk screening field works.

7.4.2 Human Health Assessment (Direct Contact and Management Limits)

For completeness, the TRH, BTEX and naphthalene results were compared to the Management Limits (*Residential, Parkland and Public Open Space*) and the Direct Contact criteria (*Residential with Accessible Soil* - also suitably protective of intrusive maintenance workers) for petroleum hydrocarbons (NEPM 2013). The results were below the relevant criteria.

7.4.3 Waste Classification Assessment

The laboratory results were assessed against the criteria presented in Part 1 of the Waste Classification Guidelines, as summarised previously in this report. The results are presented in the report tables attached in the appendices. A summary of the results is presented in the following table:

Table 7-4: Summary of Soil Laboratory Results Compared to CT and SCC Criteria

Analyte	No. of Samples Analysed	No. of Results > CT Criteria	No. of Results > SCC Criteria	Comments
Heavy Metals	122	17	0	The lead concentration (250mg/kg) exceeded the CT1 criterion in the fill sample JKE112 (0-0.2m). The result was below the SCC1 criterion. Nickel concentrations exceeded the CT1 criterion in 16 fill samples collected from JKE124 (0.05-0.2m), JKE125 (0.05-0.2m), JKE126 (0.08-0.2m), JKE127 (0.06-0.3m), JKE128 (0.08-0.2m), JKE128 (0.3-0.4m), JKE129 (0.09-0.25m), JKE130 (0.07-0.2m), JKE130 (0.2-0.25m), JKE131 (0.07-0.2m), JKE132 (0.08-0.15m), JKE133 (0.08-0.2m), JKE133 (0.2-0.3m), JKE135 (0.05-0.25m), DUPAM106 and DUPAM108. The maximum nickel concentration was 80mg/kg.
TRH	118	0	0	-
BTEX	118	0	0	-
Total PAHs	118	0	0	-
Benzo(a)pyrene	118	0	0	-
OCPs & OPPs	113	0	0	-
PCBs	113	0	0	-
Asbestos	69	-	-	Asbestos was detected in the fill samples JKE136 (0-0.2m) and JKE137 (0.04-0.2m). ACM surface fragments also detected asbestos (AMF1 and AMF101).

Table 7-5: Summary of Soil Laboratory Results Compared to TCLP Criteria

Analyte	No. of Samples Analysed	No. of Results > TCLP Criteria	Comments
Lead	1	0	-
Nickel	16	0	-

7.5 Groundwater Laboratory Results

The groundwater laboratory results are compared to the relevant SAC in the attached report tables. The groundwater contamination data is shown in Figure 4. A summary of the results assessed against the SAC is presented in the following table:

Table 7-6: Summary of Groundwater Laboratory Results – Human Health and Environmental (Ecological)

Analyte	Results Compared to SAC
Heavy Metals	The copper results in the groundwater samples MWJKE102, MWJKE122, MWJKE135, DUPMP1 and DUPMP2 ranged from 7µg/L to 47µg/L. All of the results were greater than the ecological SAC of 1.4µg/L. The zinc results in the groundwater samples MWJKE102, MWJKE122, MWJKE135, DUPMP1 and DUPMP2 ranged from 16µg/L to 52µg/L. All of the results were greater than the ecological SAC of 8µg/L. The groundwater sample MWJKE122 was obtained from within the MSCP site. All of the remaining heavy metals results were below the SAC.
TRH	All TRH results were below the SAC.
BTEX	All BTEX results were below the SAC.
Other VOCs	All VOC results were below the laboratory PQLs.
PAHs	All PAH results were below the SAC.
Other Parameters	The results for pH, EC, Sulfate and Chloride are summarised below: • pH ranged from 7.7 to 8.1; • EC of 14,000µS/cm; • Sulphate ranged from 420mg/L to 490 mg/L; and • Chloride ranged from 3,200mg/L to 3,400mg/L.

7.6 Acid Sulfate Assessment

The soil laboratory results were assessed against the action criteria adopted for the assessment. The results are presented in the attached report tables and summarised fin the following table:

Table 7-7: Summary of ASS Results

Analyte	Results Compared to ASS Guidelines
pH_{kcl} and pH_{ox}	The pH_{KCl} results ranged from 3.8 to 7.8. The pH_{KCl} results for JKE102 (4.7-4.95m), JKE108 (6.0-6.45m), JKE122 (9.0-9.45m), JKE135 (1.75-1.95m) and JKE140 (1.1-1.3m) exceeded (i.e. were below) the action criterion of pH 5. Following oxidation, the pH_{ox} results for the samples ranged from 3.5 to 7.4. The pH_{KCl} results for JKE108 (9.2-9.45m), JKE116 (9.2-9.45m), JKE116 (15.4-15.6m), JKE135 (1.7-1.95m), JKE140 (0.9-1.1m) and JKE140 (1.1-1.3m) exceeded (i.e. were below) the action criterion of pH 5. The pH of the samples typically dropped by one or more units following oxidation. The pH of the extremely weathered siltstone sample JKE116 (15.4-15.6m) dropped by 3.2 units following oxidation.
Acid Trail	• TAA results ranged from less than the PQL to 49mol H^+/tonne. The result for the sample JKE140 (1.1-1.3m) was above the action criterion of 18mol H^+/tonne; • TPA results ranged from less than the PQL to 76mol H^+/tonne. The results for the samples JKE116 (15.4-15.6m) and JKE140 (1.1-1.3m) were above the action criterion of 18mol H^+/tonne; and • TSA results ranged from less than PQL to 60mol H^+/tonne. The results for the samples JKE116 (15.4-15.6m) and JKE140 (1.1-1.3m) were above the action criterion of 18mol H^+/tonne.
Sulfur Trail	The S_{pos}% results ranged for PQL to 0.17%. The S_{pos}% result for the extremely weathered siltstone sample JKE116 (15.4-15.6m) exceeded the action criterion of 0.03%. This sample was obtained from borehole JKE116, located within the MSCP site. The majority of the results were below the action criterion of 0.03% as shown on Table R.
SCr	The extremely weathered siltstone sample JKE116 (15.4-15.6m) was analysed for chromium reducible sulfur (SCr), the result of 0.17% exceeded the action criterion of 0.03%. This sample was obtained from borehole JKE116, located within the MSCP site.
Liming Rate	The liming rate required for neutralisation ranged from PQL to 5.6kg$CaCO_3$/tonne.

7.7 Salinity Assessment

7.7.1 Salinity Assessment Results

A summary of the salinity results is presented below.

Table 7-8: Summary of Salinity Analytical Results

Analyte	Results
EC & ECe	The soil EC results ranged from 190µS/m to 780µS/m. The ECe results ranged from <2dS/m to 6.7dS/m.
Resistivity	The soil resistivity values were calculated based on the raw EC values. The resistivity values for the soil samples ranged from 1,282ohm.cm to 5,263ohm.cm.

Analyte	Results
pH	The soil pH results of the analysis ranged from 5.5 to 8.9.
CEC	The soil total CEC results ranged from 2.7meq/100g to 19meq/100g. ESP values calculated from the CEC results ranged from 4.62% to 40.74%.
Sulphate	The soil Sulphate results ranged from 30mg/kg to 530mg/kg.
Chloride	The soil Chloride results ranged from 62mg/kg to 970mg/kg.
Groundwater	See Table 7.6.

7.7.2 Interpretation of Salinity Results

The laboratory results were compared to the SAC in the attached report tables. Interpretation of the results is provided in the following table.

Table 7-9: Interpretation of Salinity Results

Parameter	Notes
Soil Salinity and Plant Growth	The ECe results ranged from non-saline to moderately saline. The majority of the results were classed as slight to moderately saline.
Soil pH and Plant Growth	The soil pH results ranged from acidic to strongly alkaline.
CEC in Soil	The CEC values ranged from very low to moderate range which is typical of the soil formation encountered at the site and are generally indicative of the low levels of organic matter within the soils.
ESP%	The ESP% values of the samples ranged from 4.62% to 40.74%. The majority of the ESP results were classed as sodic to highly sodic.
Groundwater Salinity	The laboratory results indicate that the groundwater is saline.
Soil Conditions for Exposure Classification (AS2159-2009)	The boreholes drilled for the investigation have indicated that the subsurface conditions at the site generally comprise of alluvial soil. Based on this, the exposure classification outlined under 'Soil Conditions A' has been adopted for the assessment.
Exposure Classification for Concrete Piles/Foundations (AS2159-2009)	The soil pH and sulphate results indicate that the soils are mildly to moderately aggressive towards buried concrete. The groundwater pH and chloride results indicate that the groundwater is mildly aggressive towards buried concrete.
Exposure Classification for Steel Piles/Foundations (AS2159-2009)	The soil resistivity results indicate that the soils are mild to moderately aggressive towards buried steel. The groundwater pH and chloride results indicate that the groundwater is mildly aggressive towards buried steel.

8 DISCUSSION

8.1 Tier 1 Risk Assessment and Review of CSM

For a contaminant to represent a risk to a receptor, the following three conditions must be present:

1. Source – The presence of a contaminant;
2. Pathway – A mechanism or action by which a receptor can become exposed to the contaminant; and
3. Receptor – The human or ecological entity which may be adversely impacted following exposure to contamination.

If one of the above components is missing, the potential for adverse risks is relatively low.

8.1.1 Surface ACM

Surface ACM were identified in the north-west and east sections of the site. The ACM sampling locations are shown in Figure 3. The ACM were identified outside of the proposed MSC development area. The ACM were unable to be broken by hand and therefore considered non-friable by our field staff.

The source of the ACM is likely to be associated with the demolition of former buildings or agricultural sheds in these areas of the site. JKE are of the opinion that the ACM at the site is likely a localised surface issue. However, there remain a potential for further surface ACM to be located at the site and within Liverpool Hospital grounds.

Although the ACM were considered non-friable, weathering, vehicle/pedestrian traffic and general mismanagement could have a potential to generate asbestos fibres. Generated asbestos fibres could pose a human health (inhalation) risk to potential site receptors including the public, hospital staff and construction workers. The risk could be managed by the engagement of an asbestos removal contractor to undertake a surface “emu pick” of potential ACM with a visual asbestos clearance undertaken following the removal works. JKE are of the opinion that the above should be undertaken over the entire Liverpool Hospital grounds.

8.1.2 Soil

8.1.2.1 AF/FA in Fill and Human Health Receptors

The calculated AF/FA concentration of 0.0373% w/w (JKE136 (0-0.2m)) and 0.0085% w/w (JKE137 (0.04-0.2m)) were above the SAC of 0.001% w/w. These sampling locations are in the north-west of section of the site. The sampling locations and contamination data are shown in Figure 3. The AF/FA were identified outside of the proposed MSCP development area. AF/FA or ACM were not observed during soil sampling and bulk screening field works. AF/FA materials are considered friable.

The source of the AF/FA is likely to be associated with the demolition of former buildings or agricultural sheds in these areas of the site or importation of fill material.

AF/FA identified in exposed surface soils have the potential to generate air borne asbestos fibres during high winds or other disturbance, including foot traffic and excavation. Potential inhalation of asbestos fibres

represents a risk to immediate site receptors, including immediate site (public and hospital staff) and maintenance and construction workers during excavation works.

Asphaltic concrete pavement was encountered at the surface at sampling location JKE137 and the majority of the areas surrounding this sampling location was covered by hardstand or grass, therefore immediate risk to site receptors was considered to be low. However, the fill sample JKE136 (0-0.2m) was obtained from the surface in a landscaped area with exposed soils. Based on the results, JKE were of the opinion that the detection of AF/FA above the SAC represented a potential immediate risk of inhalation of generated asbestos fibres to site receptors including the public and hospital staff. To further assess the immediate risk of exposure to receptors, JKE recommended that interim asbestos management controls be implemented in the area around sampling location JKE136, including asbestos air fibre monitoring and the exposed soils in the vicinity of sampling location be managed by isolation.

The interim controls recommended by JKE were implemented by the South Western Sydney Local Health District. JKE were provided with an asbestos air fibre monitoring report prepared by AIRSAFE OHC PTY LTD (report ref: 47292, dated 3 September 2019), the asbestos air fibre monitoring results were below laboratory detection limit of 0.01 fibres/ml. JKE were also provided a photograph showing that the exposed soils had been isolated with star pickets/warning tape and the exposed soils covered by builder's plastic and approximately 100mm of sand. The asbestos air fibre monitoring results and photographs showing the isolation and temporary capping of the exposed soils in the vicinity of JKE sampling location JKE136 are attached in the appendices. Based on the information provided, JKE were of the opinion that immediate risk to receptor was low provided that an interim Asbestos Management Plan (AMP) was prepared and implemented to manage the risks. JKE subsequently prepared an Interim AMP for the SWSLHD in December 2019[31]. The Interim AMP, provided a semi-permanent capping methodology for the exposed soils in the vicinity of JKE sampling location JKE136. At the time of reporting, JKE have not been advised if the semi-permanent have been installed. More permanent asbestos management controls (e.g. permanent capping of off-site disposal of asbestos impacted soils to a licensed landfill) will be required during future development of this area of the hospital.

At this stage, the extent of the AF/FA impacted fill soil in the north-west section of the site appears to be confined to the immediate area surrounding sampling locations JKE136 and JKE137, however further delineation investigations will be required.

Although AF/FA impacted soils were not encountered within the proposed MSCP development area, there remains a potential that the AF/FA impacted soils extend horizontally to the west section of the MSCP development area and beneath the existing P2 MSCP. Refusal was encountered within the fill material in the majority of the sampling locations within the ground floor of the existing P2 MSCP. These sampling locations were excavated/drilled using hand tools due to access limitations to mechanical sampling equipment. The extent of potential AF/FA impacted soils in the west section of the proposed MSCP development area (beneath the existing P2 MSCP) is considered to be a data gap and should be further assessed.

[31] Report to Johnstaff Projects Pty Ltd, on Interim Asbestos Management Plan, for Interim Due Diligence and Management, at Liverpool Hospital - Elizabeth Street, Liverpool, NSW (JKE ref: E32465PLrpt, dated 13 December 2019)

8.1.2.2 TRH, Human Health and Ecological Receptors

The TRH (F2) fill soils results of 290mg/kg (JKE102 (0.3-0.5m)), 170mg/kg (JKE102 (1.2-1.6m)), 180mg/kg (JKE103 (0-0.1m)) and 160mg/kg (JKE104 (0-0.1m)) were above the human health SAC of 110mg/kg. These sampling locations are located in the south section of the site on/adjacent to Elizabeth Street and are outside of the proposed MSCP development area. The sampling locations and contamination data are shown in Figures 3 and 4. The source of TRH is likely associated with the importation of fill to the area.

JKE are of the opinion that TRH (F2) results above the human health SAC represent a low risk to the receptors and remediation is not considered necessary for the following reasons:

- JKE selected the HSLs SAC for a 'low-high density residential' exposure scenario (HSL-A/HSL-B) for the assessment, as the HSL for 'recreational' exposure (HSL-C) are not limiting (i.e. there are no guidelines values provided) and NEPM 2013 Schedule B7 Section 3.2.5.3 suggests that commercial/industrial exposure scenarios are not applicable to hospitals. The HSLs SAC for a 'low-high density residential' exposure scenario (HSL-A/HSL-B) are considered to be very conservative for the proposed landuse;
- Elevated concentrations of TRH were not encountered in the natural soils analysed or in the groundwater sample analysed from JKEMW102;
- No buildings are proposed for the civil infrastructure works, therefore there is no risk of TRH vapour migration to building associated receptors. The primary receptors are considered to be construction and intrusive maintenance workers;
- All TRH results were below the Management Limits (*Residential, Parkland and Public Open Space*) and the Direct Contact criteria (*Residential with Accessible Soil* - also suitably protective of intrusive maintenance workers) for petroleum hydrocarbons (NEPM 2013); and
- Potential impacts of TRH from the AST located to the north and north-west of these boreholes is considered to be very low as the AST was located within a basement over concrete slab.

The above TRH (F2) were also above the ecological SAC. The TRH (F3) results for twelve additional fill soils samples were above the ecological SAC. The majority of the elevation were encountered in the south, south-east and east section of the western campus, however some of the TRH (F3) elevated concentrations were encountered within the MSCP development area. The source of TRH is likely associated with the importation of fill to the area. The sampling locations and contamination data are shown in Figure 4.

JKE are of the opinion that TRH (F2 and F3) results ecological SAC represent a very low risk to the ecological receptors and remediation is not considered necessary for the following reasons:

- The vegetation within the investigation area did not appear to be showing any obvious signs of stress (e.g. die back) and largely appeared healthy and well established. However, it is noted that some of the grass cover was limited, this was generally attributed to the canopy of well-established tree cover and pedestrian foot traffic;
- Sensitive ecological receptors were not identified by the JKE Stage 1 ESA;
- The site was and will remain primarily covered by hardstand preventing access to the underling fill soils; and

- Elevated concentrations of TRH were not encountered in the groundwater samples obtained from JKEMW102.

8.1.3 Groundwater

The copper and zinc results of all groundwater samples obtained were greater than the ecological criteria. Elevated concentrations of copper and zinc were not encountered is the soil samples analysed for the assessment. Elevations of heavy metals (particularly copper and zinc) are very common in urban groundwater as a result of leaking water infrastructure and surface run-off. As shown on Figure 5, groundwater flows onto the site from the west and off site to the north-east towards the Georges River which is consider to the groundwater receiving water body and likely a disturbed system as a result of past and present industrial land use.

JKE are of the opinion that the copper and zinc groundwater elevations are associated with a regional issue that does not warrant further consideration/remediation.

Based on the results, significant amounts of groundwater will not be encountered during the proposed MSCP development described in Section 1.1. However, groundwater will be encountered if deep piling is undertaken.

8.2 Acid Sulfate Soils

sPOCAS results for several samples identified acidic conditions greater than the action criteria. These results are considered to be indicative of mildly acidic soils associated with organic/humic material rather than PASS as significant concentrations of oxidisable sulfur (indicated by the low S_{pos}% results) were not encountered in the majority of the samples. However, significant S_{pos}% and chromium reducible sulfur (SCr) results were detected in the extremely weathered siltstone sample JKE116 (15.4-15.6m) obtained from JKE borehole JKE116 located with the proposed MSCP development area

Considering the information reviewed for this assessment (risk maps, subsurface conditions and laboratory results etc.), PASS or ASS conditions and are not likely to be disturbed during any near surface earthworks within fill material or earthworks above groundwater undertaken for the MSCP development. However, an ASSMP will be required for any works (e.g. piling) which includes the disturbance of PASS beneath groundwater and/or the ASS detected in the extremely weathered siltstone sample JKE116 (15.4-15.6m).

8.3 Salinity

Slightly to moderately saline soils and saline groundwater were identified by the preliminary salinity assessment. The design team must take into account the saline conditions identified.

Considering the information reviewed for this assessment (risk maps, subsurface conditions and laboratory results etc.). Saline soils are likely to be disturbed during the proposed MSCP development. Therefore, a SMP is considered necessary for the proposed development described in Section 1.1 of this report.

8.4 Decision Statements

The decision statements are addressed below:

Did the site inspection, or does the historical information identify potential contamination sources/AEC at the site?

Yes. The AEC are summarised in the CSM in Section 4.

Are any results above the SAC?

Yes. The results of the assessment are summarised in Section 7.

Do potential risks associated with contamination exist, and if so, what are they?

Risks to human health receptors, associated with AF/FA (friable asbestos) in the fill soils were identified in the north-west section of the site at sampling locations JKE136 and JKE137. The immediate risk to the receptors has been managed by the implementation of interim asbestos management controls, as discussed in Section 8.1.2.1.

Based on review of the results, the risk to receptors associated with the proposed MSCP development is considered to be low. However, further assessment of the extent of the AF/FA (friable asbestos) in the fill soils in the west section of the MSCP development area is required, as discussed in Section 8.1.2.1.

Is remediation required?

Based on the results, at this stage remediation is not required for the proposed MSCP development. However, further assessment of the extent of the AF/FA (friable asbestos) in the fill soils in the west section of the MSCP development area is required, as discussed in Section 8.1.2.1. Remediation may be necessary base on results of the additional asbestos assessment.

Remediation will be required for any future development encompassing the area around sampling locations JKE136 and JKE 137 due to the detection of AF/FA (friable asbestos) in the fill soils.

Is an Acid Sulfate Soil Management Plan (ASSMP) required for the proposed MSCP development?

Yes. An ASSMP is required for potential deep soil disturbance associated with MSCP development, see Section 8.2.

Is a Salinity Management Plan (SMP) required for the proposed MSCP development?

Yes. A SMP is required for the proposed MSCP development, see Section 8.3.

Is the site characterisation sufficient to provide adequate confidence in the above decisions?

Yes. However, the data gaps outlined in Section 8.5 should be considered.

Is the MSCP site suitable for the proposed development, or can the site be made suitable subject to further characterisation and/or remediation?

The site can be made suitable provided that the relevant data gaps outlined in Section 8.5 are addressed and the recommendations provided in Section 9 implemented.

8.5 Data Gaps

An assessment of data gaps is provided in the following table:

Table 8-1: Data Gap Assessment

Data Gap	Assessment
Underground services and on-site migration of contamination.	Although the risk to the proposed development is considered low, there remains a potential for migration of contamination from off-site fuel storage, mechanical workshops, dry cleaners and printers via underground services and trenches. JKE are of the opinion that the risk can be addressed by the preparation and implementation of an unexpected finds procedure by the head construction contractor.
Extent of AF/FA in fill (JKE136 and JKE137).	At this stage, the extent of the AF/FA impacted fill soil in the north-west section of the site and appear likely to be confined to the immediate area surrounding sampling locations JKE136 and JKE137. However, the extent of AF/FA impacted fill soil requires further assessment, including in the west section of the proposed MSCP development area (beneath the existing P2 MSCP), due to the refusal encountered in the fill material in this area. The additional asbestos assessment should be undertaken following demolition of the existing P2 MSCP (to allow access to suitable machinery for sampling purposes) and the assessment undertaken in accordance with the WA DoH 2009 Guidelines (endorsed in NEPM 2013). Based on the results and the interim asbestos controls implemented the immediate risk to receptors has been addressed as discussed in Section 8.1.2.1.

8.6 Preliminary Waste Classification Assessment

8.6.1 Preliminary Waste Classification of Fill

Based on the results of the assessment, and at the time of reporting, the majority of the fill material encountered within the MSCP development (with the exception of the fill material beneath the existing P2 MSCP) are classified as **General Solid Waste (non-putrescible)**. Further, waste classification is required for the soils beneath the existing P2 MSCP to further assess the potential for asbestos.

At this stage, JKE understand that there will be limited (if any) surplus fill material requiring off-site disposal as part of the proposed MSCP development.

Based on the results of the assessment, and at the time of reporting, the fill material in the north-west section of the site and to the west of the MSCP development area are classified as **General Solid Waste (non-putrescible) containing Special Waste (asbestos)**. Further waste classification is required to assess the extent of asbestos in the areas surround sampling locations JKE136 and JKE137.

The additional waste classification assessment/s should be undertaken prior to off-site disposal of fill. The receiving facility must be appropriately licensed by the NSW EPA to receive the waste stream. The facility should be contacted to obtain the required approvals prior to commencement of excavation.

8.6.2 Preliminary Classification of Natural Soil

Based on the scope of work undertaken for this assessment, and at the time of reporting, JKE are of the opinion that the shallow natural soils within the MSCP development area likely to meet the definition of **VENM** for off-site disposal or re-use purposes. If encountered during excavations works, the natural soils should be further assessed to confirm the VENM waste classification following removal of the overlying fill material.

Acid sulfate soils were detected in the extremely weathered siltstone sample JKE116 (15.4-15.6m). ASS do not meet the definition of VENM. This should be considered for the MSCP development should the proposed works include disturbance of natural soils and bedrock at depth (e.g. piling) beneath groundwater.

In accordance with Part 1 of the Waste Classification Guidelines, the VENM is pre-classified as general solid waste and can also be disposed of accordingly to a facility that is licensed to accept it.

Material classed as VENM must not be mixed with any fill material (including building rubble) and/or ASS as this will invalidate the VENM classification. Where doubt exists about the difference between fill and VENM material an environmental/geotechnical engineer should be contacted to inspect the site and provide further advice during excavation.

9 CONCLUSIONS AND RECOMMENDATIONS

The assessment included review of the JKE Stage 1 ESA and sampling from 40 boreholes. Twenty three of the sampling locations were located within the proposed MSCP development area. JKE consider that the report objectives outlined in Section 1.2 have been addressed. The recommendations and conclusions below have been separated to align with the known proposed MSCP development and potential future development/remainder of the assessment/investigation area.

9.1 Proposed MSCP Development

Based on the findings of the assessment, JKE are of the opinion that the MSCP site can be made suitable from a contamination view point for the proposed development described in Section 1.1, provided that the following recommendations are implemented:

1. Following demolition of the existing P2 MSCP, an additional asbestos assessment is undertaken beneath the P2 MSCP building footprint to address the data gap identified in Section 8.5;
2. A Remediation Action Plan (RAP) is prepared, if required and based on the results of the additional asbestos assessment;
3. An Acid Sulfate Soil Management Plan (ASSMP) is prepared, should the proposed MSCP development include works (e.g. piling) which have the potential to disturb potential ASS beneath groundwater and/or the ASS detected in the extremely weathered siltstone sample JKE116 (15.4-15.6m);
4. A Salinity Management Plan (SMP) is prepared; and
5. A Construction Environmental Management Plan (CEMP) is prepared by the appointed contractor. The CEMP should include an unexpected finds procedure for contamination.

9.2 Remainder of Assessment Area and Potential Future Development

Based on the findings of the assessment, JKE are of the opinion that the remainder of the site can be made suitable for potential future development provided that the following recommendations are implemented:

1. Any potential surface ACM are removed from the site in accordance with SafeWork NSW guidance and a visual Asbestos Clearance undertaken. This should be undertaken over the entire Liverpool Hospital grounds;
2. Further assessment is undertaken to assess the extent of AF/FA impacted fill soil identified at sampling locations JKE136 and JKE137 in the north-west section of the site;
3. The JKE Interim Asbestos Management Plan (AMP) is implemented to manage the AF/FA impacted fill soil. A standalone AMP is prepared if bulk earthworks are proposed in the vicinity of sampling locations JKE136 and JKE137;
4. A Remediation Action Plan (RAP) is prepared for any future development which includes the potential disturbance of the AF/FA impacted fill soil;
5. A Salinity Management Plan (SMP) is prepared for any future development works; and
6. A Construction Environmental Management Plan (CEMP) is prepared by the appointed contractor. The CEMP should include an unexpected finds procedure for contamination.

9.3 Regulatory Requirements

The regulatory requirements applicable for the development are outlined below:

Table 9-1: Regulatory Requirements

Regulator	Requirements
NSW EPA – Duty to Report	Based on the results, the interim asbestos related controls implemented and the asbestos air fibre monitoring. JKE consider that there is no requirement to notify the NSW EPA under the NSW EPA Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997 (2015)[32]. However, recommendations provided above should be implemented.
SafeWork	Sites with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan. Appropriate SafeWork NSW notification will be required for asbestos removal works or handling. Contractors are also required to be appropriately licensed for the asbestos works undertaken (i.e. bonded or friable asbestos works).
Waste Management	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.
Disposal of Groundwater during Dewatering	In the event dewatering is required during excavation works, Council, NSW Office of Water (NOW) and other relevant approvals (from authorities like NSW EPA, Sydney Water etc.) should be obtained prior to the commencement of dewatering.

[32] NSW EPA, (2015). *Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997* (referred to as Duty to Report Contamination)

10 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 landuse. 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/J&K 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

LEGEND:

APPROXIMATE SITE BOUNDARY (STAGE 2 ESA INVESTIGATION AREA)

APPROXIMATE EXTENT OF MULTI STOREY CARPARK DEVELOPMENT

Notes: Reference should be made to the report text for a full understanding of this plan. Image Sources: https://maps.six.nsw.gov.au/ and wheris.com

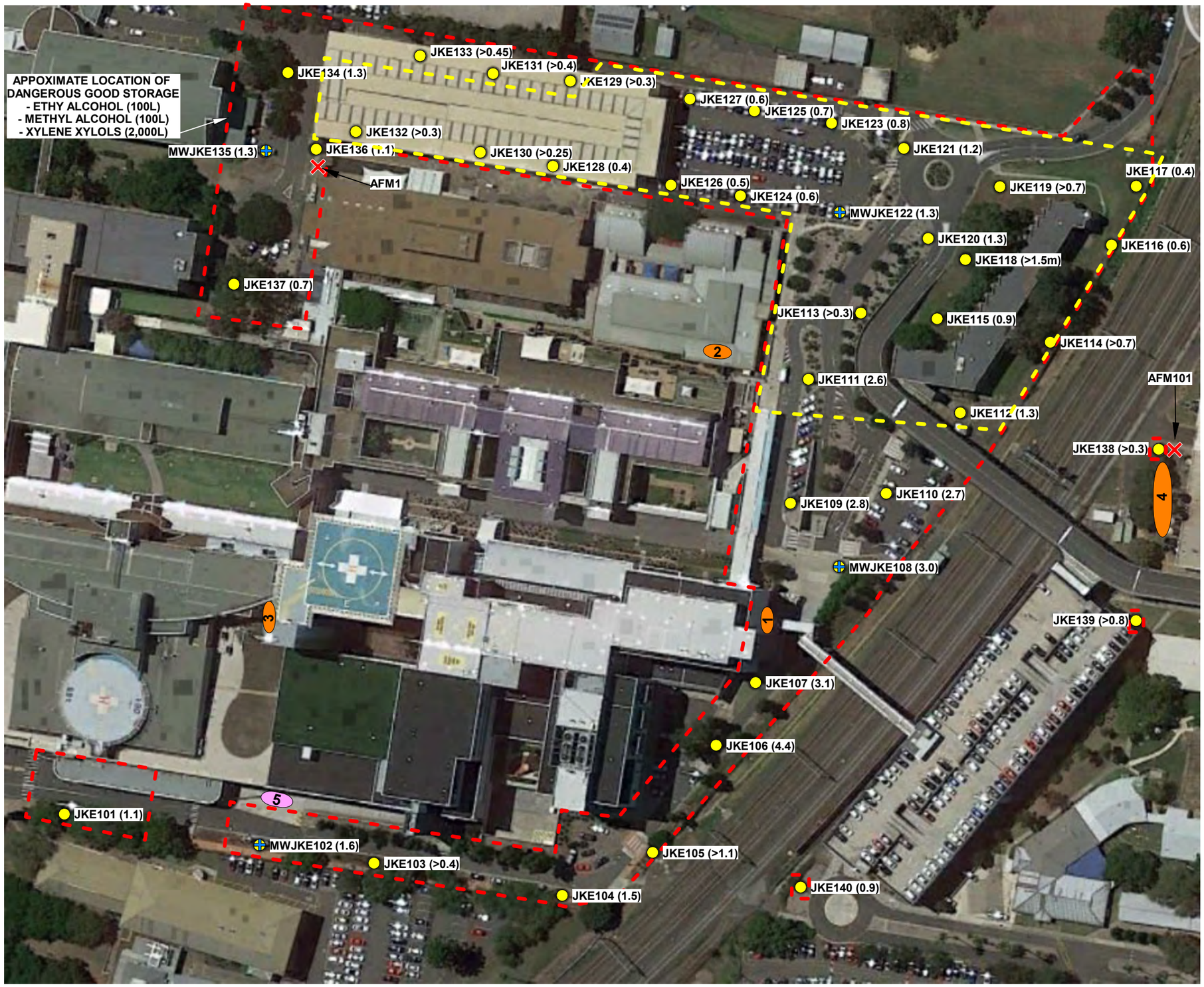
Title: **SITE LOCATION PLAN**

Location: LIVERPOOL HOSPITAL
ELIZABETH STREET, LIVERPOOL, NSW

Report No: E32465BDrpt5

Figure No: 1

JK ENVIRONMENTS



LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE EXTENT OF MULTI STOREY CARPARK DEVELOPMENT
- JKE (0.1) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- MWJKE (0.1) — BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
- AMF — ASBESTOS SURFACE FRAGMENT LOCATION
- 1 — APPOXIMATE LOCATION OF UNDERGROUND STORAGE TANK, REMOVED IN 2008
- 2 & 3 — APPOXIMATE LOCATION OF UNDERGROUND STORAGE TANK, STATUS UNKNOWN
- 4 — APPROXIMATE LOCATION OF EXISTING UNDERGROUND STORAGE TANK
- 5 — APPOXIMATE LOCATION OF EXISTING ABOVEGROUND STORAGE TANKS, WITHIN A BASEMENT

Scale (m) @A3: 0 13 26 39 52 65

Notes: Reference should be made to the report text for a full understanding of this plan.

Image Source: Google Earth

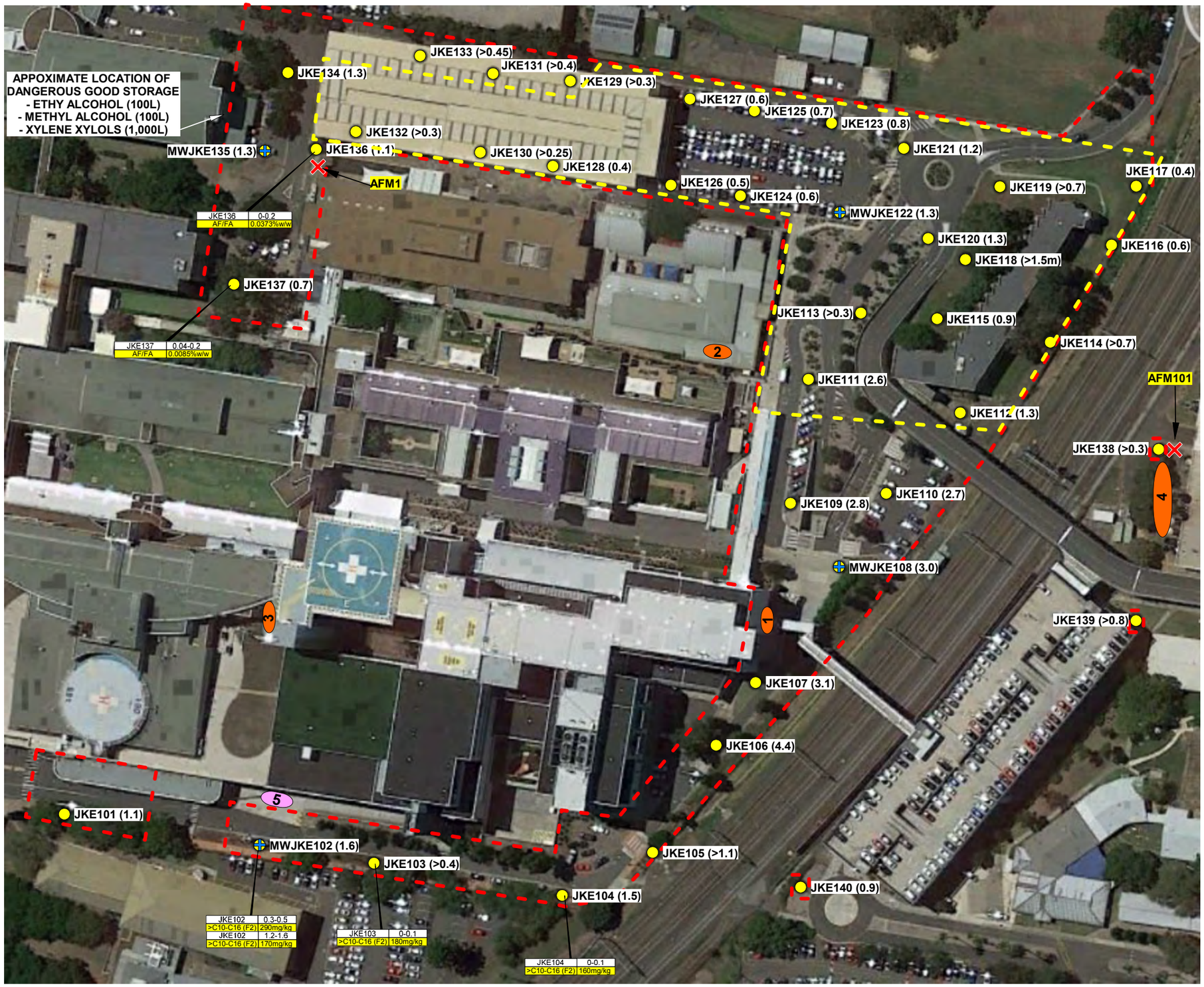
Title: **SAMPLING LOCATION PLAN**

Location: LIVERPOOL HOSPITAL
ELIZABETH STREET, LIVERPOOL, NSW

Report No: E32465BDrpt5

Figure No: 2

JK ENVIRONMENTS



LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE EXTENT OF MULTI STOREY CARPARK DEVELOPMENT
- JKE (0.1) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- MWJKE (0.1) — BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
- AMF — ASBESTOS SURFACE FRAGMENT LOCATION
- 1 — APPROXIMATE LOCATION OF UNDERGROUND STORAGE TANK, REMOVED IN 2008
- 2 & 3 — APPOXIMATE LOCATION OF UNDERGROUND STORAGE TANK, STATUS UNKNOWN
- 4 — APPROXIMATE LOCATION OF EXISTING UNDERGROUND STORAGE TANK
- 5 — APPOXIMATE LOCATION OF EXISTING ABOVEGROUND STORAGE TANKS, WITHIN A BASEMENT
- SOIL CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK (%W/W or mg/kg)

Scale (m) @A3: 0 13 26 39 52 65

Notes: Reference should be made to the report text for a full understanding of this plan.

Image Source: Google Earth

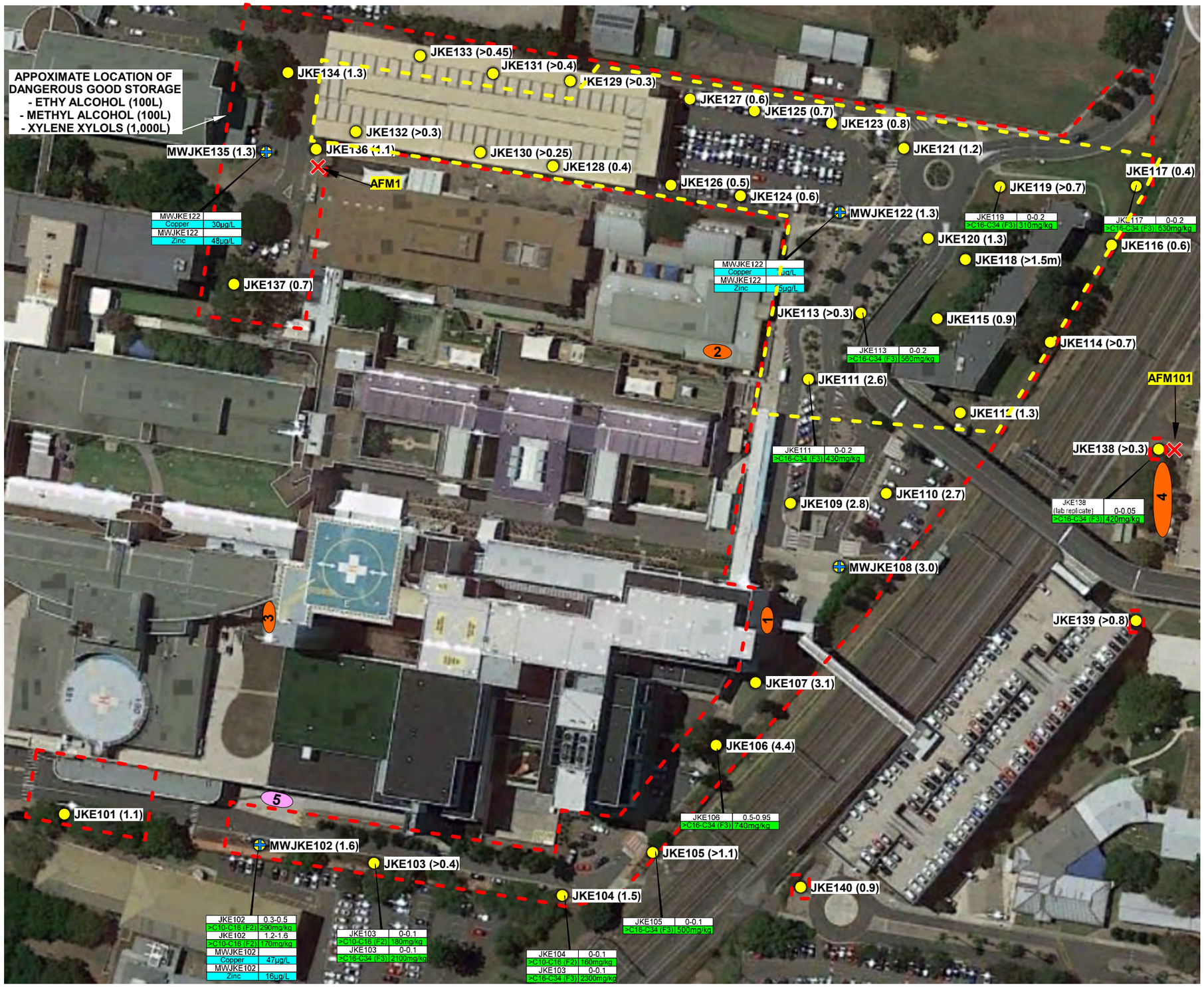
Title: **CONTAMINATION DATA PLAN - HUMAN HEALTH**

Location: LIVERPOOL HOSPITAL
ELIZABETH STREET, LIVERPOOL, NSW

Report No: E32465BDrpt5

Figure No: 3

JK ENVIRONMENTS



LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE EXTENT OF MULTI STOREY CARPARK DEVELOPMENT
- JKE (0.1) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- MWJKE (0.1) — BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
- AMF — ASBESTOS SURFACE FRAGMENT LOCATION
- 1 — APPOXIMATE LOCATION OF UNDERGROUND STORAGE TANK, REMOVED IN 2008
- 2 & 3 — APPOXIMATE LOCATION OF UNDERGROUND STORAGE TANK, STATUS UNKNOWN
- 4 — APPOXIMATE LOCATION OF EXISTING UNDERGROUND STORAGE TANK
- 5 — APPOXIMATE LOCATION OF EXISTING ABOVEGROUND STORAGE TANKS, WITHIN A BASEMENT
- SOIL CONTAMINATION ABOVE SAC FOR ECOLOGICAL RISK (mg/kg)
- GROUNDWATER CONTAMINATION ABOVE SAC FOR ECOLOGICAL RISK (µg/L)

Scale (m) @A3: 0 13 26 39 52 65

Notes: Reference should be made to the report text for a full understanding of this plan.

Image Source: Google Earth

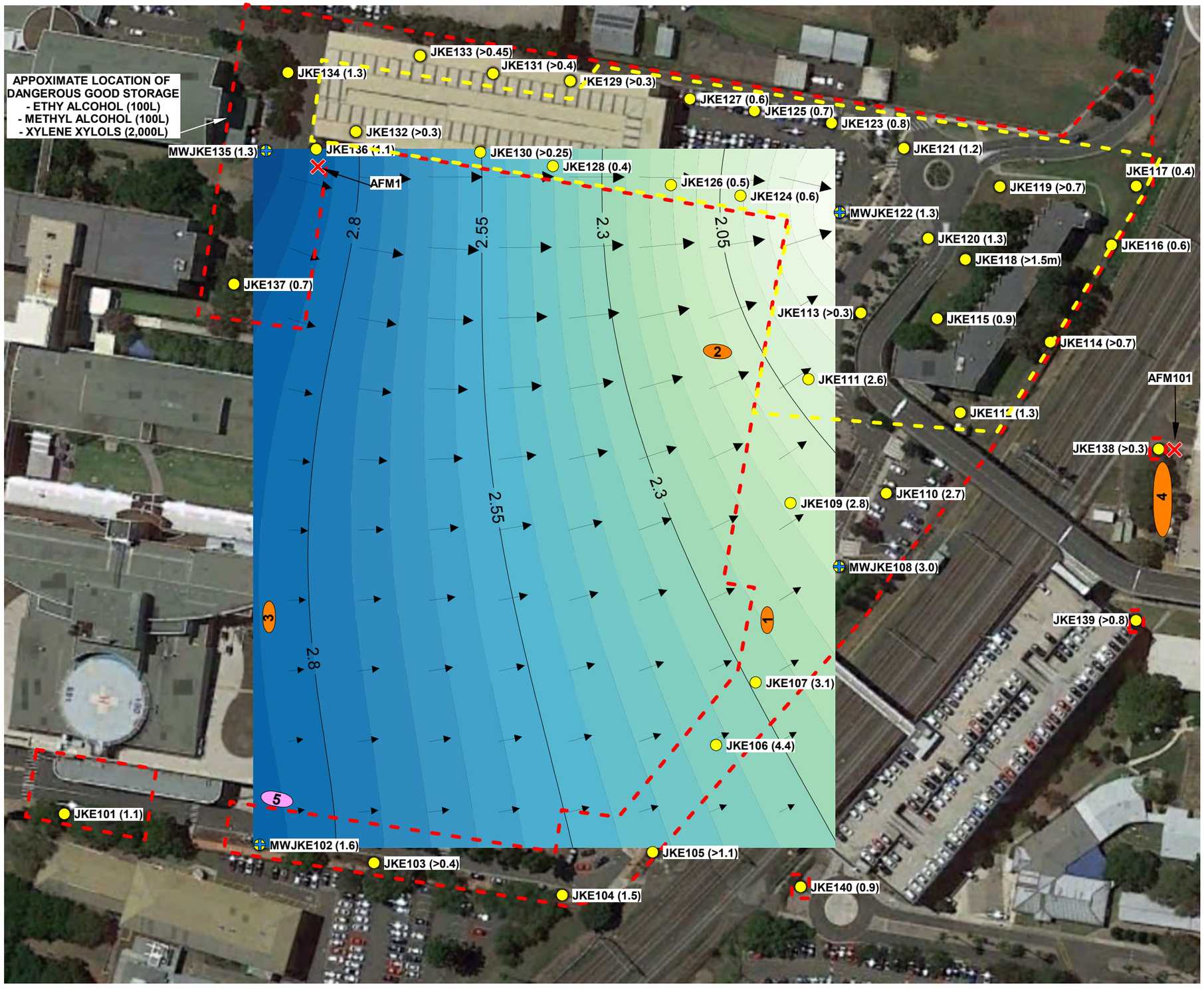
Title: **CONTAMINATION DATA PLAN - ECOLOGICAL**

Location: LIVERPOOL HOSPITAL
ELIZABETH STREET, LIVERPOOL, NSW

Report No: E32465BDrpt5

Figure No: 4

JK ENVIRONMENTS



LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE EXTENT OF MULTI STOREY CARPARK DEVELOPMENT
- JKE (0.1) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- MWJKE (0.1) — BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
- AMF — ASBESTOS SURFACE FRAGMENT LOCATION
- 1 — APPOXIMATE LOCATION OF UNDERGROUND STORAGE TANK, REMOVED IN 2008
- 2 & 3 — APPOXIMATE LOCATION OF UNDERGROUND STORAGE TANK, STATUS UNKNOWN
- 4 — APPROXIMATE LOCATION OF EXISTING UNDERGROUND STORAGE TANK
- 5 — APPOXIMATE LOCATION OF EXISTING ABOVEGROUND STORAGE TANKS, WITHIN A BASEMENT
- GROUNDWATER RL, CONTOURS AND APPROXIMATE FLOW DIRECTION BASED ON SWL DATA OBTAINED ON 16-08-2019

Scale (m) @A3: 0 13 26 39 52 65

Notes: Reference should be made to the report text for a full understanding of this plan.

Image Source: Google Earth

Title: **GROUNDWATER CONTOUR PLAN**

Location: LIVERPOOL HOSPITAL
ELIZABETH STREET, LIVERPOOL, NSW

Report No: E32465BDrpt5 | Figure No: 5

JK ENVIRONMENTS

Appendix B: Laboratory Summary Tables

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ABC:	Ambient Background Concentration	**PCBs:**	Polychlorinated Biphenyls
ACM:	Asbestos Containing Material	**PCE:**	Perchloroethylene (Tetrachloroethylene or Teterachloroethene)
ADWG:	AustralianDrinking Water Guidelines	**pH_{KCL} :**	pH of filtered 1:20, 1M KCL extract, shaken overnight
AF:	Asbestos Fines	**pH_{ox} :**	pH of filtered 1:20 1M KCl after peroxide digestion
ANZG	Australian and New Zealand Guidelines	**PQL:**	Practical Quantitation Limit
B(a)P:	Benzo(a)pyrene	**RS:**	Rinsate Sample
CEC:	Cation Exchange Capacity	**RSL:**	Regional Screening Levels
CRC:	Cooperative Research Centre	**SAC:**	Site Assessment Criteria
CT:	Contaminant Threshold	**SCC:**	Specific Contaminant Concentration
EILs:	Ecological Investigation Levels	**S_{Cr}:**	Chromium reducible sulfur
ESLs:	Ecological Screening Levels	**S_{POS}:**	Peroxide oxidisable Sulfur
FA:	Fibrous Asbestos	**SSA:**	Site Specific Assessment
GIL:	Groundwater Investigation Levels	**SSHSLs:**	Site Specific Health Screening Levels
HILs:	Health Investigation Levels	**TAA:**	Total Actual Acidity in 1M KCL extract titrated to pH6.5
HSLs:	Health Screening Levels	**TB:**	Trip Blank
HSL-SSA:	Health Screening Level-SiteSpecific Assessment	**TCA:**	1,1,1 Trichloroethane (methyl chloroform)
NA:	Not Analysed	**TCE:**	Trichloroethylene (Trichloroethene)
NC:	Not Calculated	**TCLP:**	Toxicity Characteristics Leaching Procedure
NEPM:	National Environmental Protection Measure	**TPA:**	Total Potential Acidity, 1M KCL peroxide digest
NHMRC:	National Health and Medical Research Council	**TS:**	Trip Spike
NL:	Not Limiting	**TRH:**	Total Recoverable Hydrocarbons
NSL:	No Set Limit	**TSA:**	Total Sulfide Acidity (TPA-TAA)
OCP:	Organochlorine Pesticides	**UCL:**	Upper Level Confidence Limit on Mean Value
OPP:	Organophosphorus Pesticides	**USEPA**	United States Environmental Protection Ager
PAHs:	Polycyclic Aromatic Hydrocarbons	**VOCC:**	Volatile Organic Chlorinated Compounds
ppm:	Parts per million	**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-1
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 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	0.1	100
Site Assessment Criteria (SAC)			100	20	100	6000	300	40	400	7400	300	3	10	270	300	6	50	240	6	160	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
JKE101	0.04-0.2	F: Gravelly sand	<4	<0.4	14	35	19	<0.1	27	54	0.7	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE101 (replicate)	0.04-0.2	F: Gravelly sand	<4	<0.4	18	38	19	0	28	58	0.4	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE101	1.4-1.7	Silty clay	14	<0.4	17	18	12	<0.1	3	20	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE102	0.1-0.3	F: Gravelly sand	4	<0.4	8	15	20	0	12	29	0.09	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE102	0.3-0.5	F: Silty clay	6	<0.4	10	9	19	0	3	16	1.1	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE102	1.2-1.6	F: Silty clay	8	<0.4	14	10	13	<0.1	3	9	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE102	1.6-2.0	Silty clay	5	<0.4	8	5	8	<0.1	1	4	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE103	0-0.1	F: Silty sand	<4	<0.4	9	33	19	<0.1	13	72	0.57	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE103	0.1-0.4	F: Sandy gravel	<4	<0.4	9	10	16	<0.1	10	21	0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE104	0-0.1	F: Silty clay	<4	<0.4	10	30	51	<0.1	8	93	3.2	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE104	0.1-0.3	F: Sandy gravel	<4	<0.4	11	16	28	<0.1	11	75	0.94	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE104	0.7-1.0	F: Silty clay	4	<0.4	11	15	100	1	10	80	3	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE104	1.5-1.7	Silty clay	<4	<0.4	12	4	17	0	1	5	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE105	0-0.1	F: Silty sand	5	<0.4	14	60	61	0	8	130	2.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE105 (replicate)	0-0.1	F: Silty sand	8	<0.4	17	73	63	0	8	150	4.9	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE105	0.5-0.95	F: Silty clay	<4	<0.4	11	10	16	<0.1	7	56	0.06	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
JKE106	0.08-0.2	F: Silty sand	<4	<0.4	10	44	16	<0.1	7	35	1.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE106	0.5-0.9	F: Silty clay	<4	<0.4	18	15	15	<0.1	8	18	0.86	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE106	1.5-1.95	F: Silty clay	<4	<0.4	8	8	13	<0.1	5	15	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE106	4.5-4.7	Silty clay	<4	<0.4	14	7	13	<0.1	2	8	0.06	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE107	0-0.2	F: Silty sand	<4	<0.4	9	32	78	0	9	100	2.8	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE107	1.5-1.95	F: Silty clay	<4	<0.4	12	12	18	<0.1	6	23	0.09	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE108	0.22-0.4	F: Silty clayey sand	<4	<0.4	11	13	43	<0.1	8	43	0.4	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE108	0.5-0.95	F: Silty clay	<4	<0.4	12	7	15	<0.1	4	16	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE108	3.0-3.45	Silty clay	<4	<0.4	18	6	13	<0.1	4	8	0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE109	0.045-0.2	F: Gravelly sand	<4	<0.4	13	34	16	<0.1	8	47	3.1	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE109 (replicate)	0.045-0.2	F: Gravelly sand	<4	<0.4	13	26	21	<0.1	8	47	3.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE109	0.6-0.95	F: Silty clay	<4	<0.4	13	8	15	<0.1	3	8	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE110	0.04-0.2	F: Gravelly sand	<4	<0.4	20	29	16	<0.1	9	48	1.6	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE110 (replicate)	0.04-0.2	F: Gravelly sand	<4	<0.4	15	23	14	<0.1	9	36	1.7	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE110	1.5-1.95	F: Silty clay	<4	<0.4	11	24	15	<0.1	10	44	0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE110	3.0-3.2	Silty clay	<4	<0.4	10	5	11	<0.1	1	4	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA

Concentration above the SAC **VALUE**

TABLE A-2
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)		
			Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos	TOTAL PCBs	ASBESTOS FIBRES
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	0.1	100
Site Assessment Criteria (SAC)			100	20	100	6000	300	40	400	7400	300	3	10	270	300	6	50	240	6	160	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
JKE111	0-0.2	F: Sandy gravel	5	<0.4	12	28	37	<0.1	7	92	4.4	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE111	1.4-1.7	F: Silty clay	4	<0.4	10	23	100	0	8	73	4	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE111	1.8-2.0	F: Silty clayey sand	6	<0.4	8	12	33	0	5	36	0.94	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE111	3.0-3.2	Silty clay	5	<0.4	14	8	14	<0.1	1	5	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE112	0-0.02	F: Silty clay	7	<0.4	17	41	250	<0.1	13	130	3.5	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE112	0.5-0.95	F: Silty clay	<4	<0.4	9	7	20	0	3	16	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE112	1.3-1.5	Silty clay	<4	<0.4	12	5	11	<0.1	2	7	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE113	0-0.2	F: Silty sandy clay	5	<0.4	12	74	27	0	7	120	0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE114	0-0.2	F: Silty clay	4	<0.4	14	9	22	<0.1	5	30	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE115	0-0.2	F: Sandy gravel	4	<0.4	12	25	39	0	9	71	0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE115	0.2-0.4	F: Silty clay	4	<0.4	14	22	32	0	5	26	0.3	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE116	0-0.2	F: Sandy gravel	5	<0.4	9	13	15	<0.1	7	29	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE117	0-0.2	F: Sandy gravel	8	<0.4	25	43	22	<0.1	6	70	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE117 (replicate)	0-0.2	F: Sandy gravel	5	<0.4	11	48	18	<0.1	5	53	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE117 (triplicate)	0-0.2	F: Sandy gravel	6	<0.4	12	42	26	<0.1	7	63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE117	0.4-0.6	Silty clay	<4	<0.4	12	5	13	<0.1	2	8	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE118	0-0.2	F: Silty clay	4	<0.4	10	41	44	0	23	80	1.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE119	0-0.2	F: Silty clay	<4	<0.4	13	30	33	0	24	56	0.52	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE120	0-0.2	F: Silty sand	5	<0.4	11	17	23	<0.1	7	36	0.78	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE120	0.85-1.1	F: Silty clay	6	<0.4	13	2	24	<0.1	2	3	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE120	1.5-1.7	Silty clay	<4	<0.4	8	2	11	<0.1	1	3	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE121	0-0.2	F: Gravelly sand	<4	<0.4	9	41	61	0	23	88	2.4	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE121	0.4-0.85	F: Sandy gravel	<4	<0.4	10	12	13	<0.1	17	24	0.66	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE121 (replicate)	0.4-0.85	F: Sandy gravel	<4	<0.4	8	14	13	<0.1	9	26	0.99	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE121 (triplicate)	0.4-0.85	F: Sandy gravel	<4	<0.4	11	9	16	<0.1	13	24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE121	1.5-1.7	Silty clay	4	<0.4	12	5	18	<0.1	2	5	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE122	0.04-0.2	F: Gravelly sand	<4	<0.4	14	25	33	<0.1	15	57	1.9	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE122	0.5-0.8	F: Silty clay	4	<0.4	14	15	28	0	14	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
JKE122	0.8-1.0	F: Silty clay	5	<0.4	12	34	100	1	6	110	3.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE122	1.5-1.95	Silty clay	<4	<0.4	7	4	7	<0.1	<1	3	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE123	0.03-0.2	F: Gravelly sand	<4	<0.4	24	20	28	<0.1	9	40	0.62	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE123	0.5-0.8	F: Silty clay	<4	<0.4	13	8	12	<0.1	4	17	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE123	0.8-0.95	Silty clay	<4	<0.4	9	3	11	<0.1	4	5	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE123 (replicate)	0.8-0.95	Silty clay	<4	<0.4	6	3	3	<0.1	2	3	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE123 (triplicate)	0.8-0.95	Silty clay	<4	<0.4	7	3	6	<0.1	3	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE124	0.05-0.2	F: Silty sand	<4	<0.4	13	51	4	<0.1	62	33	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE124	0.2-0.3	F: Silty clay	<4	<0.4	11	24	14	<0.1	29	28	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE124	0.6-0.95	Silty clay	<4	<0.4	10	4	9	<0.1	2	4	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE125	0.05-0.2	F: Gravelly sand	<4	<0.4	11	48	4	<0.1	64	31	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE125	0.4-0.7	F: Silty clay	5	<0.4	12	21	58	0	5	57	0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE125	0.7-0.95	Silty clay	<4	<0.4	11	6	9	<0.1	3	6	0.07	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE126	0.08-0.2	F: Silty sand	<4	<0.4	10	49	2	<0.1	67	33	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE126	0.5-0.95	Silty clay	<4	<0.4	5	3	4	<0.1	1	2	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE127	0.06-0.3	F: Gravelly sand	<4	<0.4	10	48	2	<0.1	59	29	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE127	0.3-0.5	F: Silty clay	<4	<0.4	10	17	7	<0.1	24	23	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE127 (replicate)	0.3-0.5	F: Silty clay	<4	<0.4	9	8	9	<0.1	12	21	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE127 (triplicate)	0.3-0.5	F: Silty clay	<4	<0.4	9	10	8	<0.1	14	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE127	0.6-0.95	Silty clay	<4	<0.4	11	4	10	<0.1	3	6	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA

Concentration above the SAC **VALUE**

TABLE A-3
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 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	0.1	100
Site Assessment Criteria (SAC)			100	20	100	6000	300	40	400	7400	300	3	10	270	300	6	50	240	6	160	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
JKE128	0.08-0.2	F: Gravelly sand	<4	<0.4	7	68	1	<0.1	76	34	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE128	0.3-0.4	F: Silty clay	<4	<0.4	25	23	3	<0.1	43	18	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE128	0.4-0.6	Silty clay	<4	<0.4	9	4	8	<0.1	2	4	4.7	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE129	0.09-0.25	F: Gravelly sand	<4	<0.4	8	66	2	<0.1	80	34	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE129	0.25-0.3	F: Silty clay	<4	<0.4	16	27	4	<0.1	39	19	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE130	0.07-0.2	F: Gravelly sand	<4	<0.4	6	58	1	<0.1	73	31	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE130	0.2-0.25	F: Silty clay	<4	<0.4	30	37	2	<0.1	66	25	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE131	0.07-0.2	F: Gravelly sand	<4	<0.4	5	73	1	<0.1	53	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
JKE131	0.2-0.3	F: Silty clay	<4	<0.4	9	28	2	<0.1	35	16	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE131 (replicate)	0.2-0.3	F: Silty clay	<4	<0.4	10	26	2	<0.1	40	18	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE132	0.08-0.15	F: Gravelly sand	<4	<0.4	6	93	2	0	64	41	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE132	0.15-0.3	F: Silty clay	<4	<0.4	45	2	4	<0.1	24	3	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE133	0.08-0.2	F: Gravelly sand	<4	<0.4	6	63	2	<0.1	63	29	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE133	0.2-0.3	F: Silty clay	<4	<0.4	9	30	2	<0.1	50	21	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE134	0-0.2	F: Silty sand	<4	<0.4	7	11	8	<0.1	13	21	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE134	0.5-0.95	F: Sility clayey sand	<4	<0.4	6	<1	4	<0.1	<1	1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE134	1.5-1.7	Silty clay	<4	<0.4	5	4	4	<0.1	<1	2	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE135	0.05-0.25	F: Gravelly sand	<4	<0.4	10	40	1	<0.1	80	30	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE135	0.4-0.6	F: Silty clay	7	<0.4	16	12	49	0	5	86	0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE135	1.5-1.7	Silty clay	<4	<0.4	8	5	10	<0.1	1	5	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE135 (replicate)	1.5-1.7	Silty clay	<4	<0.4	9	6	11	<0.1	1	4	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE136	0-0.2	F: Silty clay	<4	<0.4	9	16	26	0	9	63	0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**Detected**
JKE136	0.4-0.8	F: Silty clay	4	<0.4	11	6	16	<0.1	3	10	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE136	1.5-1.7	Silty clay	<4	<0.4	7	5	7	<0.1	1	4	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE137	0.04-0.2	F: Silty clay	5	<0.4	14	21	51	0	7	57	4	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**Detected**
JKE137	0.5-0.7	F: Silty clay	<4	<0.4	8	4	8	<0.1	2	3	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE138	0-0.05	F: Silty clay	<4	<0.4	13	24	39	<0.1	7	590	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE138 (replicate)	0-0.05	F: Silty clay	<4	<0.4	14	20	40	<0.1	6	400	0.53	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
JKE138	0.05-0.2	F: Silty clay	<4	<0.4	14	10	21	<0.1	5	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
JKE139	0-0.2	F: Silty clayey sand	<4	<0.4	3	4	9	<0.1	2	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
JKE139	0.3-0.5	F: Silty clay	<4	<0.4	18	8	23	<0.1	8	15	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE140	0-0.2	F: Silty clayey sand	13	<0.4	25	63	64	<0.1	6	160	3.3	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE140	0.2-0.4	F: Silty clayey sand	<4	<0.4	16	4	19	<0.1	5	14	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
JKE140	0.9-1.1	Silty clay	<4	<0.4	12	6	13	<0.1	3	8	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
DUPAM101	-	Soil	5	<0.4	7	13	20	0	12	29	0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
DUPAM102	-	Soil	4	<0.4	13	62	50	0	8	120	2.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
DUPAM103	-	Soil	4	<0.4	42	34	41	<0.1	8	90	3.5	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
DUPAM104	-	Soil	<4	<0.4	7	4	8	<0.1	1	4	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
DUPAM106	-	Soil	<4	<0.4	11	68	6	<0.1	61	27	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
DUPAM107	-	Soil	<4	<0.4	9	19	23	0	8	58	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
DUPAM108	-	Soil	<4	<0.4	5	60	1	<0.1	56	25	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
DUPAM201	-	Soil	<4	<0.4	5	5	6	<0.1	3	24	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
Total Number of Samples			122	122	122	122	122	122	122	122	118	118	113	113	113	113	113	113	113	113	113	69
Maximum Value			14	<PQL	45	93	250	1.4	80	590	4.9	0.8	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	NC

Concentration above the SAC **VALUE**

TABLE B-1
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**								
JKE101	0.04-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE101 (replicate)	0.04-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE101	1.4-1.7	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE102	0.1-0.3	F: Gravelly sand	0m to <1m	Sand	<25	50	<0.2	<0.5	<1	<3	<1	3
JKE102	0.3-0.5	F: Silty clay	0m to <1m	Sand	<25	290	<0.2	<0.5	<1	<3	<1	57
JKE102	1.2-1.6	F: Silty clay	0m to <1m	Sand	<25	170	<0.2	<0.5	<1	<3	<1	120
JKE102	1.6-2.0	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	41
JKE103	0-0.1	F: Silty sand	0m to <1m	Sand	<25	180	<0.2	<0.5	<1	<3	<1	0
JKE103	0.1-0.4	F: Sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE104	0-0.1	F: Silty clay	0m to <1m	Sand	<25	160	<0.2	<0.5	<1	<3	<1	0
JKE104	0.1-0.3	F: Sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE104	0.7-1.0	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	1
JKE104	1.5-1.7	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE105	0-0.1	F: Silty sand	0m to <1m	Sand	<25	80	<0.2	<0.5	<1	<3	<1	0
JKE105 (replicate)	0-0.1	F: Silty sand	0m to <1m	Sand	<25	86	<0.2	<0.5	<1	<3	<1	0
JKE105	0.5-0.95	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	14
JKE106	0.08-0.2	F: Silty sand	0m to <1m	Sand	<25	68	<0.2	<0.5	<1	<3	<1	0
JKE106	0.5-0.9	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	1
JKE106	1.5-1.95	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	1
JKE106	4.5-4.7	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	3
JKE107	0-0.2	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE107	1.5-1.95	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE108	0.22-0.4	F: Silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE108	0.5-0.95	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE108	3.0-3.45	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE109	0.045-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE109 (replicate)	0.045-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE109	0.6-0.95	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE110	0.04-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE110 (replicate)	0.04-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE110	1.5-1.95	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE110	3.0-3.2	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
Total Number of Samples					32	32	32	32	32	32	32	32
Maximum Value					<PQL	290	<PQL	<PQL	<PQL	<PQL	<PQL	120

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**							
JKE101	0.04-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE101 (replicate)	0.04-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE101	1.4-1.7	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE102	0.1-0.3	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE102	0.3-0.5	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE102	1.2-1.6	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE102	1.6-2.0	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE103	0-0.1	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE103	0.1-0.4	F: Sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE104	0-0.1	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE104	0.1-0.3	F: Sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE104	0.7-1.0	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE104	1.5-1.7	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE105	0-0.1	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE105 (replicate)	0-0.1	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE105	0.5-0.95	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE106	0.08-0.2	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE106	0.5-0.9	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE106	1.5-1.95	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE106	4.5-4.7	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE107	0-0.2	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE107	1.5-1.95	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE108	0.22-0.4	F: Silty clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE108	0.5-0.95	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE108	3.0-3.45	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE109	0.045-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE109 (replicate)	0.045-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE109	0.6-0.95	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE110	0.04-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE110 (replicate)	0.04-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE110	1.5-1.95	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE110	3.0-3.2	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3

TABLE B-2
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**								
JKE111	0-0.2	F: Sandy gravel	0m to <1m	Sand	<25	60	<0.2	<0.5	<1	<3	<1	0
JKE111	1.4-1.7	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE111	1.8-2.0	F: Silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE111	3.0-3.2	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE112	0-0.02	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE112	0.5-0.95	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE112	1.3-1.5	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE113	0-0.2	F: Silty sandy clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE114	0-0.2	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE115	0-0.2	F: Sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE115	0.2-0.4	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE116	0-0.2	F: Sandy gravel	0m to <1m	Sand	<25	66	<0.2	<0.5	<1	<3	<1	0
JKE117	0-0.2	F: Sandy gravel	0m to <1m	Sand	<25	50	<0.2	<0.5	<1	<3	<1	0
JKE117 (replicate)	0-0.2	F: Sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE117	0.4-0.6	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE118	0-0.2	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE119	0-0.2	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE120	0-0.2	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE120	0.85-1.1	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE120	1.5-1.7	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE121	0-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE121	0.4-0.85	F: Sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE121 (replicate)	0.4-0.85	F: Sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE121	1.5-1.7	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE122	0.04-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	1
JKE122	0.5-0.8	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE122	0.8-1.0	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE122	1.5-1.95	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE123	0.03-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE123	0.5-0.8	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE123	0.8-0.95	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	3
JKE123 (replicate)	0.8-0.95	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	3
JKE124	0.05-0.2	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE124	0.2-0.3	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE124	0.6-0.95	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE125	0.05-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE125	0.4-0.7	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE125	0.7-0.95	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE126	0.08-0.2	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE126	0.5-0.95	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE127	0.06-0.3	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE127	0.3-0.5	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE127 (replicate)	0.3-0.5	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE127	0.6-0.95	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
Total Number of Samples					44	44	44	44	44	44	44	44
Maximum Value					<PQL	66	<PQL	<PQL	<PQL	<PQL	<PQL	3

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**							
JKE111	0-0.2	F: Sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE111	1.4-1.7	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE111	1.8-2.0	F: Silty clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE111	3.0-3.2	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE112	0-0.02	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE112	0.5-0.95	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE112	1.3-1.5	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE113	0-0.2	F: Silty sandy clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE114	0-0.2	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE115	0-0.2	F: Sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE115	0.2-0.4	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE116	0-0.2	F: Sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE117	0-0.2	F: Sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE117 (replicate)	0-0.2	F: Sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE117	0.4-0.6	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE118	0-0.2	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE119	0-0.2	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE120	0-0.2	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE120	0.85-1.1	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE120	1.5-1.7	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE121	0-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE121	0.4-0.85	F: Sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE121 (replicate)	0.4-0.85	F: Sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE121	1.5-1.7	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE122	0.04-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE122	0.5-0.8	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE122	0.8-1.0	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE122	1.5-1.95	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE123	0.03-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE123	0.5-0.8	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE123	0.8-0.95	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE123 (replicate)	0.8-0.95	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE124	0.05-0.2	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE124	0.2-0.3	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE124	0.6-0.95	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE125	0.05-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE125	0.4-0.7	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE125	0.7-0.95	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE126	0.08-0.2	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE126	0.5-0.95	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE127	0.06-0.3	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE127	0.3-0.5	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE127 (replicate)	0.3-0.5	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE127	0.6-0.95	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3

TABLE B-3
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**								
JKE128	0.08-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE128	0.3-0.4	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE128	0.4-0.6	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE129	0.09-0.25	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE129	0.25-0.3	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE130	0.07-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE130	0.2-0.25	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE131	0.07-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE131	0.2-0.3	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE131 (replicate)	0.2-0.3	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE132	0.08-0.15	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE132	0.15-0.3	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE133	0.08-0.2	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE133	0.2-0.3	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE134	0-0.2	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE134	0.5-0.95	F: Sility clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE134	1.5-1.7	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE135	0.05-0.25	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE135	0.4-0.6	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE135	1.5-1.7	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE135 (replicate)	1.5-1.7	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE136	0-0.2	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE136	0.4-0.8	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE136	1.5-1.7	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE137	0.04-0.2	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE137	0.5-0.7	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
JKE138	0-0.05	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	1.6
JKE138 (replicate)	0-0.05	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	1.6
JKE138	0.05-0.2	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.1
JKE139	0-0.2	F: Silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.3
JKE139	0.3-0.5	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.3
JKE140	0-0.2	F: Silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.2
JKE140	0.2-0.4	F: Silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.1
JKE140	0.9-1.1	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.3
DUPAM101	-	Soil	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
DUPAM102	-	Soil	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
DUPAM103	-	Soil	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
DUPAM104	-	Soil	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
DUPAM106	-	Soil	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
DUPAM107	-	Soil	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
DUPAM108	-	Soil	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
DUPAM201	-	Soil	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
Total Number of Samples					42	42	42	42	42	42	42	34
Maximum Value					<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	1.6

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**							
JKE128	0.08-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE128	0.3-0.4	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE128	0.4-0.6	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE129	0.09-0.25	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE129	0.25-0.3	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE130	0.07-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE130	0.2-0.25	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE131	0.07-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE131	0.2-0.3	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE131 (replicate)	0.2-0.3	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE132	0.08-0.15	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE132	0.15-0.3	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE133	0.08-0.2	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE133	0.2-0.3	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE134	0-0.2	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE134	0.5-0.95	F: Sility clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE134	1.5-1.7	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE135	0.05-0.25	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE135	0.4-0.6	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE135	1.5-1.7	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE135 (replicate)	1.5-1.7	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE136	0-0.2	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE136	0.4-0.8	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE136	1.5-1.7	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE137	0.04-0.2	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE137	0.5-0.7	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE138	0-0.05	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE138 (replicate)	0-0.05	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE138	0.05-0.2	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE139	0-0.2	F: Silty clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE139	0.3-0.5	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE140	0-0.2	F: Silty clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE140	0.2-0.4	F: Silty clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
JKE140	0.9-1.1	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
DUPAM101	-	Soil	0m to <1m	Sand	45	110	0.5	160	55	40	3
DUPAM102	-	Soil	0m to <1m	Sand	45	110	0.5	160	55	40	3
DUPAM103	-	Soil	0m to <1m	Sand	45	110	0.5	160	55	40	3
DUPAM104	-	Soil	0m to <1m	Sand	45	110	0.5	160	55	40	3
DUPAM106	-	Soil	0m to <1m	Sand	45	110	0.5	160	55	40	3
DUPAM107	-	Soil	0m to <1m	Sand	45	110	0.5	160	55	40	3
DUPAM108	-	Soil	0m to <1m	Sand	45	110	0.5	160	55	40	3
DUPAM201	-	Soil	0m to <1m	Sand	45	110	0.5	160	55	40	3

JKEnvironments

TABLE C-1
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**																			
JKE101	0.04-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	14	35	19	27	54	<1	<0.1	<25	<50	170	200	<0.2	<0.5	<1	<3	0.08
JKE101 (replicate)	0.04-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	18	38	19	28	58	<1	<0.1	<25	<50	140	210	<0.2	<0.5	<1	<3	0.1
JKE101	1.4-1.7	Silty clay	Coarse	8.43	43	7	14	17	18	12	3	20	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE102	0.1-0.3	F: Gravelly sand	Coarse	8.43	43	7	4	8	15	20	12	29	<1	<0.1	<25	50	<100	<100	<0.2	<0.5	<1	<3	0.09
JKE102	0.3-0.5	F: Silty clay	Coarse	8.43	43	7	6	10	9	19	3	16	<1	NA	<25	290	<100	<100	<0.2	<0.5	<1	<3	0.2
JKE102	1.2-1.6	F: Silty clay	Coarse	8.43	43	7	8	14	10	13	3	9	<1	NA	<25	170	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE102	1.6-2.0	Silty clay	Coarse	8.43	43	7	5	8	5	8	1	4	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE103	0-0.1	F: Silty sand	Coarse	8.43	43	7	<4	9	33	19	13	72	<1	<0.1	<25	180	2100	1100	<0.2	<0.5	<1	<3	0.08
JKE103	0.1-0.4	F: Sandy gravel	Coarse	8.43	43	7	<4	9	10	16	10	21	<1	<0.1	<25	<50	100	<100	<0.2	<0.5	<1	<3	<0.05
JKE104	0-0.1	F: Silty clay	Coarse	8.43	43	7	<4	10	30	51	8	93	<1	<0.1	<25	160	2300	930	<0.2	<0.5	<1	<3	0.4
JKE104	0.1-0.3	F: Sandy gravel	Coarse	8.43	43	7	<4	11	16	28	11	75	<1	<0.1	<25	<50	120	100	<0.2	<0.5	<1	<3	0.2
JKE104	0.7-1.0	F: Silty clay	Coarse	8.43	43	7	4	11	15	100	10	80	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.3
JKE104	1.5-1.7	Silty clay	Coarse	8.43	43	7	<4	12	4	17	1	5	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE105	0-0.1	F: Silty sand	Coarse	8.43	43	7	5	14	60	61	8	130	<1	<0.1	<25	80	500	280	<0.2	<0.5	<1	<3	0.2
JKE105 (replicate)	0-0.1	F: Silty sand	Coarse	8.43	43	7	8	17	73	63	8	150	<1	<0.1	<25	86	540	300	<0.2	<0.5	<1	<3	0.53
JKE105	0.5-0.95	F: Silty clay	Coarse	8.43	43	7	<4	11	10	16	7	56	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.06
JKE106	0.08-0.2	F: Silty sand	Coarse	8.43	43	7	<4	10	44	16	7	35	<1	<0.1	<25	68	740	820	<0.2	<0.5	<1	<3	0.1
JKE106	0.5-0.9	F: Silty clay	Coarse	8.43	43	7	<4	18	15	15	8	18	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.07
JKE106	1.5-1.95	F: Silty clay	Coarse	8.43	43	7	<4	8	8	13	5	15	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE106	4.5-4.7	Silty clay	Coarse	8.43	43	7	<4	14	7	13	2	8	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.06
JKE107	0-0.2	F: Silty sand	Coarse	8.43	43	7	<4	9	32	78	9	100	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.2
JKE107	1.5-1.95	F: Silty clay	Coarse	8.43	43	7	<4	12	12	18	6	23	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.09
JKE108	0.22-0.4	F: Silty clayey sand	Coarse	8.43	43	7	<4	11	13	43	8	43	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.1
JKE108	0.5-0.95	F: Silty clay	Coarse	8.43	43	7	<4	12	7	15	4	16	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE108	3.0-3.45	Silty clay	Coarse	8.43	43	7	<4	18	6	13	4	8	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.05
JKE109	0.045-0.2	F: Gravelly sand	Coarse	10.5	88	3	<4	13	34	16	8	47	<1	<0.1	<25	<50	140	170	<0.2	<0.5	<1	<3	0.4
JKE109 (replicate)	0.045-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	13	26	21	8	47	<1	<0.1	<25	<50	130	150	<0.2	<0.5	<1	<3	0.3
JKE109	0.6-0.95	F: Silty clay	Coarse	8.43	43	7	<4	13	8	15	3	8	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE110	0.04-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	20	29	16	9	48	<1	<0.1	<25	<50	250	330	<0.2	<0.5	<1	<3	0.2
JKE110 (replicate)	0.04-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	15	23	14	9	36	<1	<0.1	<25	<50	220	320	<0.2	<0.5	<1	<3	0.2
JKE110	1.5-1.95	F: Silty clay	Coarse	8.43	43	7	<4	11	24	15	10	44	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE110	3.0-3.2	Silty clay	Coarse	8.43	43	7	<4	10	5	11	1	4	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
Total Number of Samples							32	32	32	32	32	32	32	27	32	32	32	32	32	32	32	32	32
Maximum Value							14	20	73	100	28	150	<PQL	<PQL	<PQL	290	2300	1100	<PQL	<PQL	<PQL	<PQL	0.53

Concentration above the SAC **VALUE**

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**																			
JKE101	0.04-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE101 (replicate)	0.04-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE101	1.4-1.7	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE102	0.1-0.3	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE102	0.3-0.5	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	--	180	120	300	2800	50	85	70	105	20
JKE102	1.2-1.6	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	--	180	120	300	2800	50	85	70	105	20
JKE102	1.6-2.0	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	--	180	120	300	2800	50	85	70	105	20
JKE103	0-0.1	F: Silty sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE103	0.1-0.4	F: Sandy gravel	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE104	0-0.1	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE104	0.1-0.3	F: Sandy gravel	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE104	0.7-1.0	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE104	1.5-1.7	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE105	0-0.1	F: Silty sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE105 (replicate)	0-0.1	F: Silty sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE105	0.5-0.95	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	--	180	120	300	2800	50	85	70	105	20
JKE106	0.08-0.2	F: Silty sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE106	0.5-0.9	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE106	1.5-1.95	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE106	4.5-4.7	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	--	180	120	300	2800	50	85	70	105	20
JKE107	0-0.2	F: Silty sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE107	1.5-1.95	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE108	0.22-0.4	F: Silty clayey sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE108	0.5-0.95	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE108	3.0-3.45	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE109	0.045-0.2	F: Gravelly sand	Coarse	10.5	88	3	100	333	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE109 (replicate)	0.045-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE109	0.6-0.95	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE110	0.04-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE110 (replicate)	0.04-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE110	1.5-1.95	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE110	3.0-3.2	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20

JKEnvironments

TABLE C-2
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_{35} (F1)	>C_{35}-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**																			
JKE111	0-0.2	F: Sandy gravel	Coarse	8.43	43	7	5	12	28	37	7	92	<1	<0.1	<25	60	430	260	<0.2	<0.5	<1	<3	0.5
JKE111	1.4-1.7	F: Silty clay	Coarse	8.43	43	7	4	10	23	100	8	73	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.3
JKE111	1.8-2.0	F: Silty clayey sand	Coarse	8.43	43	7	6	8	12	33	5	36	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.2
JKE111	3.0-3.2	Silty clay	Coarse	8.43	43	7	5	14	8	14	1	5	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE112	0-0.02	F: Silty clay	Coarse	8.43	43	7	7	17	41	250	13	130	<1	<0.1	<25	<50	170	110	<0.2	<0.5	<1	<3	0.6
JKE112	0.5-0.95	F: Silty clay	Coarse	8.43	43	7	<4	9	7	20	3	16	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE112	1.3-1.5	Silty clay	Coarse	8.43	43	7	<4	12	5	11	2	7	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE113	0-0.2	F: Silty sandy clay	Coarse	8.43	43	7	5	12	74	27	7	120	<1	<0.1	<25	<50	560	280	<0.2	<0.5	<1	<3	<0.05
JKE114	0-0.2	F: Silty clay	Coarse	8.43	43	7	4	14	9	22	5	30	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE115	0-0.2	F: Sandy gravel	Coarse	7.5	33	10	4	12	25	39	9	71	<1	<0.1	<25	<50	170	<100	<0.2	<0.5	<1	<3	<0.05
JKE115	0.2-0.4	F: Silty clay	Coarse	8.43	43	7	4	14	22	32	5	26	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE116	0-0.2	F: Sandy gravel	Coarse	8.43	43	7	5	9	13	15	7	29	<1	<0.1	<25	66	150	<100	<0.2	<0.5	<1	<3	<0.05
JKE117	0-0.2	F: Sandy gravel	Coarse	8.43	43	7	8	25	43	22	6	70	<1	<0.1	<25	50	630	170	<0.2	<0.5	<1	<3	<0.05
JKE117 (replicate)	0-0.2	F: Sandy gravel	Coarse	8.43	43	7	5	11	48	18	5	53	<1	<0.1	<25	<50	320	150	<0.2	<0.5	<1	<3	<0.05
JKE117 (triplicate)	0-0.2	F: Sandy gravel	Coarse	8.43	43	7	6	12	42	26	7	63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE117	0.4-0.6	Silty clay	Coarse	8.43	43	7	<4	12	5	13	2	8	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE118	0-0.2	F: Silty clay	Coarse	8.43	43	7	4	10	41	44	23	80	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE119	0-0.2	F: Silty clay	Coarse	8.43	43	7	<4	13	30	33	24	56	<1	<0.1	<25	<50	310	<100	<0.2	<0.5	<1	<3	<0.05
JKE120	0-0.2	F: Silty sand	Coarse	8.43	43	7	5	11	17	23	7	36	<1	<0.1	<25	<50	180	100	<0.2	<0.5	<1	<3	0.1
JKE120	0.85-1.1	F: Silty clay	Coarse	8.43	43	7	6	13	2	24	2	3	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE120	1.5-1.7	Silty clay	Coarse	8.43	43	7	<4	8	2	11	1	3	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE121	0-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	9	41	61	23	88	<1	<0.1	<25	<50	170	120	<0.2	<0.5	<1	<3	0.5
JKE121	0.4-0.85	F: Sandy gravel	Coarse	8.43	43	7	<4	10	12	13	17	24	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.2
JKE121 (replicate)	0.4-0.85	F: Sandy gravel	Coarse	8.43	43	7	<4	8	14	13	9	26	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.2
JKE121 (triplicate)	0.4-0.85	F: Sandy gravel	Coarse	8.43	43	7	<4	11	9	16	13	24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE121	1.5-1.7	Silty clay	Coarse	8.43	43	7	4	12	5	18	2	5	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE122	0.04-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	14	25	33	15	57	<1	<0.1	<25	<50	180	170	<0.2	<0.5	<1	<3	0.3
JKE122	0.5-0.8	F: Silty clay	Coarse	8.43	43	7	4	14	15	28	14	37	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE122	0.8-1.0	F: Silty clay	Coarse	8.43	43	7	5	12	34	100	6	110	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE122	1.5-1.95	Silty clay	Coarse	8.43	43	7	<4	7	4	7	<1	3	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE123	0.03-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	24	20	28	9	40	<1	<0.1	<25	<50	<100	120	<0.2	<0.5	<1	<3	<0.05
JKE123	0.5-0.8	F: Silty clay	Coarse	8.43	43	7	<4	13	8	12	4	17	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE123	0.8-0.95	Silty clay	Coarse	8.43	43	7	<4	9	3	11	4	5	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE123 (replicate)	0.8-0.95	Silty clay	Coarse	8.43	43	7	<4	6	3	3	2	3	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE123 (triplicate)	0.8-0.95	Silty clay	Coarse	8.43	43	7	<4	7	3	6	3	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE124	0.05-0.2	F: Silty sand	Coarse	8.43	43	7	<4	13	51	4	62	33	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE124	0.2-0.3	F: Silty clay	Coarse	8.43	43	7	<4	11	24	14	29	28	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE124	0.6-0.95	Silty clay	Coarse	8.43	43	7	<4	10	4	9	2	4	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE125	0.05-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	11	48	4	64	31	<1	<0.1	<25	<50	<100	120	<0.2	<0.5	<1	<3	<0.05
JKE125	0.4-0.7	F: Silty clay	Coarse	8.43	43	7	5	12	21	58	5	57	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE125	0.7-0.95	Silty clay	Coarse	8.43	43	7	<4	11	6	9	3	6	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.07
JKE126	0.08-0.2	F: Silty sand	Coarse	8.43	43	7	<4	10	49	2	67	33	<1	<0.1	<25	<50	160	320	<0.2	<0.5	<1	<3	<0.05
JKE126	0.5-0.95	Silty clay	Coarse	8.43	43	7	<4	5	3	4	1	2	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE127	0.06-0.3	F: Gravelly sand	Coarse	8.43	43	7	<4	10	48	2	59	29	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE127	0.3-0.5	F: Silty clay	Coarse	8.43	43	7	<4	10	17	7	24	23	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE127 (replicate)	0.3-0.5	F: Silty clay	Coarse	8.43	43	7	<4	9	8	9	12	21	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE127 (triplicate)	0.3-0.5	F: Silty clay	Coarse	8.43	43	7	<4	9	10	8	14	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE127	0.6-0.95	Silty clay	Coarse	8.43	43	7	<4	11	4	10	3	6	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
Total Number of Samples							48	48	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44
Maximum Value							8	25	74	250	67	130	<PQL	<PQL	<PQL	66	630	320	<PQL	<PQL	<PQL	<PQL	0.6

Concentration above the SAC **VALUE**

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_{35} (F1)	>C_{35}-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**																			
JKE111	0-0.2	F: Sandy gravel	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE111	1.4-1.7	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE111	1.8-2.0	F: Silty clayey sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE111	3.0-3.2	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE112	0-0.02	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE112	0.5-0.95	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE112	1.3-1.5	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE113	0-0.2	F: Silty sandy clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE114	0-0.2	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE115	0-0.2	F: Sandy gravel	Coarse	7.5	33	10	100	413	248	1263	425	1322	170	180	180	120	300	2800	50	85	70	105	20
JKE115	0.2-0.4	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE116	0-0.2	F: Sandy gravel	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE117	0-0.2	F: Sandy gravel	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE117 (replicate)	0-0.2	F: Sandy gravel	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE117 (triplicate)	0-0.2	F: Sandy gravel	Coarse	8.43	43	7	100	413	258	1263	565	1422	--	--	--	--	--	--	--	--	--	--	--
JKE117	0.4-0.6	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE118	0-0.2	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE119	0-0.2	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE120	0-0.2	F: Silty sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE120	0.85-1.1	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE120	1.5-1.7	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE121	0-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE121	0.4-0.85	F: Sandy gravel	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE121 (replicate)	0.4-0.85	F: Sandy gravel	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE121 (triplicate)	0.4-0.85	F: Sandy gravel	Coarse	8.43	43	7	100	413	258	1263	565	1422	--	--	--	--	--	--	--	--	--	--	--
JKE121	1.5-1.7	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE122	0.04-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE122	0.5-0.8	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE122	0.8-1.0	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE122	1.5-1.95	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE123	0.03-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE123	0.5-0.8	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE123	0.8-0.95	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE123 (replicate)	0.8-0.95	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE123 (triplicate)	0.8-0.95	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	--	--	--	--	--	--	--	--	--	--	--
JKE124	0.05-0.2	F: Silty sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE124	0.2-0.3	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE124	0.6-0.95	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE125	0.05-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE125	0.4-0.7	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE125	0.7-0.95	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE126	0.08-0.2	F: Silty sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE126	0.5-0.95	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE127	0.06-0.3	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE127	0.3-0.5	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE127 (replicate)	0.3-0.5	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE127 (triplicate)	0.3-0.5	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	--	--	--	--	--	--	--	--	--	--	--
JKE127	0.6-0.95	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20

JKEnvironments

TABLE C-3
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**																				
JKE128	0.08-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	7	68	1	76	34	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE128	0.3-0.4	F: Silty clay	Coarse	8.43	43	7	<4	25	23	3	43	18	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE128	0.4-0.6	Silty clay	Coarse	8.43	43	7	<4	9	4	8	2	4	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE129	0.09-0.25	F: Gravelly sand	Coarse	8.43	43	7	<4	8	66	2	80	34	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE129	0.25-0.3	F: Silty clay	Coarse	8.43	43	7	<4	16	27	4	39	19	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE130	0.07-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	6	58	1	73	31	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE130	0.2-0.25	F: Silty clay	Coarse	8.43	43	7	<4	30	37	2	66	25	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE131	0.07-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	5	73	1	53	27	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE131	0.2-0.3	F: Silty clay	Coarse	8.43	43	7	<4	9	28	2	35	16	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE131 (replicate)	0.2-0.3	F: Silty clay	Coarse	8.43	43	7	<4	10	26	2	40	18	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE132	0.08-0.15	F: Gravelly sand	Coarse	8.43	43	7	<4	6	93	2	64	41	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE132	0.15-0.3	F: Silty clay	Coarse	8.43	43	7	<4	45	2	4	24	3	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE133	0.08-0.2	F: Gravelly sand	Coarse	8.43	43	7	<4	6	63	2	63	29	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE133	0.2-0.3	F: Silty clay	Coarse	8.43	43	7	<4	9	30	2	50	21	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE134	0-0.2	F: Silty sand	Coarse	7.5	8	8	<4	7	11	8	13	21	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE134	0.5-0.95	F: Sility clayey sand	Coarse	8.43	43	7	<4	6	<1	4	<1	1	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE134	1.5-1.7	Silty clay	Coarse	8.43	43	7	<4	5	4	4	<1	2	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE135	0.05-0.25	F: Gravelly sand	Coarse	8.43	43	7	<4	10	40	1	80	30	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE135	0.4-0.6	F: Silty clay	Coarse	8.43	43	7	7	16	12	49	5	86	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.1
JKE135	1.5-1.7	Silty clay	Coarse	8.43	43	7	<4	8	5	10	1	5	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE135 (replicate)	1.5-1.7	Silty clay	Coarse	8.43	43	7	<4	9	6	11	1	4	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE136	0-0.2	F: Silty clay	Coarse	8.43	43	7	<4	9	16	26	9	63	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.1
JKE136	0.4-0.8	F: Silty clay	Coarse	8.43	43	7	4	11	6	16	3	10	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE136	1.5-1.7	Silty clay	Coarse	8.43	43	7	<4	7	5	7	1	4	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE137	0.04-0.2	F: Silty clay	Coarse	8.43	43	7	5	14	21	51	7	57	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.52
JKE137	0.5-0.7	F: Silty clay	Coarse	8.43	43	7	<4	8	4	8	2	3	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE138	0-0.05	F: Silty clay	Coarse	8.43	43	7	<4	13	24	39	7	590	<1	<0.1	<25	<50	240	260	<0.2	<0.5	<1	<3	<0.05
JKE138 (replicate)	0-0.05	F: Silty clay	Coarse	8.43	43	7	<4	14	20	40	6	400	<1	<0.1	<25	<50	420	420	<0.2	<0.5	<1	<3	0.05
JKE138	0.05-0.2	F: Silty clay	Coarse	8.43	43	7	<4	14	10	21	5	38	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE139	0-0.2	F: Silty clayey sand	Coarse	8.43	43	7	<4	3	4	9	2	27	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE139	0.3-0.5	F: Silty clay	Coarse	8.43	43	7	<4	18	8	23	8	15	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE140	0-0.2	F: Silty clayey sand	Coarse	8.43	43	7	13	25	63	64	6	160	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.2
JKE140	0.2-0.4	F: Silty clayey sand	Coarse	8.43	43	7	<4	16	4	19	5	14	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
JKE140	0.9-1.1	Silty clay	Coarse	8.43	43	7	<4	12	6	13	3	8	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
DUPAM101	-	Soil	Coarse	8.43	43	7	5	7	13	20	12	29	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.1
DUPAM102	-	Soil	Coarse	8.43	43	7	4	13	62	50	8	120	<1	<0.1	<25	<50	190	120	<0.2	<0.5	<1	<3	0.3
DUPAM103	-	Soil	Coarse	8.43	43	7	4	42	34	41	8	90	<1	<0.1	<25	<50	220	<100	<0.2	<0.5	<1	<3	0.48
DUPAM104	-	Soil	Coarse	8.43	43	7	<4	7	4	8	1	4	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
DUPAM106	-	Soil	Coarse	8.43	43	7	<4	11	68	6	61	27	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
DUPAM107	-	Soil	Coarse	8.43	43	7	<4	9	19	23	8	58	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
DUPAM108	-	Soil	Coarse	8.43	43	7	<4	5	60	1	56	25	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
DUPAM201	-	Soil	Coarse	8.43	43	7	<4	5	5	6	3	24	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
Total Number of Samples							42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
Maximum Value							13	45	93	64	80	590	<PQL	<PQL	<PQL	<PQL	420	420	<PQL	<PQL	<PQL	<PQL	0.52

Concentration above the SAC **VALUE**

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**																				
JKE128	0.08-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE128	0.3-0.4	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE128	0.4-0.6	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE129	0.09-0.25	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE129	0.25-0.3	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE130	0.07-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE130	0.2-0.25	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE131	0.07-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE131	0.2-0.3	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE131 (replicate)	0.2-0.3	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE132	0.08-0.15	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE132	0.15-0.3	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE133	0.08-0.2	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE133	0.2-0.3	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE134	0-0.2	F: Silty sand	Coarse	7.5	8	8	100	413	218	1263	175	522	170	180	180	120	300	2800	50	85	70	105	20
JKE134	0.5-0.95	F: Sility clayey sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE134	1.5-1.7	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE135	0.05-0.25	F: Gravelly sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE135	0.4-0.6	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE135	1.5-1.7	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE135 (replicate)	1.5-1.7	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE136	0-0.2	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE136	0.4-0.8	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE136	1.5-1.7	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE137	0.04-0.2	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE137	0.5-0.7	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE138	0-0.05	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE138 (replicate)	0-0.05	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE138	0.05-0.2	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE139	0-0.2	F: Silty clayey sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE139	0.3-0.5	F: Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE140	0-0.2	F: Silty clayey sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE140	0.2-0.4	F: Silty clayey sand	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
JKE140	0.9-1.1	Silty clay	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
DUPAM101	-	Soil	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
DUPAM102	-	Soil	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
DUPAM103	-	Soil	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
DUPAM104	-	Soil	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
DUPAM106	-	Soil	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
DUPAM107	-	Soil	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
DUPAM108	-	Soil	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20
DUPAM201	-	Soil	Coarse	8.43	43	7	100	413	258	1263	565	1422	170	180	180	120	300	2800	50	85	70	105	20

JKEnvironments

TABLE D-1
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	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	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**																									
JKE101	0.04-0.2	F: Gravelly sand	<4	<0.4	14	35	19	<0.1	27	54	0.7	0.08	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	150	150	<0.2	<0.5	<1	<3	Not Detected
JKE101 (replicate)	0.04-0.2	F: Gravelly sand	<4	<0.4	18	38	19	0.1	28	58	0.4	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	140	140	<0.2	<0.5	<1	<3	NA
JKE101	1.4-1.7	Silty clay	14	<0.4	17	18	12	<0.1	3	20	<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
JKE102	0.1-0.3	F: Gravelly sand	4	<0.4	8	15	20	0.1	12	29	0.09	0.09	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
JKE102	0.3-0.5	F: Silty clay	6	<0.4	10	9	19	0.2	3	16	1.1	0.2	NA	NA	NA	NA	NA	<25	240	<100	<100	240	<0.2	<0.5	<1	<3	NA
JKE102	1.2-1.6	F: Silty clay	8	<0.4	14	10	13	<0.1	3	9	<0.05	<0.05	NA	NA	NA	NA	NA	<25	160	<100	<100	160	<0.2	<0.5	<1	<3	NA
JKE102	1.6-2.0	Silty clay	5	<0.4	8	5	8	<0.1	1	4	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
JKE103	0-0.1	F: Silty sand	<4	<0.4	9	33	19	<0.1	13	72	0.57	0.08	<0.1	<0.1	<0.1	<0.1	<0.1	<25	100	1200	1500	2800	<0.2	<0.5	<1	<3	Not Detected
JKE103	0.1-0.4	F: Sandy gravel	<4	<0.4	9	10	16	<0.1	10	21	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	Not Detected
JKE104	0-0.1	F: Silty clay	<4	<0.4	10	30	51	<0.1	8	93	3.2	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<25	96	1400	1300	2796	<0.2	<0.5	<1	<3	Not Detected
JKE104	0.1-0.3	F: Sandy gravel	<4	<0.4	11	16	28	<0.1	11	75	0.94	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	100	100	<0.2	<0.5	<1	<3	Not Detected
JKE104	0.7-1.0	F: Silty clay	4	<0.4	11	15	100	0.6	10	80	3	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
JKE104	1.5-1.7	Silty clay	<4	<0.4	12	4	17	0.4	1	5	<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
JKE105	0-0.1	F: Silty sand	5	<0.4	14	60	61	0.2	8	130	2.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	63	260	390	713	<0.2	<0.5	<1	<3	Not Detected
JKE105 (replicate)	0-0.1	F: Silty sand	8	<0.4	17	73	63	0.2	8	150	4.9	0.53	<0.1	<0.1	<0.1	<0.1	<0.1	<25	70	290	410	770	<0.2	<0.5	<1	<3	NA
JKE105	0.5-0.95	F: Silty clay	<4	<0.4	11	10	16	<0.1	7	56	0.06	0.06	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
JKE106	0.08-0.2	F: Silty sand	<4	<0.4	10	44	16	<0.1	7	35	1.5	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	310	730	1040	<0.2	<0.5	<1	<3	Not Detected
JKE106	0.5-0.9	F: Silty clay	<4	<0.4	18	15	15	<0.1	8	18	0.86	0.07	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
JKE106	1.5-1.95	F: Silty clay	<4	<0.4	8	8	13	<0.1	5	15	<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
JKE106	4.5-4.7	Silty clay	<4	<0.4	14	7	13	<0.1	2	8	0.06	0.06	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
JKE107	0-0.2	F: Silty sand	<4	<0.4	9	32	78	0.2	9	100	2.8	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
JKE107	1.5-1.95	F: Silty clay	<4	<0.4	12	12	18	<0.1	6	23	0.09	0.09	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
JKE108	0.22-0.4	F: Silty clayey sand	<4	<0.4	11	13	43	<0.1	8	43	0.4	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
JKE108	0.5-0.95	F: Silty clay	<4	<0.4	12	7	15	<0.1	4	16	<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
JKE108	3.0-3.45	Silty clay	<4	<0.4	18	6	13	<0.1	4	8	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
JKE109	0.045-0.2	F: Gravelly sand	<4	<0.4	13	34	16	<0.1	8	47	3.1	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
JKE109 (replicate)	0.045-0.2	F: Gravelly sand	<4	<0.4	13	26	21	<0.1	8	47	3.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	110	110	<0.2	<0.5	<1	<3	NA
JKE109	0.6-0.95	F: Silty clay	<4	<0.4	13	8	15	<0.1	3	8	<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
JKE110	0.04-0.2	F: Gravelly sand	<4	<0.4	20	29	16	<0.1	9	48	1.6	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	120	250	370	<0.2	<0.5	<1	<3	Not Detected
JKE110 (replicate)	0.04-0.2	F: Gravelly sand	<4	<0.4	15	23	14	<0.1	9	36	1.7	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	120	230	350	<0.2	<0.5	<1	<3	NA
JKE110	1.5-1.95	F: Silty clay	<4	<0.4	11	24	15	<0.1	10	44	0.2	<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
JKE110	3.0-3.2	Silty clay	<4	<0.4	10	5	11	<0.1	1	4	<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
JKE111	0-0.2	F: Sandy gravel	5	<0.4	12	28	37	<0.1	7	92	4.4	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<25	51	210	340	601	<0.2	<0.5	<1	<3	Not Detected
JKE111	1.4-1.7	F: Silty clay	4	<0.4	10	23	100	0.3	8	73	4	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
JKE111	1.8-2.0	F: Silty clayey sand	6	<0.4	8	12	33	0.1	5	36	0.94	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
JKE111	3.0-3.2	Silty clay	5	<0.4	14	8	14	<0.1	1	5	<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
JKE112	0-0.02	F: Silty clay	7	<0.4	17	41	**250**	<0.1	13	130	3.5	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	130	130	<0.2	<0.5	<1	<3	Not Detected
JKE112	0.5-0.95	F: Silty clay	<4	<0.4	9	7	20	0.2	3	16	<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
JKE112	1.3-1.5	Silty clay	<4	<0.4	12	5	11	<0.1	2	7	<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
JKE113	0-0.2	F: Silty sandy clay	5	<0.4	12	74	27	0.2	7	120	0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	280	420	700	<0.2	<0.5	<1	<3	Not Detected
JKE114	0-0.2	F: Silty clay	4	<0.4	14	9	22	<0.1	5	30	<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
JKE115	0-0.2	F: Sandy gravel	4	<0.4	12	25	39	0.1	9	71	0.2	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	120	120	<0.2	<0.5	<1	<3	Not Detected
JKE115	0.2-0.4	F: Silty clay	4	<0.4	14	22	32	0.1	5	26	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
JKE116	0-0.2	F: Sandy gravel	5	<0.4	9	13	15	<0.1	7	29	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	110	120	230	<0.2	<0.5	<1	<3	Not Detected
JKE117	0-0.2	F: Sandy gravel	8	<0.4	25	43	22	<0.1	6	70	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	68	420	310	798	<0.2	<0.5	<1	<3	Not Detected
JKE117 (replicate)	0-0.2	F: Sandy gravel	5	<0.4	11	48	18	<0.1	5	53	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	170	220	390	<0.2	<0.5	<1	<3	NA
JKE117 (triplicate)	0-0.2	F: Sandy gravel	6	<0.4	12	42	26	<0.1	7	63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE117	0.4-0.6	Silty clay	<4	<0.4	12	5	13	<0.1	2	8	<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
JKE118	0-0.2	F: Silty clay	4	<0.4	10	41	44	0.2	23	80	1.1	<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
JKE119	0-0.2	F: Silty clay	<4	<0.4	13	30	33	0.1	24	56	0.52	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	260	<100	260	<0.2	<0.5	<1	<3	Not Detected
JKE120	0-0.2	F: Silty sand	5	<0.4	11	17	23	<0.1	7	36	0.78	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	130	130	<0.2	<0.5	<1	<3	Not Detected
JKE120	0.85-1.1	F: Silty clay	6	<0.4	13	2	24	<0.1	2	3	<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
JKE120	1.5-1.7	Silty clay	<4	<0.4	8	2	11	<0.1	1	3	<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
JKE121	0-0.2	F: Gravelly sand	<4	<0.4	9	41	61	0.2	23	88	2.4	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	140	140	<0.2	<0.5	<1	<3	Not Detected
JKE121	0.4-0.85	F: Sandy gravel	<4	<0.4	10	12	13	<0.1	17	24	0.66	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
JKE121 (replicate)	0.4-0.85	F: Sandy gravel	<4	<0.4	8	14	13	<0.1	9	26	0.99	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
JKE121 (triplicate)	0.4-0.85	F: Sandy gravel	<4	<0.4	11	9	16	<0.1	13	24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE121	1.5-1.7	Silty clay	4	<0.4	12	5	18	<0.1	2	5	<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
JKE122	0.04-0.2	F: Gravelly sand	<4	<0.4	14	25	33	<0.1	15	57	1.9	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	140	140	<0.2	<0.5	<1	<3	Not Detected
JKE122	0.5-0.8	F: Silty clay	4	<0.4	14	15	28	0.2	14	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
JKE122	0.8-1.0	F: Silty clay	5	<0.4	12	34	100	1.4	6	110	3.5	<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
JKE122	1.5-1.95	Silty clay	<4	<0.4	7	4	7	<0.1	<1	3	<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

Concentration above the CT1 — **VALUE**
Concentration above SCC1 — **VALUE**
Concentration above the SCC2 — **VALUE**

TABLE D-2
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	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	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**																									
JKE123	0.03-0.2	F: Gravelly sand	<4	<0.4	24	20	28	<0.1	9	40	0.62	<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
JKE123	0.5-0.8	F: Silty clay	<4	<0.4	13	8	12	<0.1	4	17	<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
JKE123	0.8-0.95	Silty clay	<4	<0.4	9	3	11	<0.1	4	5	<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
JKE123 (replicate)	0.8-0.95	Silty clay	<4	<0.4	6	3	3	<0.1	2	3	<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
JKE123 (triplicate)	0.8-0.95	Silty clay	<4	<0.4	7	3	6	<0.1	3	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE124	0.05-0.2	F: Silty sand	<4	<0.4	13	51	4	<0.1	**62**	33	<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
JKE124	0.2-0.3	F: Silty clay	<4	<0.4	11	24	14	<0.1	29	28	<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
JKE124	0.6-0.95	Silty clay	<4	<0.4	10	4	9	<0.1	2	4	<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
JKE125	0.05-0.2	F: Gravelly sand	<4	<0.4	11	48	4	<0.1	**64**	31	<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
JKE125	0.4-0.7	F: Silty clay	5	<0.4	12	21	58	0.3	5	57	0.2	<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
JKE125	0.7-0.95	Silty clay	<4	<0.4	11	6	9	<0.1	3	6	0.07	0.07	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
JKE126	0.08-0.2	F: Silty sand	<4	<0.4	10	49	2	<0.1	**67**	33	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	200	200	<0.2	<0.5	<1	<3	Not Detected
JKE126	0.5-0.95	Silty clay	<4	<0.4	5	3	4	<0.1	1	2	<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
JKE127	0.06-0.3	F: Gravelly sand	<4	<0.4	10	48	2	<0.1	**59**	29	<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
JKE127	0.3-0.5	F: Silty clay	<4	<0.4	10	17	7	<0.1	24	23	<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
JKE127 (replicate)	0.3-0.5	F: Silty clay	<4	<0.4	9	8	9	<0.1	12	21	<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
JKE127 (triplicate)	0.3-0.5	F: Silty clay	<4	<0.4	9	10	8	<0.1	14	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JKE127	0.6-0.95	Silty clay	<4	<0.4	11	4	10	<0.1	3	6	<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
JKE128	0.08-0.2	F: Gravelly sand	<4	<0.4	7	68	1	<0.1	**76**	34	<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
JKE128	0.3-0.4	F: Silty clay	<4	<0.4	25	23	3	<0.1	**43**	18	<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
JKE128	0.4-0.6	Silty clay	<4	<0.4	9	4	8	<0.1	2	4	4.7	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
JKE129	0.09-0.25	F: Gravelly sand	<4	<0.4	8	66	2	<0.1	**80**	34	<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
JKE129	0.25-0.3	F: Silty clay	<4	<0.4	16	27	4	<0.1	39	19	<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
JKE130	0.07-0.2	F: Gravelly sand	<4	<0.4	6	58	1	<0.1	**73**	31	<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
JKE130	0.2-0.25	F: Silty clay	<4	<0.4	30	37	2	<0.1	**66**	25	<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
JKE131	0.07-0.2	F: Gravelly sand	<4	<0.4	5	73	1	<0.1	**53**	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
JKE131	0.2-0.3	F: Silty clay	<4	<0.4	9	28	2	<0.1	35	16	<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
JKE131 (replicate)	0.2-0.3	F: Silty clay	<4	<0.4	10	26	2	<0.1	40	18	<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
JKE132	0.08-0.15	F: Gravelly sand	<4	<0.4	6	93	2	0.2	**64**	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	Not Detected
JKE132	0.15-0.3	F: Silty clay	<4	<0.4	45	2	4	<0.1	24	3	<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
JKE133	0.08-0.2	F: Gravelly sand	<4	<0.4	6	63	2	<0.1	**63**	29	<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
JKE133	0.2-0.3	F: Silty clay	<4	<0.4	9	30	2	<0.1	**50**	21	<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
JKE134	0-0.2	F: Silty sand	<4	<0.4	7	11	8	<0.1	13	21	<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
JKE134	0.5-0.95	F: Silty clayey sand	<4	<0.4	6	<1	4	<0.1	<1	1	<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
JKE134	1.5-1.7	Silty clay	<4	<0.4	5	4	4	<0.1	<1	2	<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
JKE135	0.05-0.25	F: Gravelly sand	<4	<0.4	10	40	1	<0.1	**80**	30	<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
JKE135	0.4-0.6	F: Silty clay	7	<0.4	16	12	49	0.1	5	86	0.1	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
JKE135	1.5-1.7	Silty clay	<4	<0.4	8	5	10	<0.1	1	5	<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
JKE135 (replicate)	1.5-1.7	Silty clay	<4	<0.4	9	6	11	<0.1	1	4	<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
JKE136	0-0.2	F: Silty clay	<4	<0.4	9	16	26	0.1	9	63	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	**Detected**
JKE136	0.4-0.8	F: Silty clay	4	<0.4	11	6	16	<0.1	3	10	<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
JKE136	1.5-1.7	Silty clay	<4	<0.4	7	5	7	<0.1	1	4	<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
JKE137	0.04-0.2	F: Silty clay	5	<0.4	14	21	51	0.2	7	57	4	0.52	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	**Detected**
JKE137	0.5-0.7	F: Silty clay	<4	<0.4	8	4	8	<0.1	2	3	<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
JKE138	0-0.05	F: Silty clay	<4	<0.4	13	24	39	<0.1	7	590	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	280	280	<0.2	<0.5	<1	<3	Not Detected
JKE138 (replicate)	0-0.05	F: Silty clay	<4	<0.4	14	20	40	<0.1	6	400	0.53	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	140	420	560	<0.2	<0.5	<1	<3	NA
JKE138	0.05-0.2	F: Silty clay	<4	<0.4	14	10	21	<0.1	5	38	<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
JKE139	0-0.2	F: Silty clayey sand	<4	<0.4	3	4	9	<0.1	2	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
JKE139	0.3-0.5	F: Silty clay	<4	<0.4	18	8	23	<0.1	8	15	<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
JKE140	0-0.2	F: Silty clayey sand	13	<0.4	25	63	64	<0.1	6	160	3.3	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
JKE140	0.2-0.4	F: Silty clayey sand	<4	<0.4	16	4	19	<0.1	5	14	<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
JKE140	0.9-1.1	Silty clay	<4	<0.4	12	6	13	<0.1	3	8	<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
DUPAM101	-	Soil	5	<0.4	7	13	20	0.1	12	29	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
DUPAM102	-	Soil	4	<0.4	13	62	50	0.1	8	120	2.5	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	190	190	<0.2	<0.5	<1	<3	NA
DUPAM103	-	Soil	4	<0.4	42	34	41	<0.1	8	90	3.5	0.48	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	190	190	<0.2	<0.5	<1	<3	NA
DUPAM104	-	Soil	<4	<0.4	7	4	8	<0.1	1	4	<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
DUPAM106	-	Soil	<4	<0.4	11	68	6	<0.1	**61**	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	NA
DUPAM107	-	Soil	<4	<0.4	9	19	23	0.1	8	58	<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
DUPAM108	-	Soil	<4	<0.4	5	60	1	<0.1	**56**	25	<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
DUPAM201	-	Soil	<4	<0.4	5	5	6	<0.1	3	24	<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
Total Number of samples			122	122	122	122	122	122	122	122	118	118	113	113	113	113	113	118	118	118	118	118	118	118	118	118	69
Maximum Value			14	<PQL	45	93	250	1.4	80	590	4.9	0.6	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	240	1400	1500	2800	<PQL	<PQL	<PQL	<PQL	Detected

Concentration above the CT1 — **VALUE**
Concentration above SCC1 — **VALUE**
Concentration above the SCC2 — **VALUE**

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**		
JKE112	0-0.02	F: Silty clay	<0.03	NA
JKE124	0.05-0.2	F: Silty sand	NA	0.06
JKE125	0.05-0.2	F: Gravelly sand	NA	0.08
JKE126	0.08-0.2	F: Silty sand	NA	0.1
JKE127	0.06-0.3	F: Gravelly sand	NA	0.08
JKE128	0.08-0.2	F: Gravelly sand	NA	0.1
JKE128	0.3-0.4	F: Silty clay	NA	0.05
JKE129	0.09-0.25	F: Gravelly sand	NA	0.1
JKE130	0.07-0.2	F: Gravelly sand	NA	0.1
JKE130	0.2-0.25	F: Silty clay	NA	0.1
JKE131	0.07-0.2	F: Gravelly sand	NA	0.1
JKE132	0.08-0.15	F: Gravelly sand	NA	0.09
JKE133	0.08-0.2	F: Gravelly sand	NA	0.09
JKE133	0.2-0.3	F: Silty clay	NA	0.08
JKE135	0.05-0.25	F: Gravelly sand	NA	0.1
DUPAM106	-	Soil	NA	0.1
DUPAM108	-	Soil	NA	0.1
Total Number of samples			1	16
Maximum Value			<PQL	0.1

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

JKEnvironments

TABLE F-1
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**				
JKE101	0.04-0.2	Coarse	<25	<50	170	200
JKE101 (replicate)	0.04-0.2	Coarse	<25	<50	140	210
JKE101	1.4-1.7	Coarse	<25	<50	<100	<100
JKE102	0.1-0.3	Coarse	<25	50	<100	<100
JKE102	0.3-0.5	Coarse	<25	290	<100	<100
JKE102	1.2-1.6	Coarse	<25	170	<100	<100
JKE102	1.6-2.0	Coarse	<25	<50	<100	<100
JKE103	0-0.1	Coarse	<25	180	2100	1100
JKE103	0.1-0.4	Coarse	<25	<50	100	<100
JKE104	0-0.1	Coarse	<25	160	2300	930
JKE104	0.1-0.3	Coarse	<25	<50	120	100
JKE104	0.7-1.0	Coarse	<25	<50	<100	<100
JKE104	1.5-1.7	Coarse	<25	<50	<100	<100
JKE105	0-0.1	Coarse	<25	80	500	280
JKE105 (replicate)	0-0.1	Coarse	<25	86	540	300
JKE105	0.5-0.95	Coarse	<25	<50	<100	<100
JKE106	0.08-0.2	Coarse	<25	68	740	820
JKE106	0.5-0.9	Coarse	<25	<50	<100	<100
JKE106	1.5-1.95	Coarse	<25	<50	<100	<100
JKE106	4.5-4.7	Coarse	<25	<50	<100	<100
JKE107	0-0.2	Coarse	<25	<50	<100	<100
JKE107	1.5-1.95	Coarse	<25	<50	<100	<100
JKE108	0.22-0.4	Coarse	<25	<50	<100	<100
JKE108	0.5-0.95	Coarse	<25	<50	<100	<100
JKE108	3.0-3.45	Coarse	<25	<50	<100	<100
JKE109	0.045-0.2	Coarse	<25	<50	140	170
JKE109 (replicate)	0.045-0.2	Coarse	<25	<50	130	150
JKE109	0.6-0.95	Coarse	<25	<50	<100	<100
JKE110	0.04-0.2	Coarse	<25	<50	250	330
JKE110 (replicate)	0.04-0.2	Coarse	<25	<50	220	320
JKE110	1.5-1.95	Coarse	<25	<50	<100	<100
JKE110	3.0-3.2	Coarse	<25	<50	<100	<100
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**				
JKE101	0.04-0.2	Coarse	700	1000	2500	10000
JKE101 (replicate)	0.04-0.2	Coarse	700	1000	2500	10000
JKE101	1.4-1.7	Coarse	700	1000	2500	10000
JKE102	0.1-0.3	Coarse	700	1000	2500	10000
JKE102	0.3-0.5	Coarse	700	1000	2500	10000
JKE102	1.2-1.6	Coarse	700	1000	2500	10000
JKE102	1.6-2.0	Coarse	700	1000	2500	10000
JKE103	0-0.1	Coarse	700	1000	2500	10000
JKE103	0.1-0.4	Coarse	700	1000	2500	10000
JKE104	0-0.1	Coarse	700	1000	2500	10000
JKE104	0.1-0.3	Coarse	700	1000	2500	10000
JKE104	0.7-1.0	Coarse	700	1000	2500	10000
JKE104	1.5-1.7	Coarse	700	1000	2500	10000
JKE105	0-0.1	Coarse	700	1000	2500	10000
JKE105 (replicate)	0-0.1	Coarse	700	1000	2500	10000
JKE105	0.5-0.95	Coarse	700	1000	2500	10000
JKE106	0.08-0.2	Coarse	700	1000	2500	10000
JKE106	0.5-0.9	Coarse	700	1000	2500	10000
JKE106	1.5-1.95	Coarse	700	1000	2500	10000
JKE106	4.5-4.7	Coarse	700	1000	2500	10000
JKE107	0-0.2	Coarse	700	1000	2500	10000
JKE107	1.5-1.95	Coarse	700	1000	2500	10000
JKE108	0.22-0.4	Coarse	700	1000	2500	10000
JKE108	0.5-0.95	Coarse	700	1000	2500	10000
JKE108	3.0-3.45	Coarse	700	1000	2500	10000
JKE109	0.045-0.2	Coarse	700	1000	2500	10000
JKE109 (replicate)	0.045-0.2	Coarse	700	1000	2500	10000
JKE109	0.6-0.95	Coarse	700	1000	2500	10000
JKE110	0.04-0.2	Coarse	700	1000	2500	10000
JKE110 (replicate)	0.04-0.2	Coarse	700	1000	2500	10000
JKE110	1.5-1.95	Coarse	700	1000	2500	10000
JKE110	3.0-3.2	Coarse	700	1000	2500	10000

TABLE F-2
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**				
JKE111	0-0.2	Coarse	<25	60	430	260
JKE111	1.4-1.7	Coarse	<25	<50	<100	<100
JKE111	1.8-2.0	Coarse	<25	<50	<100	<100
JKE111	3.0-3.2	Coarse	<25	<50	<100	<100
JKE112	0-0.02	Coarse	<25	<50	170	110
JKE112	0.5-0.95	Coarse	<25	<50	<100	<100
JKE112	1.3-1.5	Coarse	<25	<50	<100	<100
JKE113	0-0.2	Coarse	<25	<50	560	280
JKE114	0-0.2	Coarse	<25	<50	<100	<100
JKE115	0-0.2	Coarse	<25	<50	170	<100
JKE115	0.2-0.4	Coarse	<25	<50	<100	<100
JKE116	0-0.2	Coarse	<25	66	150	<100
JKE117	0-0.2	Coarse	<25	50	630	170
JKE117 (replicate)	0-0.2	Coarse	<25	<50	320	150
JKE117	0.4-0.6	Coarse	<25	<50	<100	<100
JKE118	0-0.2	Coarse	<25	<50	<100	<100
JKE119	0-0.2	Coarse	<25	<50	310	<100
JKE120	0-0.2	Coarse	<25	<50	180	100
JKE120	0.85-1.1	Coarse	<25	<50	<100	<100
JKE120	1.5-1.7	Coarse	<25	<50	<100	<100
JKE121	0-0.2	Coarse	<25	<50	170	120
JKE121	0.4-0.85	Coarse	<25	<50	<100	<100
JKE121 (replicate)	0.4-0.85	Coarse	<25	<50	<100	<100
JKE121	1.5-1.7	Coarse	<25	<50	<100	<100
JKE122	0.04-0.2	Coarse	<25	<50	180	170
JKE122	0.5-0.8	Coarse	<25	<50	<100	<100
JKE122	0.8-1.0	Coarse	<25	<50	<100	<100
JKE122	1.5-1.95	Coarse	<25	<50	<100	<100
JKE123	0.03-0.2	Coarse	<25	<50	<100	120
JKE123	0.5-0.8	Coarse	<25	<50	<100	<100
JKE123	0.8-0.95	Coarse	<25	<50	<100	<100
JKE123 (replicate)	0.8-0.95	Coarse	<25	<50	<100	<100
JKE124	0.05-0.2	Coarse	<25	<50	<100	<100
JKE124	0.2-0.3	Coarse	<25	<50	<100	<100
JKE124	0.6-0.95	Coarse	<25	<50	<100	<100
JKE125	0.05-0.2	Coarse	<25	<50	<100	120
JKE125	0.4-0.7	Coarse	<25	<50	<100	<100
JKE125	0.7-0.95	Coarse	<25	<50	<100	<100
JKE126	0.08-0.2	Coarse	<25	<50	160	320
JKE126	0.5-0.95	Coarse	<25	<50	<100	<100
JKE127	0.06-0.3	Coarse	<25	<50	<100	<100
JKE127	0.3-0.5	Coarse	<25	<50	<100	<100
JKE127 (replicate)	0.3-0.5	Coarse	<25	<50	<100	<100
JKE127	0.6-0.95	Coarse	<25	<50	<100	<100

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**				
JKE111	0-0.2	Coarse	700	1000	2500	10000
JKE111	1.4-1.7	Coarse	700	1000	2500	10000
JKE111	1.8-2.0	Coarse	700	1000	2500	10000
JKE111	3.0-3.2	Coarse	700	1000	2500	10000
JKE112	0-0.02	Coarse	700	1000	2500	10000
JKE112	0.5-0.95	Coarse	700	1000	2500	10000
JKE112	1.3-1.5	Coarse	700	1000	2500	10000
JKE113	0-0.2	Coarse	700	1000	2500	10000
JKE114	0-0.2	Coarse	700	1000	2500	10000
JKE115	0-0.2	Coarse	700	1000	2500	10000
JKE115	0.2-0.4	Coarse	700	1000	2500	10000
JKE116	0-0.2	Coarse	700	1000	2500	10000
JKE117	0-0.2	Coarse	700	1000	2500	10000
JKE117 (replicate)	0-0.2	Coarse	700	1000	2500	10000
JKE117	0.4-0.6	Coarse	700	1000	2500	10000
JKE118	0-0.2	Coarse	700	1000	2500	10000
JKE119	0-0.2	Coarse	700	1000	2500	10000
JKE120	0-0.2	Coarse	700	1000	2500	10000
JKE120	0.85-1.1	Coarse	700	1000	2500	10000
JKE120	1.5-1.7	Coarse	700	1000	2500	10000
JKE121	0-0.2	Coarse	700	1000	2500	10000
JKE121	0.4-0.85	Coarse	700	1000	2500	10000
JKE121 (replicate)	0.4-0.85	Coarse	700	1000	2500	10000
JKE121	1.5-1.7	Coarse	700	1000	2500	10000
JKE122	0.04-0.2	Coarse	700	1000	2500	10000
JKE122	0.5-0.8	Coarse	700	1000	2500	10000
JKE122	0.8-1.0	Coarse	700	1000	2500	10000
JKE122	1.5-1.95	Coarse	700	1000	2500	10000
JKE123	0.03-0.2	Coarse	700	1000	2500	10000
JKE123	0.5-0.8	Coarse	700	1000	2500	10000
JKE123	0.8-0.95	Coarse	700	1000	2500	10000
JKE123 (replicate)	0.8-0.95	Coarse	700	1000	2500	10000
JKE124	0.05-0.2	Coarse	700	1000	2500	10000
JKE124	0.2-0.3	Coarse	700	1000	2500	10000
JKE124	0.6-0.95	Coarse	700	1000	2500	10000
JKE125	0.05-0.2	Coarse	700	1000	2500	10000
JKE125	0.4-0.7	Coarse	700	1000	2500	10000
JKE125	0.7-0.95	Coarse	700	1000	2500	10000
JKE126	0.08-0.2	Coarse	700	1000	2500	10000
JKE126	0.5-0.95	Coarse	700	1000	2500	10000
JKE127	0.06-0.3	Coarse	700	1000	2500	10000
JKE127	0.3-0.5	Coarse	700	1000	2500	10000
JKE127 (replicate)	0.3-0.5	Coarse	700	1000	2500	10000
JKE127	0.6-0.95	Coarse	700	1000	2500	10000

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TABLE F-3
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**				
JKE128	0.08-0.2	Coarse	<25	<50	<100	<100
JKE128	0.3-0.4	Coarse	<25	<50	<100	<100
JKE128	0.4-0.6	Coarse	<25	<50	<100	<100
JKE129	0.09-0.25	Coarse	<25	<50	<100	<100
JKE129	0.25-0.3	Coarse	<25	<50	<100	<100
JKE130	0.07-0.2	Coarse	<25	<50	<100	<100
JKE130	0.2-0.25	Coarse	<25	<50	<100	<100
JKE131	0.07-0.2	Coarse	<25	<50	<100	<100
JKE131	0.2-0.3	Coarse	<25	<50	<100	<100
JKE131 (replicate)	0.2-0.3	Coarse	<25	<50	<100	<100
JKE132	0.08-0.15	Coarse	<25	<50	<100	<100
JKE132	0.15-0.3	Coarse	<25	<50	<100	<100
JKE133	0.08-0.2	Coarse	<25	<50	<100	<100
JKE133	0.2-0.3	Coarse	<25	<50	<100	<100
JKE134	0-0.2	Coarse	<25	<50	<100	<100
JKE134	0.5-0.95	Coarse	<25	<50	<100	<100
JKE134	1.5-1.7	Coarse	<25	<50	<100	<100
JKE135	0.05-0.25	Coarse	<25	<50	<100	<100
JKE135	0.4-0.6	Coarse	<25	<50	<100	<100
JKE135	1.5-1.7	Coarse	<25	<50	<100	<100
JKE135 (replicate)	1.5-1.7	Coarse	<25	<50	<100	<100
JKE136	0-0.2	Coarse	<25	<50	<100	<100
JKE136	0.4-0.8	Coarse	<25	<50	<100	<100
JKE136	1.5-1.7	Coarse	<25	<50	<100	<100
JKE137	0.04-0.2	Coarse	<25	<50	<100	<100
JKE137	0.5-0.7	Coarse	<25	<50	<100	<100
JKE138	0-0.05	Coarse	<25	<50	240	260
JKE138 (replicate)	0-0.05	Coarse	<25	<50	420	420
JKE138	0.05-0.2	Coarse	<25	<50	<100	<100
JKE139	0-0.2	Coarse	<25	<50	<100	<100
JKE139	0.3-0.5	Coarse	<25	<50	<100	<100
JKE140	0-0.2	Coarse	<25	<50	<100	<100
JKE140	0.2-0.4	Coarse	<25	<50	<100	<100
JKE140	0.9-1.1	Coarse	<25	<50	<100	<100
DUPAM101	-	Coarse	<25	<50	<100	<100
DUPAM102	-	Coarse	<25	<50	190	120
DUPAM103	-	Coarse	<25	<50	220	<100
DUPAM104	-	Coarse	<25	<50	<100	<100
DUPAM106	-	Coarse	<25	<50	<100	<100
DUPAM107	-	Coarse	<25	<50	<100	<100
DUPAM108	-	Coarse	<25	<50	<100	<100
DUPAM201	-	Coarse	<25	<50	<100	<100
Total Number of Samples			118	118	118	118
Maximum Value			<PQL	290	2300	1100

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**				
JKE128	0.08-0.2	Coarse	700	1000	2500	10000
JKE128	0.3-0.4	Coarse	700	1000	2500	10000
JKE128	0.4-0.6	Coarse	700	1000	2500	10000
JKE129	0.09-0.25	Coarse	700	1000	2500	10000
JKE129	0.25-0.3	Coarse	700	1000	2500	10000
JKE130	0.07-0.2	Coarse	700	1000	2500	10000
JKE130	0.2-0.25	Coarse	700	1000	2500	10000
JKE131	0.07-0.2	Coarse	700	1000	2500	10000
JKE131	0.2-0.3	Coarse	700	1000	2500	10000
JKE131 (replicate)	0.2-0.3	Coarse	700	1000	2500	10000
JKE132	0.08-0.15	Coarse	700	1000	2500	10000
JKE132	0.15-0.3	Coarse	700	1000	2500	10000
JKE133	0.08-0.2	Coarse	700	1000	2500	10000
JKE133	0.2-0.3	Coarse	700	1000	2500	10000
JKE134	0-0.2	Coarse	700	1000	2500	10000
JKE134	0.5-0.95	Coarse	700	1000	2500	10000
JKE134	1.5-1.7	Coarse	700	1000	2500	10000
JKE135	0.05-0.25	Coarse	700	1000	2500	10000
JKE135	0.4-0.6	Coarse	700	1000	2500	10000
JKE135	1.5-1.7	Coarse	700	1000	2500	10000
JKE135 (replicate)	1.5-1.7	Coarse	700	1000	2500	10000
JKE136	0-0.2	Coarse	700	1000	2500	10000
JKE136	0.4-0.8	Coarse	700	1000	2500	10000
JKE136	1.5-1.7	Coarse	700	1000	2500	10000
JKE137	0.04-0.2	Coarse	700	1000	2500	10000
JKE137	0.5-0.7	Coarse	700	1000	2500	10000
JKE138	0-0.05	Coarse	700	1000	2500	10000
JKE138 (replicate)	0-0.05	Coarse	700	1000	2500	10000
JKE138	0.05-0.2	Coarse	700	1000	2500	10000
JKE139	0-0.2	Coarse	700	1000	2500	10000
JKE139	0.3-0.5	Coarse	700	1000	2500	10000
JKE140	0-0.2	Coarse	700	1000	2500	10000
JKE140	0.2-0.4	Coarse	700	1000	2500	10000
JKE140	0.9-1.1	Coarse	700	1000	2500	10000
DUPAM101	-	Coarse	700	1000	2500	10000
DUPAM102	-	Coarse	700	1000	2500	10000
DUPAM103	-	Coarse	700	1000	2500	10000
DUPAM104	-	Coarse	700	1000	2500	10000
DUPAM106	-	Coarse	700	1000	2500	10000
DUPAM107	-	Coarse	700	1000	2500	10000
DUPAM108	-	Coarse	700	1000	2500	10000
DUPAM201	-	Coarse	700	1000	2500	10000

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TABLE G1
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		4,400	3,300	4,500	6,300	100	14,000	4,500	12,000	1,400	
Site Use		RESIDENTIAL WITH ACCESSIBLE SOIL- DIRECT SOIL CONTACT									
Sample Reference	**Sample Depth**										
JKE101	0.04-0.2	<25	<50	170	200	<0.2	<0.5	<1	<3	<1	0
JKE101 (replicate)	0.04-0.2	<25	<50	140	210	<0.2	<0.5	<1	<3	<1	0
JKE101	1.4-1.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE102	0.1-0.3	<25	50	<100	<100	<0.2	<0.5	<1	<3	<1	3
JKE102	0.3-0.5	<25	290	<100	<100	<0.2	<0.5	<1	<3	<1	57
JKE102	1.2-1.6	<25	170	<100	<100	<0.2	<0.5	<1	<3	<1	120
JKE102	1.6-2.0	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	41
JKE103	0-0.1	<25	180	2100	1100	<0.2	<0.5	<1	<3	<1	0
JKE103	0.1-0.4	<25	<50	100	<100	<0.2	<0.5	<1	<3	<1	0
JKE104	0-0.1	<25	160	2300	930	<0.2	<0.5	<1	<3	<1	0
JKE104	0.1-0.3	<25	<50	120	100	<0.2	<0.5	<1	<3	<1	0
JKE104	0.7-1.0	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	1
JKE104	1.5-1.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE105	0-0.1	<25	80	500	280	<0.2	<0.5	<1	<3	<1	0
JKE105 (replicate)	0-0.1	<25	86	540	300	<0.2	<0.5	<1	<3	<1	0
JKE105	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	14
JKE106	0.08-0.2	<25	68	740	820	<0.2	<0.5	<1	<3	<1	0
JKE106	0.5-0.9	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	1
JKE106	1.5-1.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	1
JKE106	4.5-4.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	3
JKE107	0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE107	1.5-1.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE108	0.22-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE108	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE108	3.0-3.45	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE109	0.045-0.2	<25	<50	140	170	<0.2	<0.5	<1	<3	<1	0
JKE109 (replicate)	0.045-0.2	<25	<50	130	150	<0.2	<0.5	<1	<3	<1	0
JKE109	0.6-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE110	0.04-0.2	<25	<50	250	330	<0.2	<0.5	<1	<3	<1	0
JKE110 (replicate)	0.04-0.2	<25	<50	220	320	<0.2	<0.5	<1	<3	<1	0
JKE110	1.5-1.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE110	3.0-3.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE111	0-0.2	<25	60	430	260	<0.2	<0.5	<1	<3	<1	0
JKE111	1.4-1.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE111	1.8-2.0	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE111	3.0-3.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE112	0-0.02	<25	<50	170	110	<0.2	<0.5	<1	<3	<1	0
JKE112	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE112	1.3-1.5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE113	0-0.2	<25	<50	560	280	<0.2	<0.5	<1	<3	<1	0
JKE114	0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE115	0-0.2	<25	<50	170	<100	<0.2	<0.5	<1	<3	<1	0
JKE115	0.2-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE116	0-0.2	<25	66	150	<100	<0.2	<0.5	<1	<3	<1	0
JKE117	0-0.2	<25	50	630	170	<0.2	<0.5	<1	<3	<1	0
JKE117 (replicate)	0-0.2	<25	<50	320	150	<0.2	<0.5	<1	<3	<1	0
JKE117	0.4-0.6	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE118	0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE119	0-0.2	<25	<50	310	<100	<0.2	<0.5	<1	<3	<1	0
JKE120	0-0.2	<25	<50	180	100	<0.2	<0.5	<1	<3	<1	0
JKE120	0.85-1.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE120	1.5-1.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE121	0-0.2	<25	<50	170	120	<0.2	<0.5	<1	<3	<1	0
JKE121	0.4-0.85	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE121 (replicate)	0.4-0.85	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE121	1.5-1.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE122	0.04-0.2	<25	<50	180	170	<0.2	<0.5	<1	<3	<1	1
JKE122	0.5-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE122	0.8-1.0	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE122	1.5-1.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0

Concentration above the SAC **VALUE**

JKEnvironments

TABLE G-2
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		4,400	3,300	4,500	6,300	100	14,000	4,500	12,000	1,400	
Site Use		RESIDENTIAL WITH ACCESSIBLE SOIL- DIRECT SOIL CONTACT									
Sample Reference	**Sample Depth**										
JKE123	0.03-0.2	<25	<50	<100	120	<0.2	<0.5	<1	<3	<1	0
JKE123	0.5-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE123	0.8-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	3
JKE123 (replicate)	0.8-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	3
JKE124	0.05-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE124	0.2-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE124	0.6-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE125	0.05-0.2	<25	<50	<100	120	<0.2	<0.5	<1	<3	<1	0
JKE125	0.4-0.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE125	0.7-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE126	0.08-0.2	<25	<50	160	320	<0.2	<0.5	<1	<3	<1	0
JKE126	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE127	0.06-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE127	0.3-0.5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE127 (replicate)	0.3-0.5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE127	0.6-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE128	0.08-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE128	0.3-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE128	0.4-0.6	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE129	0.09-0.25	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE129	0.25-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE130	0.07-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE130	0.2-0.25	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE131	0.07-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE131	0.2-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE131 (replicate)	0.2-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE132	0.08-0.15	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE132	0.15-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE133	0.08-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE133	0.2-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE134	0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE134	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE134	1.5-1.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE135	0.05-0.25	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE135	0.4-0.6	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE135	1.5-1.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE135 (replicate)	1.5-1.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE136	0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE136	0.4-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE136	1.5-1.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE137	0.04-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE137	0.5-0.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
JKE138	0-0.05	<25	<50	240	260	<0.2	<0.5	<1	<3	<1	1.6
JKE138 (replicate)	0-0.05	<25	<50	420	420	<0.2	<0.5	<1	<3	<1	1.6
JKE138	0.05-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0.1
JKE139	0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0.3
JKE139	0.3-0.5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0.3
JKE140	0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0.2
JKE140	0.2-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0.1
JKE140	0.9-1.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0.3
DUPAM101	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	NA
DUPAM102	-	<25	<50	190	120	<0.2	<0.5	<1	<3	<1	NA
DUPAM103	-	<25	<50	220	<100	<0.2	<0.5	<1	<3	<1	NA
DUPAM104	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	NA
DUPAM106	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	NA
DUPAM107	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	NA
DUPAM108	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	NA
DUPAM201	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	NA
Total Number of Samples		118	118	118	118	118	118	118	118	118	115
Maximum Value		<PQL	290	2300	1100	<PQL	<PQL	<PQL	<PQL	<PQL	120

Concentration above the SAC **VALUE**

TABLE H-1
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**
31.7.19	JKE101	0.04-0.5	No	10	5,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE101	0.04-0.2	1112.28	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
31.7.19	JKE101	0.5-1.1	NA	10	3,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
31.7.19	JKE102	0.1-0.3	NA	10	3,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE102	0.1-0.3	642.43	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
31.7.19	JKE102	0.3-1.2	NA	10	5,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
31.7.19	JKE102	1.2-1.6	NA	10	5,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
31.7.19	JKE103	0-0.1	No	10	7,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE103	0-0.1	494.68	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
31.7.19	JKE103	0.1-0.4	NA	10	11,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE103	0.1-0.4	860	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
31.7.19	JKE104	0-0.1	No	10	8,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE104	0-0.1	223.67	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
31.7.19	JKE104	0.1-0.7	NA	10	11,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE104	0.1-0.3	712.2	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
31.7.19	JKE104	0.7-1.5	NA	10	4,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE104	0.7-1.0	685.17	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
1.8.19	JKE105	0-0.4	No	10	9,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE105	0-0.1	504.43	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
1.8.19	JKE105	0.4-1.1	NA	10	6,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE105	0.5-0.95	448.91	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
1.8.19	JKE106	0.08-0.4	No	10	6,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE106	0.08-0.2	679.95	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
1.8.19	JKE106	0.4-1.0	NA	10	8,300	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE106	0.5-0.9	635.11	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
1.8.19	JKE106	1.0-1.5	NA	10	8,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1.8.19	JKE106	1.5-2.5	NA	10	9,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE106	1.5-1.95	539.07	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
1.8.19	JKE106	2.5-3.5	NA	10	8,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1.8.19	JKE106	3.5-4.4	NA	10	8,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1.8.19	JKE107	0-0.4	No	10	11,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE107	0-0.2	615.1	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
1.8.19	JKE107	0.4-1.5	NA	10	11,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1.8.19	JKE107	1.5-2.5	NA	10	9,300	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE107	1.5-1.95	369.09	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
1.8.19	JKE107	2.5-3.1	NA	10	7,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1.8.19	JKE108	0.22-0.5	NA	10	5,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE108	0.22-0.4	693.93	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
1.8.19	JKE108	0.5-1.5	NA	10	9,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE108	0.5-0.95	464.38	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
1.8.19	JKE108	1.5-2.5	NA	10	9,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1.8.19	JKE108	2.5-3.0	NA	10	4,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5.8.19	JKE109	0.045-0.4	NO	10	5,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE109	0.045-0.2	663.65	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
5.8.19	JKE109	0.4-0.6	NA	10	1,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5.8.19	JKE109	0.6-1.6	NA	10	11,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE109	0.6-0.95	499.34	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
5.8.19	JKE109	1.6-2.8	NA	10	9,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2.8.19	JKE110	0.04-0.6	NO	10	7,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE110	0.04-0.2	769.21	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
2.8.19	JKE110	0.6-1.5	NA	10	11,300	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2.8.19	JKE110	1.5-2.7	NA	10	10,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE110	1.5-1.95	583.07	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
2.8.19	JKE111	0-0.5	NO	10	11,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE111	0-0.2	632.26	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
2.8.19	JKE111	0.5-0.7	NA	10	1,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2.8.19	JKE111	0.7-1.4	NA	10	11,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2.8.19	JKE111	1.4-1.8	NA	10	8,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE111	1.4-1.7	466.3	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
2.8.19	JKE111	1.8-2.0	NA	10	1,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2.8.19	JKE111	2.0-2.6	NA	10	9,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE111	1.4-1.7	466.3	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
5.8.19	JKE112	0-0.5	NO	10	10,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE112	0-0.02	641.55	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
5.8.19	JKE112	0.5-1.3	NA	10	10,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE112	0.5-0.95	545.44	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
7.8.19	JKE113	0-0.2	NO	10	7,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE113	0-0.2	378.57	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected: Synthetic mineral fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
6.8.19	JKE114	0-0.5	NO	10	12,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE114	0-0.2	652.62	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
5.8.19	JKE115	0-0.2	NO	10	10,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE115	0-0.2	537.09	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
5.8.19	JKE115	0.2-0.9	NA	10	10,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE115	0.2-0.4	444.62	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
5.8.19	JKE116	0-0.6	NO	10	12,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE116	0-0.2	791	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
5.8.19	JKE117	0-0.4	NO	10	11,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE117	0-0.2	754.22	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
6.8.19	JKE118	0-1.5	NO	10	12,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE118	0-0.2	863.27	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

Concentration above the SAC **VALUE**

JKEnvironments

TABLE H-2
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**
6.8.19	JKE119	0-0.7	NO	10	11,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE119	0-0.2	997.04	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
2.8.19	JKE120	0-0.2	NO	10	9,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE120	0-0.2	703.79	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
2.8.19	JKE120	0.2-0.9	NA	10	8,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE120	0.85-1.1	477.41	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
2.8.19	JKE120	0.9-1.3	NA	10	6,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2.8.19	JKE121	0-0.4	NO	10	11,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE121	0-0.2	574.67	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
2.8.19	JKE121	0.4-1.0	NA	10	7,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223302	JKE121	0.4-0.85	971.69	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
2.8.19	JKE121	1.0-1.2	NA	10	2,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6.8.19	JKE122	0.04-0.5	NO	10	8,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE122	0.04-0.2	643.06	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
6.8.19	JKE122	0.5-0.8	NA	10	4,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE122	0.5-0.8	798.25	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
6.8.19	JKE122	0.8-1.3	NA	10	7,300	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE122	0.8-1.0	551.57	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
6.8.19	JKE123	0.03-0.3	NO	10	5,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE123	0.03-0.2	812.47	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
6.8.19	JKE123	0.3-0.8	NA	10	6,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE123	0.5-0.8	536.28	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
7.8.19	JKE124	0.05-0.2	NO	10	3,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE124	0.05-0.2	1001.34	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
7.8.19	JKE124	0.2-0.3	NA	10	3,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE124	0.2-0.3	743.82	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
7.8.19	JKE124	0.3-0.6	NA	10	5,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7.8.19	JKE125	0.05-0.2	NO	10	3,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE125	0.05-0.2	861.11	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
7.8.19	JKE125	0.2-0.4	NA	10	2,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7.8.19	JKE125	0.4-0.7	NA	10	5,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE125	0.4-0.7	473.83	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
7.8.19	JKE126	0.08-0.3	NO	10	5,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE126	0.08-0.2	1072.09	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
7.8.19	JKE126	0.3-0.5	NA	10	3,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7.8.19	JKE127	0.06-0.3	NO	10	4,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE127	0.06-0.3	967.78	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
7.8.19	JKE127	0.3-0.6	NA	10	5,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE127	0.3-0.5	645.31	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
9.8.19	JKE128	0.08-0.3	NO	10	5,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE128	0.08-0.2	908.55	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
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	223661	JKE128	0.3-0.4	710.84	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
9.8.19	JKE129	0.09-0.2	NO	10	4,300	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE129	0.09-0.25	920.55	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
9.8.19	JKE130	0.07-0.2	NO	10	2,800	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE130	0.07-0.2	921.86	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
9.8.19	JKE131	0.07-0.2	NO	10	3,400	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE131	0.07-0.2	891.89	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
9.8.19	JKE131	0.2-0.4	NA	10	3,400	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE131	0.2-0.3	699.37	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
9.8.19	JKE132	0.08-0.2	NO	10	1,500	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE132	0.08-0.15	1158.41	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
9.8.19	JKE133	0.08-0.2	NO	10	3,700	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE133	0.08-0.2	1088.38	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
9.8.19	JKE133	0.2-0.45	NA	10	3,900	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8.8.19	JKE134	0-0.5	NO	10	12,500	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE134	0-0.2	788.35	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
8.8.19	JKE134	0.5-1.3	NA	10	8,900	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE134	0.5-0.95	942.46	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
8.8.19	JKE135	0.05-0.3	NO	10	2,700	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE135	0.05-0.25	1022.15	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
8.8.19	JKE135	0.4-1.2	NA	10	11,700	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE135	0.4-0.6	704.78	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
8.8.19	JKE136	0-0.4	NO	10	11,100	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE136	0-0.2	599.06	Chrysotile asbestos detected: Organic fibres detected	No asbestos detected	0.3727	No visible asbestos detected	–	0.2233	<0.01	**0.0373**
8.8.19	JKE136	0.4-1.1	NA	10	10,400	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE136	0.4-0.8	437.68	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
8.8.19	JKE137	0.04-0.5	NO	10	5,100	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	223661	JKE137	0.04-0.2	739.61	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	Chrysotile	–	0.0632	<0.01	**0.0085**
8.8.19	JKE137	0.5-0.7	NA	10	2,500	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
30.8.19	JKE138	0-0.05	NO	10	8,500	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	225210	JKE138	0-0.05	384.73	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
30.8.19	JKE138	0.05-0.3	NO	10	2,500	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	225210	JKE138	0.05-0.2	649.72	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
30.8.19	JKE139	0-0.25	NO	10	10,200	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	225210	JKE139	0-0.2	738.71	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
30.8.19	JKE139	0.25-0.3	NA	10	5,300	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
30.8.19	JKE139	0.3-0.8	NA	10	3,000	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	225210	JKE139	0.3-0.5	492.65	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
30.8.19	JKE140	0-0.2	NO	10	10,500	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	225210	JKE140	0-0.2	473.54	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
30.8.19	JKE140	0.2-0.6	NA	10	2,200	No ACM observed			No ACM <7mm observed	--	--	No FA observed	--	--	225210	JKE140	0.2-0.4	536.2	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

Concentration above the SAC **VALUE**

TABLE I
SUMMARY OF FIBRE CEMENT ANALYSIS FOR ASBESTOS

		Asbestos
Sample Reference	**Sample Description**	
AMF1	Fibre cement material	**Asbestos detected**
AMF101	Fibre cement material	**Asbestos detected**
Total Number of Samples		2

Asbestos detected in fibre cement

TABLE J
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	
PQL - Envirolab Services				10	50	1	1	1	3	1	PID
NEPM 2013 - Land Use Category				**HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL**							
Sample Reference	**Water Depth**	**Depth Category**	**Soil Category**								
MWJKE102	8.2	2m to <4m	Sand	<10	<50	<1	<1	<1	<3	<1	0
MWJKE122	8.1	2m to <4m	Sand	<10	<50	<1	1	<1	<3	<1	2.7
MWJKE135	7.85	2m to <4m	Sand	<10	<50	<1	<1	<1	<3	<1	1.8
DUPMP1	8.1	2m to <4m	Sand	<10	<50	<1	1	<1	<3	<1	NA
DUPMP2	7.85	2m to <4m	Sand	<10	<50	<1	<1	<1	<3	<1	NA
Total Number of Samples				5	5	5	5	5	5	5	3
Maximum Value				<PQL	<PQL	<PQL	1	<PQL	<PQL	<PQL	2.7

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**							
MWJKE102	8.2	2m to <4m	Sand	1000	1000	800	NL	NL	NL	NL
MWJKE122	8.1	2m to <4m	Sand	1000	1000	800	NL	NL	NL	NL
MWJKE135	7.85	2m to <4m	Sand	1000	1000	800	NL	NL	NL	NL
DUPMP1	8.1	2m to <4m	Sand	1000	1000	800	NL	NL	NL	NL
DUPMP2	7.85	2m to <4m	Sand	1000	1000	800	NL	NL	NL	NL

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TABLE K

GROUNDWATER LABORATORY RESULTS COMPARED TO SITE SPECIFIC HSLs - RISK ASSESSMENT

All results in µg/L unless stated otherwise.

	PQL Envirolab Services	NHMRC ADWG 2018	SAMPLES		
			MWJKE102	MWJKE122	MWJKE135
Volatile Organic Compounds (VOCs), including chlorinated VOCs					
Vinyl Chloride	**10**	0.3	<10	<10	<10
1,1-Dichloroethene	1	30	<1	<1	<1
Chloroform	1	250	<1	2	<1
Bromodichloromethane	1		<1	<1	<1
1,2-dichloroethane	1	3	<1	<1	<1
Chlorobenzene	1	300	<1	<1	<1
1,3-dichlorobenzene	1	300	<1	<1	<1
1,4-dichlorobenzene	1	40	<1	<1	<1
1,2-dichlorobenzene	1	1500	<1	<1	<1

Concentration above the HSL -SSA	VALUE
PQL exceeds GIL	**BOLD/RED**

TABLE L

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				
			MWJKE102	MWJKE122	MWJKE135	DUPMP1	DUPMP2
Inorganic Compounds and Parameters							
pH	0.1	6.5 - 8.5	8.1	7.7	8	NA	NA
Electrical Conductivity (µS/cm)	1	NSL	14,000	14,000	14,000	NA	NA
Metals and Metalloids							
Arsenic (As III)	1	24	<1	<1	<1	<1	<1
Cadmium	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (VI)	1	1	<1	<1	<1	<1	<1
Copper	1	1.4	**47**	**7**	**30**	**7**	**33**
Lead	1	3.4	<1	<1	<1	<1	<1
Total Mercury (inorganic)	0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	1	11	1	2	3	2	1
Zinc	1	8	**16**	**25**	**48**	**24**	**52**
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)							
Benzene	1	950	<1	<1	<1	<1	<1
Toluene	1	180	<1	1	<1	1	<1
Ethylbenzene	1	80	<1	<1	<1	<1	<1
m+p-xylene	2	75	<2	<2	<2	<2	<2
o-xylene	1	350	<1	<1	<1	<1	<1
Total xylenes	1	NSL	<1	<1	<1	<1	<1
Volatile Organic Compounds (VOCs), including chlorinated VOCs							
Dichlorodifluoromethane	10	NSL	<10	<10	<10	NA	NA
Chloromethane	10	NSL	<10	<10	<10	NA	NA
Vinyl Chloride	10	100	<10	<10	<10	NA	NA
Bromomethane	10	NSL	<10	<10	<10	NA	NA
Chloroethane	10	NSL	<10	<10	<10	NA	NA
Trichlorofluoromethane	10	NSL	<10	<10	<10	NA	NA
1,1-Dichloroethene	1	700	<1	<1	<1	NA	NA
Trans-1,2-dichloroethene	1	NSL	<1	<1	<1	NA	NA
1,1-dichloroethane	1	90	<1	<1	<1	NA	NA
Cis-1,2-dichloroethene	1	NSL	<1	<1	<1	NA	NA
Bromochloromethane	1	NSL	<1	<1	<1	NA	NA
Chloroform	1	370	<1	2	<1	NA	NA
2,2-dichloropropane	1	NSL	<1	<1	<1	NA	NA
1,2-dichloroethane	1	1900	<1	<1	<1	NA	NA
1,1,1-trichloroethane	1	270	<1	<1	<1	NA	NA
1,1-dichloropropene	1	NSL	<1	<1	<1	NA	NA
Cyclohexane	1	NSL	<1	<1	<1	NA	NA
Carbon tetrachloride	1	240	<1	<1	<1	NA	NA
Benzene	1	see BTEX	<1	<1	<1	NA	NA
Dibromomethane	1	NSL	<1	<1	<1	NA	NA
1,2-dichloropropane	1	900	<1	<1	<1	NA	NA
Trichloroethene	1	NSL	<1	<1	<1	NA	NA
Bromodichloromethane	1	NSL	<1	<1	<1	NA	NA
trans-1,3-dichloropropene	1	NSL	<1	<1	<1	NA	NA
cis-1,3-dichloropropene	1	NSL	<1	<1	<1	NA	NA
1,1,2-trichloroethane	1	6500	<1	<1	<1	NA	NA
Toluene	1	see BTEX	<1	1	<1	NA	NA
1,3-dichloropropane	1	1100	<1	<1	<1	NA	NA
Dibromochloromethane	1	NSL	<1	<1	<1	NA	NA
1,2-dibromoethane	1	NSL	<1	<1	<1	NA	NA
Tetrachloroethene	1	70	<1	<1	<1	NA	NA
1,1,1,2-tetrachloroethane	1	NSL	<1	<1	<1	NA	NA
Chlorobenzene	1	55	<1	<1	<1	NA	NA
Ethylbenzene	1	see BTEX	<1	<1	<1	NA	NA
Bromoform	1	NSL	<1	<1	<1	NA	NA
m+p-xylene	2	see BTEX	<2	<2	<2	NA	NA
Styrene	1	NSL	<1	<1	<1	NA	NA
1,1,2,2-tetrachloroethane	1	400	<1	<1	<1	NA	NA
o-xylene	1	see BTEX	<1	<1	<1	NA	NA
1,2,3-trichloropropane	1	NSL	<1	<1	<1	NA	NA
Isopropylbenzene	1	30	<1	<1	<1	NA	NA
Bromobenzene	1	NSL	<1	<1	<1	NA	NA
n-propyl benzene	1	NSL	<1	<1	<1	NA	NA
2-chlorotoluene	1	NSL	<1	<1	<1	NA	NA
4-chlorotoluene	1	NSL	<1	<1	<1	NA	NA
1,3,5-trimethyl benzene	1	NSL	<1	<1	<1	NA	NA
Tert-butyl benzene	1	NSL	<1	<1	<1	NA	NA
1,2,4-trimethyl benzene	1	NSL	<1	<1	<1	NA	NA
1,3-dichlorobenzene	1	260	<1	<1	<1	NA	NA
Sec-butyl benzene	1	NSL	<1	<1	<1	NA	NA
1,4-dichlorobenzene	1	60	<1	<1	<1	NA	NA
4-isopropyl toluene	1	NSL	<1	<1	<1	NA	NA
1,2-dichlorobenzene	1	160	<1	<1	<1	NA	NA
n-butyl benzene	1	NSL	<1	<1	<1	NA	NA
1,2-dibromo-3-chloropropane	1	NSL	<1	<1	<1	NA	NA
1,2,4-trichlorobenzene	1	85	<1	<1	<1	NA	NA
Hexachlorobutadiene	1	NSL	<1	<1	<1	NA	NA
1,2,3-trichlorobenzene	1	3	<1	<1	<1	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs)							
Naphthalene	0.2	16	<0.2	<0.2	<0.2	<0.2	<0.2
Acenaphthylene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	0.1	0.6	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	0.1	0.01	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	0.1	1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	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	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1

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

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TABLE M-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 = BH JKE102 (0.1-0.3)	Arsenic	4	4	5	4.5	22
Dup Ref = DUPAM101	Cadmium	0.4	<0.4	<0.4	NC	NC
	Chromium	1	8	7	7.5	13
Envirolab Report: 223302	Copper	1	15	13	14.0	14
	Lead	1	20	20	20.0	0
	Mercury	0.1	0.1	0.1	0.1	0
	Nickel	1	12	12	12.0	0
	Zinc	1	29	29	29.0	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	0.09	0.1	0.1	11
	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
	Total OCPs	0.1	<0.1	<0.1	NC	NC
	Total OPPs	0.1	<0.1	<0.1	NC	NC
	Total PCBs	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	37.5	67
	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

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TABLE M-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 = JKE105 (0-0.1)	Arsenic	4	5	4	4.5	22
Dup Ref = DUPAM102	Cadmium	0.4	<0.4	<0.4	NC	NC
	Chromium	1	14	13	13.5	7
Envirolab Report: 223302	Copper	1	60	62	61.0	3
	Lead	1	61	50	55.5	20
	Mercury	0.1	0.2	0.1	0.2	67
	Nickel	1	8	8	8.0	0
	Zinc	1	130	120	125.0	8
	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	0.2	0.2	67
	Anthracene	0.1	<0.1	<0.1	NC	NC
	Fluoranthene	0.1	0.3	0.4	0.4	29
	Pyrene	0.1	0.3	0.4	0.4	29
	Benzo(a)anthracene	0.1	0.2	<0.1	0.1	120
	Chrysene	0.1	0.3	0.3	0.3	0
	Benzo(b,j+k)fluoranthene	0.2	0.3	0.3	0.3	0
	Benzo(a)pyrene	0.05	0.2	0.3	0.3	40
	Indeno(123-cd)pyrene	0.1	0.1	0.2	0.2	67
	Dibenzo(ah)anthracene	0.1	<0.1	<0.1	NC	NC
	Benzo(ghi)perylene	0.1	0.3	0.2	0.3	40
	Total OCPs	0.1	<0.1	<0.1	NC	NC
	Total OPPs	0.1	<0.1	<0.1	NC	NC
	Total PCBs	0.1	<0.1	<0.1	NC	NC
	TRH C6-C10 (F1)	25	<25	<25	NC	NC
	TRH >C10-C16 (F2)	50	80	<50	52.5	105
	TRH >C16-C34 (F3)	100	500	190	345.0	90
	TRH >C34-C40 (F4)	100	280	120	200.0	80
	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-3
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 = JKE109 (0.045-0.2)	Arsenic	4	<4	<4	NC	NC
Dup Ref = DUPAM104	Cadmium	0.4	<0.4	<0.4	NC	NC
	Chromium	1	13	7	10.0	60
Envirolab Report: 223661	Copper	1	34	4	19.0	158
	Lead	1	16	8	12.0	67
	Mercury	0.1	<0.1	<0.1	NC	NC
	Nickel	1	8	1	4.5	156
	Zinc	1	47	4	25.5	169
	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	0.1	67
	Anthracene	0.1	<0.1	<0.1	NC	NC
	Fluoranthene	0.1	0.5	<0.1	0.3	164
	Pyrene	0.1	0.7	<0.1	0.4	173
	Benzo(a)anthracene	0.1	0.3	<0.1	0.2	143
	Chrysene	0.1	0.4	<0.1	0.2	156
	Benzo(b,j+k)fluoranthene	0.2	0.4	<0.2	0.3	120
	Benzo(a)pyrene	0.05	0.4	<0.05	0.2	176
	Indeno(123-cd)pyrene	0.1	0.1	<0.1	0.1	67
	Dibenzo(ah)anthracene	0.1	0.1	<0.1	0.1	67
	Benzo(ghi)perylene	0.1	0.2	<0.1	0.1	120
	Total OCPs	0.1	<0.1	<0.1	NC	NC
	Total OPPs	0.1	<0.1	<0.1	NC	NC
	Total PCBs	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	140	<100	95.0	95
	TRH >C34-C40 (F4)	100	170	<100	110.0	109
	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-4
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 = JKE133 (0.08-0.2)	Arsenic	4	<4	<4	NC	NC
Dup Ref = DUPAM108	Cadmium	0.4	<0.4	<0.4	NC	NC
	Chromium	1	6	5	5.5	18
Envirolab Report: 223661	Copper	1	63	60	61.5	5
	Lead	1	2	1	1.5	67
	Mercury	0.1	<0.1	<0.1	NC	NC
	Nickel	1	63	56	59.5	12
	Zinc	1	29	25	27.0	15
	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
	Total OCPs	0.1	<0.1	<0.1	NC	NC
	Total OPPs	0.1	<0.1	<0.1	NC	NC
	Total PCBs	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	<100	NC	NC
	TRH >C34-C40 (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

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TABLE M-5
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 = JKE139 (0-0.2)	Arsenic	4	<4	<4	NC	NC
Dup Ref = DUPAM201	Cadmium	0.4	<0.4	<0.4	NC	NC
	Chromium	1	3	5	4.0	50
Envirolab Report: 225210	Copper	1	4	5	4.5	22
	Lead	1	9	6	7.5	40
	Mercury	0.1	<0.1	<0.1	NC	NC
	Nickel	1	2	3	2.5	40
	Zinc	1	27	24	25.5	12
	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
	Total OCPs	0.1	<0.1	<0.1	NC	NC
	Total OPPs	0.1	<0.1	<0.1	NC	NC
	Total PCBs	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	<100	NC	NC
	TRH >C34-C40 (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

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TABLE N-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 = JKE111 (0-0.2)	Arsenic	4	4	5	4	4.5	22
Dup Ref = DUPAM103	Cadmium	0.4	0.4	<0.4	<0.4	NC	NC
	Chromium	1	1	12	42	27.0	111
Envirolab Report: 223302	Copper	1	1	28	34	31.0	19
Envirolab VIC Report: 17672	Lead	1	1	37	41	39.0	10
	Mercury	0.1	0.1	<0.1	<0.1	NC	NC
	Nickel	1	1	7	8	7.5	13
	Zinc	1	1	92	90	91.0	2
	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	0.2	0.1	0.2	67
	Anthracene	0.1	0.1	<0.1	<0.1	NC	NC
	Fluoranthene	0.1	0.1	0.7	0.5	0.6	33
	Pyrene	0.1	0.1	0.7	0.5	0.6	33
	Benzo(a)anthracene	0.1	0.1	0.4	0.2	0.3	67
	Chrysene	0.1	0.1	0.5	0.3	0.4	50
	Benzo(b,j+k)fluoranthene	0.2	0.2	0.5	0.7	0.6	33
	Benzo(a)pyrene	0.05	0.05	0.5	0.48	0.5	4
	Indeno(123-cd)pyrene	0.1	0.1	0.3	0.3	0.3	0
	Dibenzo(ah)anthracene	0.1	0.1	0.1	<0.1	0.1	67
	Benzo(ghi)perylene	0.1	0.1	0.5	0.4	0.5	22
	Total OCPs	0.1	0.1	<0.1	<0.1	NC	NC
	Total OPPs	0.1	0.1	<0.1	<0.1	NC	NC
	Total PCBs	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	60	<50	42.5	82
	TRH >C16-C34 (F3)	100	100	430	220	325.0	65
	TRH >C34-C40 (F4)	100	100	260	<100	155.0	135
	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-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 = JKE124 (0.05-0.2)	Arsenic	4	4	<4	<4	NC	NC
Dup Ref = DUPAM106	Cadmium	0.4	0.4	<0.4	<0.4	NC	NC
	Chromium	1	1	13	11	12.0	17
Envirolab Report: 223661	Copper	1	1	51	68	59.5	29
Envirolab VIC Report: 17738	Lead	1	1	4	6	5.0	40
	Mercury	0.1	0.1	<0.1	<0.1	NC	NC
	Nickel	1	1	62	61	61.5	2
	Zinc	1	1	33	27	30.0	20
	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
	Total OCPs	0.1	0.1	<0.1	<0.1	NC	NC
	Total OPPs	0.1	0.1	<0.1	<0.1	NC	NC
	Total PCBs	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	<50	NC	NC
	TRH >C16-C34 (F3)	100	100	<100	<100	NC	NC
	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

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TABLE N-3
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 = JKE136 (0.05-0.2)	Arsenic	4	4	<4	<4	NC	NC
Dup Ref = DUPAM107	Cadmium	0.4	0.4	<0.4	<0.4	NC	NC
	Chromium	1	1	9	9	9.0	0
Envirolab Report: 223661	Copper	1	1	16	19	17.5	17
Envirolab VIC Report: 17738	Lead	1	1	26	23	24.5	12
	Mercury	0.1	0.1	0.1	0.1	NC	NC
	Nickel	1	1	9	8	8.5	12
	Zinc	1	1	63	58	60.5	8
	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	0.1	<0.05	0.1	120
	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
	Total OCPs	0.1	0.1	<0.1	<0.1	NC	NC
	Total OPPs	0.1	0.1	<0.1	<0.1	NC	NC
	Total PCBs	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	<50	NC	NC
	TRH >C16-C34 (F3)	100	100	<100	<100	NC	NC
	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

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TABLE O
GROUNDWATER INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in µg/L unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = MWJKE122	Arsenic	1	<1	<1	NC	NC
Dup Ref = DUPMP1	Cadmium	0.1	<0.1	<0.1	NC	NC
	Chromium	1	<1	<1	NC	NC
Envirolab Report: 224207	Copper	1	7	7	7	0
	Lead	1	<1	<1	NC	NC
	Mercury	0.05	<0.05	<0.05	NC	NC
	Nickel	1	2	2	2	0
	Zinc	1	25	24	25	4
	Naphthalene	0.2	<0.2	<0.2	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	0.1	<0.1	<0.1	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)	10	<10	<10	NC	NC
	TRH >C10-C16 (F2)	50	<50	<50	NC	NC
	TRH >C16-C34 (F3)	100	<100	<100	NC	NC
	TRH >C34-C40 (F4)	100	<100	<100	NC	NC
	Benzene	1	<1	<1	NC	NC
	Toluene	1	1	1	1	0
	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 P
GROUNDWATER INTER-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in µg/L unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	Envirolab VIC PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = MWJKE135	Arsenic	1	1	<1	<1	NC	NC
Dup Ref = DUPMP2	Cadmium	0.1	0.1	<0.1	<0.1	NC	NC
	Chromium	1	1	<1	<1	NC	NC
Envirolab Report: 224207	Copper	1	1	30	33	31.5	9.5
Envirolab Vic Report: 17823	Lead	1	1	<1	<1	NC	NC
	Mercury	0.05	0.05	<0.05	<0.05	NC	NC
	Nickel	1	1	3	1	2	100.0
	Zinc	1	1	48	52	50	8.0
	Naphthalene	0.2	0.2	<0.2	<0.2	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	0.1	0.1	<0.1	<0.1	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)	10	10	<10	<10	NC	NC
	TRH >C10-C16 (F2)	50	50	<50	<50	NC	NC
	TRH >C16-C34 (F3)	100	100	<100	<100	NC	NC
	TRH >C34-C40 (F4)	100	100	<100	<100	NC	NC
	Benzene	1	1	<1	<1	NC	NC
	Toluene	1	1	<1	<1	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 Q
SUMMARY OF FIELD QA/QC RESULTS

ANALYSIS	Envirolab PQL		TB4[S]	T1[S]	FR1[W]	TB4[S]	TS2[S]	FRAM101[W]	FRRK1[W]	FRAM201[W]	TSW1[W]	TBW1[W]
			2/08/2019	31/07/2019	31/07/2019	9/08/2019	9/08/2019	6/08/2019	9/08/2019	30/08/2019	16/08/2019	16/08/2019
	mg/kg	µg/L	mg/kg	% Recovery	µg/L	mg/kg	% Recovery	µg/L	µg/L	µg/L	% Recovery	µg/L
TRH C6-C10 (F1)	25	10	<25	NA	NA	<25	NA	NA	NA	<10	NA	NA
Benzene	0.2	1	<0.2	83	<1	<0.2	83	<1	<1	<1	123	<1
Toluene	0.5	1	<0.5	91	**2**	<0.5	84	<1	**1**	**1**	109	**3**
Ethylbenzene	1	1	<1	88	<1	<1	89	<1	<1	<1	106	<1
m+p-xylene	2	2	<2	87	<2	<2	89	<2	<2	<2	104	<2
o-xylene	1	1	<1	92	<1	<1	89	<1	<1	<1	109	<1

Explanation:

[W] Sample type (water)

[S] Sample type (sand)

BTEX concentrations in trip spikes are presented as % recovery

Values above PQLs/Acceptance criteria **VALUE**

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TABLE R

SUMMARY OF LABORATORY RESULTS - ACID SULFATE SOIL ANALYSIS (sPOCAS)

		Analysis	pH_{KCL}	TAA	pH_{ox}	TPA	TSA	S_{POS}	SCr	Liming Rate
				pH 6.5		pH 6.5	pH 6.5	%w/w	%w/w	kg $CaCO_3$/tonne
Acid Sulfate Soil Manual (1998) - Action Criteria		Coarse Textured Soil	pH 5.0	18molH+/ tonne	pH 5.0	18molH+/ tonne	18molH+/ tonne	0.03% w/w	0.03% w/w	
Sample Reference	**Sample Depth (m)**	**Sample Description**								
JKE102	1.2-1.6	F: Silty clay	7.8	<5	5.8	<5	<5	0.03	NA	1.5
JKE102 (replicate)	1.2-1.6	F: Silty clay	7.8	<5	6.1	<5	<5	0.03	NA	1.5
JKE102	4.7-4.95	Silty clay	5.0	5	5.5	16	11	<0.005	NA	<0.75
JKE102	5.0-5.4	Silty clayey sand	5.3	<5	5.8	16	14	<0.005	NA	<0.75
JKE102	9.0-9.45	Silty clay	7.2	<5	6.5	<5	<5	<0.005	NA	<0.75
JKE102	9.8-10.0	Silty clay	7.4	<5	7.3	<5	<5	<0.005	NA	<0.75
JKE108	6.0-6.45	Silty clay	4.8	6	5.7	16	10	<0.005	NA	<0.75
JKE108	7.5-7.95	Sand	5.9	<5	6.6	<5	<5	<0.005	NA	<0.75
JKE108	8.4-8.8	Silty clay	7.1	<5	6.7	<5	<5	<0.005	NA	<0.75
JKE108	9.2-9.45	Silty sand	6.4	<5	5.0	<5	<5	<0.005	NA	<0.75
JKE116	7.6-7.95	Silty clay	6.7	<5	6.4	<5	<5	<0.005	NA	<0.75
JKE116 (replicate)	7.6-7.95	Silty clay	6.6	<5	6.3	<5	<5	<0.005	NA	<0.75
JKE116	8.3-8.6	Sandy clay	6.9	<5	6.4	<5	<5	<0.005	NA	<0.75
JKE116	15.4-15.6	Extremly weathered siltstone	6.7	<5	3.5	60	60	0.17	0.17	5.6
JKE122	8.5-8.8	Silty clay	6.6	<5	6.5	<5	<5	<0.005	NA	<0.75
JKE122	9.0-9.45	Silty clayey sand	4.9	5	5.5	<5	<5	<0.005	NA	<0.75
JKE126	12.5-13.0	Silty clay	7.5	<5	6.8	<5	<5	<0.005	NA	<0.75
JKE126	13.5-13.75	Extremly weathered siltstone	7.4	<5	7.2	<5	<5	0.01	NA	<0.75
JKE135	1.7-1.95	Silty clay	4.8	<5	4.3	5	<5	0.02	NA	1.2
JKE135	9.1-9.45	Silty sandy clay	7.1	<5	7.4	<5	<5	0.008	NA	<0.75
JKE140	0.9-1.1	Silty clay	5.7	5	4.6	<5	<5	0.009	NA	0.8
JKE140	1.1-1.3	Silty clay	3.8	49	4	76	28	<0.005	NA	4
Total Number of Samples			22	22	22	22	22	22	1	22
Minimum Value			3.8	5	3.5	5	5	0.008	0.17	0.8
Maximum Value			7.8	49	7.4	76	60	0.17	0.17	5.6

Values Exceeding Action Criteria **VALUE**

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TABLE S
SUMMARY OF SOIL LABORATORY RESULTS - EC and ECe

Borehole Number	Sample Depth (m)	Sample Description	EC (µS/cm)	ECe (dS/m)	Salinity Class[1]
JKE102	3.25-3.45	Silty clay	260	<2	**Non-saline**
JKE102	9.8-10.0	Silty clay	460	3.7	**Slightly Saline**
JKE108	3.0-3.45	Silty clay	340	2.4	**Slightly Saline**
JKE108	7.5-7.95	Sand	250	3.5	**Slightly Saline**
JKE108	9.2-9.45	Silty sand	230	2.1	**Slightly Saline**
JKE116	0.6-0.8	Silty clay	460	3.2	**Slightly Saline**
JKE116	7.6-7.95	Sandy clay	520	4.1	**Moderately Saline**
JKE116	15.4-15.6	Extreemly weatherd siltstor	540	4.6	**Moderately Saline**
JKE122	2.3-2.6	Silty clay	390	3.1	**Slightly Saline**
JKE122	6.6-7.0	Silty clay	470	3.7	**Slightly Saline**
JKE126	0.5-0.95	Silty clay	190	<2	**Non-saline**
JKE126	13.5-13.75	Extreemly weatherd siltstor	710	6.4	**Moderately Saline**
JKE135	3.0-3.45	Silty clay	210	<2	**Non-saline**
JKE135	9.1-9.45	Silty sandy clay	780	6.7	**Moderately Saline**
Total Number of Samples			14	14	-
Minimum Value			190	<2	-
Maximum Value			780	6.7	-

Explanation

1 - Salinity Class has been adopted from '*Site Investigations for Urban Salinity*' DLWC 2002.

(dS/m)	Salinity Class
<2	**Non-Saline**
2 to 4	**Slightly Saline**
4 to 8	**Moderately Saline**
8 to 16	**Very Saline**
>16	**Highly Saline**

Abbreviations

EC - Electrical Conductivity

ECe - Extract Electrical Conductivity

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TABLE T
SUMMARY OF RESISTIVITY CALCULATION ON SOIL EC RESULTS

Borehole Number	Sample Depth (m)	Sample Description	EC (µS/cm)	Resistivity[1] (ohm.cm)	Classification[2] Condition A
JKE102	3.25-3.45	Silty clay	260	3,846	**Mildly Aggressive**
JKE102	9.8-10.0	Silty clay	460	2,174	**Mildly Aggressive**
JKE108	3.0-3.45	Silty clay	340	2,941	**Mildly Aggressive**
JKE108	7.5-7.95	Sand	250	4,000	**Mildly Aggressive**
JKE108	9.2-9.45	Silty sand	230	4,348	**Mildly Aggressive**
JKE116	0.6-0.8	Silty clay	460	2,174	**Mildly Aggressive**
JKE116	7.6-7.95	Sandy clay	520	1,923	**Moderately Aggressive**
JKE116	15.4-15.6	Extreemly weatherd siltstone	540	1,852	**Moderately Aggressive**
JKE122	2.3-2.6	Silty clay	390	2,564	**Mildly Aggressive**
JKE122	6.6-7.0	Silty clay	470	2,128	**Mildly Aggressive**
JKE126	0.5-0.95	Silty clay	190	5,263	Non-Aggressive
JKE126	13.5-13.75	Extreemly weatherd siltstone	710	1,408	**Moderately Aggressive**
JKE135	3.0-3.45	Silty clay	210	4,762	**Mildly Aggressive**
JKE135	9.1-9.45	Silty sandy clay	780	1,282	**Moderately Aggressive**
Total Number of Samples			14	14	-
Minimum Value			190	1,282	-
Maximum Value			780	5,263	-

Explanation

1 - Resistivity values have been calculated on the laboratory EC values presented in Table S

2 - Classification derived from the Australian Standard 2159-2009 Piling Design and Installation (Table 6.5.2 [A] & [C])
Classification is based on Soil condition 'A' - high permeability soils (e.g. sands & gravel) that are in groundwater.

Resistivity Values (ohm.cm)	Classification for Steel Piles
>5,000	**Non-Aggressive**
2,000 - 5,000	**Mildly Aggressive**
1,000 - 2,000	**Moderately Aggressive**
<1,000	**Severely Aggressive**

Abbreviations

EC - Electrical Conductivity

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TABLE U
SUMMARY OF SOIL LABORATORY RESULTS - pH

Borehole Number	Sample Depth (m)	Sample Description	pH	Classification for Concrete Piles[1] Soil Condition A[2]	Classification for Steel Piles[1] Soil Condition A[2]
JKE102	3.25-3.45	Silty clay	7.7	Mildly Aggressive	Non-Aggressive
JKE102	9.8-10.0	Silty clay	8.9	Mildly Aggressive	Non-Aggressive
JKE108	3.0-3.45	Silty clay	7.6	Mildly Aggressive	Non-Aggressive
JKE108	7.5-7.95	Sand	6.7	Mildly Aggressive	Non-Aggressive
JKE108	9.2-9.45	Silty sand	7.8	Mildly Aggressive	Non-Aggressive
JKE116	0.6-0.8	Silty clay	7.9	Mildly Aggressive	Non-Aggressive
JKE116	7.6-7.95	Sandy clay	8.2	Mildly Aggressive	Non-Aggressive
JKE116	15.4-15.6	Extreemly weatherd siltstone	8	Mildly Aggressive	Non-Aggressive
JKE122	2.3-2.6	Silty clay	6.3	Mildly Aggressive	Non-Aggressive
JKE122	6.6-7.0	Silty clay	7.8	Mildly Aggressive	Non-Aggressive
JKE126	0.5-0.95	Silty clay	8.2	Mildly Aggressive	Non-Aggressive
JKE126	13.5-13.75	Extreemly weatherd siltstone	8.6	Mildly Aggressive	Non-Aggressive
JKE135	3.0-3.45	Silty clay	5.5	Moderately Aggressive	Non-Aggressive
JKE135	9.1-9.45	Silty sandy clay	8.6	Mildly Aggressive	Non-Aggressive
Total Number of Samples			14	-	-
Minimum Value			5.5	-	-
Maximum Value			8.9	-	-

Explanation

1 - pH Classification derived from the Australian Standard 2159-2009 Piling Design and Installation (Tables 6.4.2 [C] & 6.5.2 [C])

2 - Classification is based on Soil condition 'A' - high permeability soils (e.g. sands & gravel) that are in groundwater.

pH Value	Classification for Concrete Piles
>5.5	Mildly Aggressive
4.5 - 5.5	Moderately Aggressive
4 - 4.5	Severely Aggressive
<4	Very Severely Aggressive

pH Value	Classification for Steel Piles
>5	Non-Aggressive
4.0 - 5.0	Mildly Aggressive
3.0 - 4.0	Moderately Aggressive
<3	Severely Aggressive

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TABLE V
SUMMARY OF SOIL LABORATORY RESULTS - SULPHATE & CHLORIDES

Borehole Number	Sample Depth (m)	Sample Description	Sulphate (mg/kg)	Chloride (mg/kg)	Classification for Concrete Piles[1] SO4 - Soil Condition A[2]	Classification for Steel Piles[1] Cl - Soil Condition A[2]
JKE102	3.25-3.45	Silty clay	200	230	Mildly Aggressive	Non-Aggressive
JKE102	9.8-10.0	Silty clay	86	490	Mildly Aggressive	Non-Aggressive
JKE108	3.0-3.45	Silty clay	310	230	Mildly Aggressive	Non-Aggressive
JKE108	7.5-7.95	Sand	68	300	Mildly Aggressive	Non-Aggressive
JKE108	9.2-9.45	Silty sand	30	280	Mildly Aggressive	Non-Aggressive
JKE116	0.6-0.8	Silty clay	300	390	Mildly Aggressive	Non-Aggressive
JKE116	7.6-7.95	Sandy clay	50	790	Mildly Aggressive	Non-Aggressive
JKE116	15.4-15.6	Extreemly weatherd siltstone	160	690	Mildly Aggressive	Non-Aggressive
JKE122	2.3-2.6	Silty clay	530	140	Mildly Aggressive	Non-Aggressive
JKE122	6.6-7.0	Silty clay	300	420	Mildly Aggressive	Non-Aggressive
JKE126	0.5-0.95	Silty clay	210	62	Mildly Aggressive	Non-Aggressive
JKE126	13.5-13.75	Extreemly weatherd siltstone	110	840	Mildly Aggressive	Non-Aggressive
JKE135	3.0-3.45	Silty clay	110	200	Mildly Aggressive	Non-Aggressive
JKE135	9.1-9.45	Silty sandy clay	140	970	Mildly Aggressive	Non-Aggressive
Total Number of Samples			14	14	-	-
Minimum Value			30	62	-	-
Maximum Value			530	970	-	-

Explanation

1 - Classification derived from the Australian Standard 2159-2009 Piling Design and Installation (Tables 6.4.2 [C] & 6.5.2 [C])

2 - Classification is based on Soil condition 'A' - high permeability soils (e.g. sands & gravel) that are in groundwater.

Sulphate (SO4) Values	Classification for Concrete Piles	Chloride (Cl) Values	Classification for Steel Piles
<5,000	Mildly Aggressive	<5,000	Non-Aggressive
5,000 - 10,000	Moderately Aggressive	5,000 - 20,000	Mildly Aggressive
10,000 - 20,000	Severely Aggressive	20,000 - 50,000	Moderately Aggressive
>20,000	Very Severely Aggressive	>50,000	Severely Aggressive

JKEnvironments

TABLE W
SUMMARY OF SOIL LABORATORY RESULTS - CEC & ESP

Borehole Number	Sample Depth (m)	Sample Description	Total CEC	Ca	K	Mg	Na	ESP[1]
			(meq/100g)					%
JKE102	3.25-3.45	Silty clay	5.2	1.1	<0.1	2.8	1.2	**23.1**
JKE108	3.0-3.45	Silty clay	13	7.6	0.2	3.8	1.2	**9.2**
JKE116	0.6-0.8	Silty clay	19	7.3	0.1	9.9	1.9	**10.0**
JKE116	15.4-15.6	Extreemly weatherd siltstone	3.8	0.7	0.3	2.3	0.57	**15.0**
JKE122	2.3-2.6	Silty clay	8.1	2.1	<0.1	4.5	1.3	**16.0**
JKE122	6.6-7.0	Silty clay	4.7	1.6	<0.1	2.2	0.83	**17.7**
JKE126	0.5-0.95	Silty clay	13	5.8	0.4	6.3	0.6	4.6
JKE135	3.0-3.45	Silty clay	2.7	<0.1	<0.1	1.6	1.1	**40.7**
Total Number of Samples			8	7	4	8	8	8
Minimum Value			2.70	0.70	0.10	1.60	0.57	4.62
Maximum Value			19.00	7.60	0.40	9.90	1.90	40.74

Explanation

1 - Sodicity rating has been adopted from the publication *'Site Investigations for Urban Salinity' DLWC* 2002.

ESP Value	Sodicity Rating
< 5%	**Non-Sodic**
5% to 15%	**Sodic**
> 15%	**Highly Sodic**

Abbreviation

CEC: Cation Exchange Capacity
ESP: Exchangeable Sodium Percentage (Each Na/CEC)
Mg: Exchangeable Magnesium
Na: Exchangeable Sodium
K: Exchangeable Potassium
Ca: Exchangeable Calcium

JKEnvironments

TABLE X
SUMMARY OF GROUNDWATER LABORATORY RESULTS

Sample Reference	Field Measurements[1]						Laboratory Results				Classification for Concrete Piles[2] Soil Condition A[3]	Classification for Steel Piles[2] Soil Condition A[3]
	SWL (m)	pH	EC (µS/cm)	Temp (°C)	Eh (mV)	DO (mg/L)	pH	EC (µS/cm)	SO4 (mg/L)	Cl (mg/L)		
MWJKE102	8.2	6.93	11208	21.1	141	3.6	8.1	14000	480	3400	Mildly Aggressive	Mildly Aggressive
MWJKE122	8.1	6.59	10224	21.5	194.2	2	7.7	14000	420	3200	Mildly Aggressive	Mildly Aggressive
MWJKE135	7.85	6.94	10702	21	115.1	4.7	8	14000	490	3400	Mildly Aggressive	Mildly Aggressive
Total Number of Samples	3	3	3	3	3	3	3	3	3	3	-	-
Minimum Value	7.85	6.59	10224	21	115.1	2	7.7	14000	420	3200	-	-
Maximum Value	8.2	6.94	11208	21.5	194.2	4.7	8.1	14000	490	3400	-	-

Explanation

1 - Field Measurements were obtained on 16 August 2019

Exposure Classification for Concrete Piles

2 - Classification derived from the Australian Standard 2159-2009 Piling Design and Installation (Tables 6.4.2 [A] & [C])

3 - Classification is based on Soil condition 'A' - high permeability soils (e.g. sands & gravel) that are in groundwater.

pH	Sulphate (mg/L)	Chloride (mg/L)	Classification
> 5.5	<1,000	<6,000	Mildly Aggressive
4.5 - 5.5	1,000 - 3,000	6,000 - 12,000	Moderately Aggressive
4.0 - 4.5	3,000 - 10,000	12,000 - 30,000	Severely Aggressive
< 4	>10,000	>30,000	Very Severely Aggressive

Exposure Classification for Steel Piles

2 - Classification derived from the Australian Standard 2159-2009 Piling Design and Installation (Tables 6.5.2 [A] & [C])

3 - Classification is also based on Soil condition 'A' - high permeability soils (e.g. sands & gravel) that are in groundwater.

pH	Chloride (mg/L)	Classification
> 5	<1,000	Non-Aggressive
4.0 - 5.0	1,000 - 10,000	Mildly Aggressive
3.0 - 4.0	10,000 - 20,000	Moderately Aggressive
<3	>20,000	Severely Aggressive

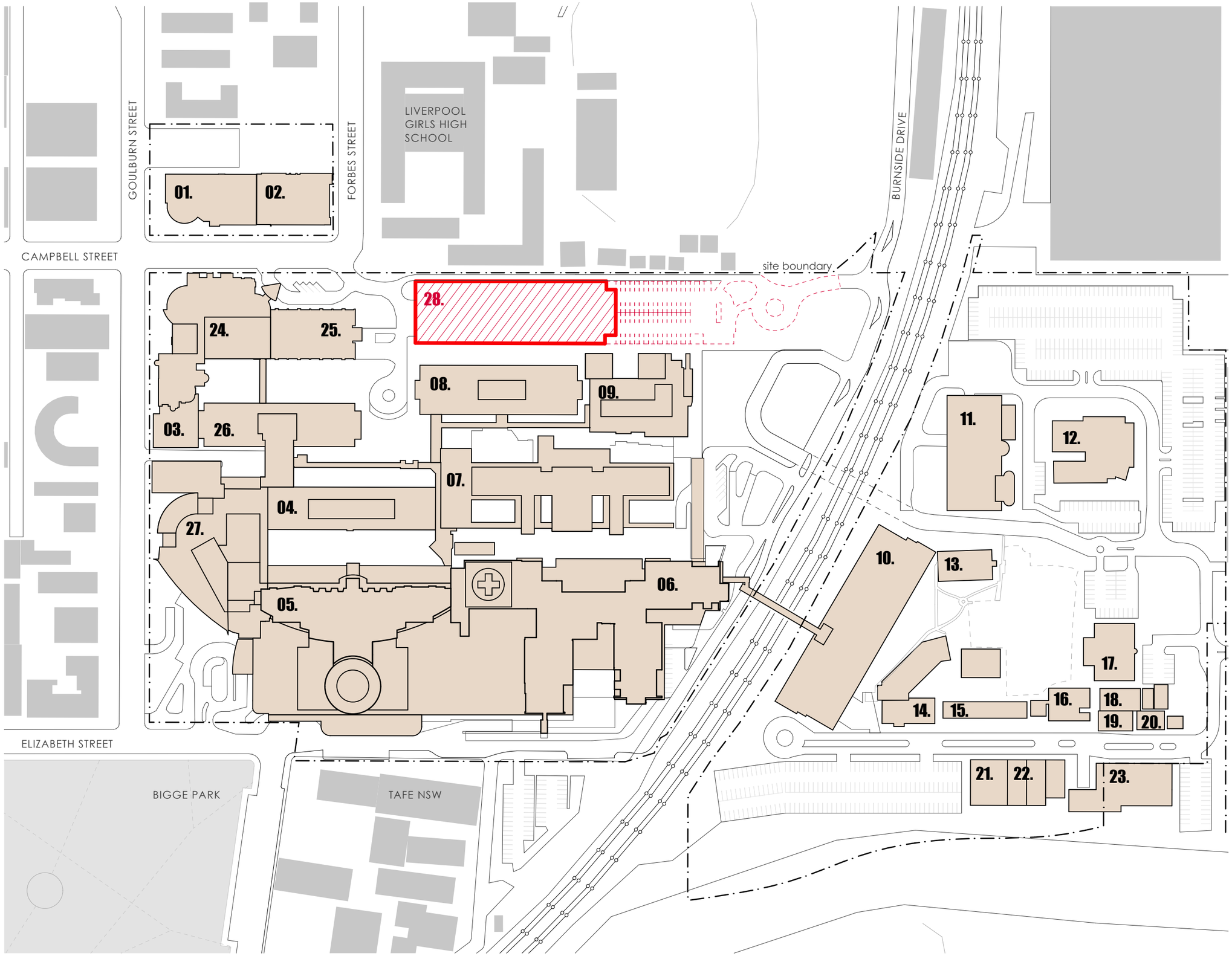
Abbreviation

SWL - Standing Water Level
EC - Electrical Conductivity
Eh - Redox Potential
SO4 - Sulphate
Cl - Chloride
DO - Dissolved Oxygen

Appendix C: Proposed Development Plans

LEGEND

01. health services building
02. ingham building
03. oncology bunkers
04. caroline chisholm
05. old clinical services building
06. new clinical services bld
07. mental health centre
08. don everett building
09. brain injury unit
10. P4 multi-storey car park
11. central energy building
12. ngara health education
13. bungala building
14. child care centre
15. staff education trainning
16. physical recources
17. admin building
18. multicultural health services
19. biu admin
20. biu nursing area
21. interpret building
22. store shed
23. isd swsahs
24. cancer building
25. pathology building
26. alex grimson
27. thomas & rachael moore edu. centre
***28.** P2 car park



- - - - - road demo works

buildings to be demolished

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existing buildings

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
01	12/12/19	FOR REVIEW	RP
02	10/01/20	FOR REVIEW	RP
03	15/01/20	FOR REVIEW	RP

PROJECT
LIVERPOOL HEALTH & ACADEMIC PRECINCT
ELIZABETH STREET LIVERPOOL NSW

CLIENT
HEALTH INFRASTRUCTURE
14/77 PACIFIC HWY, NORTH SYDNEY NSW 2060

PROJECT NORTH
SCALE 1:2000 @A3
25mm ON ORIGINAL

DRAWING
DEMOLITION PLAN

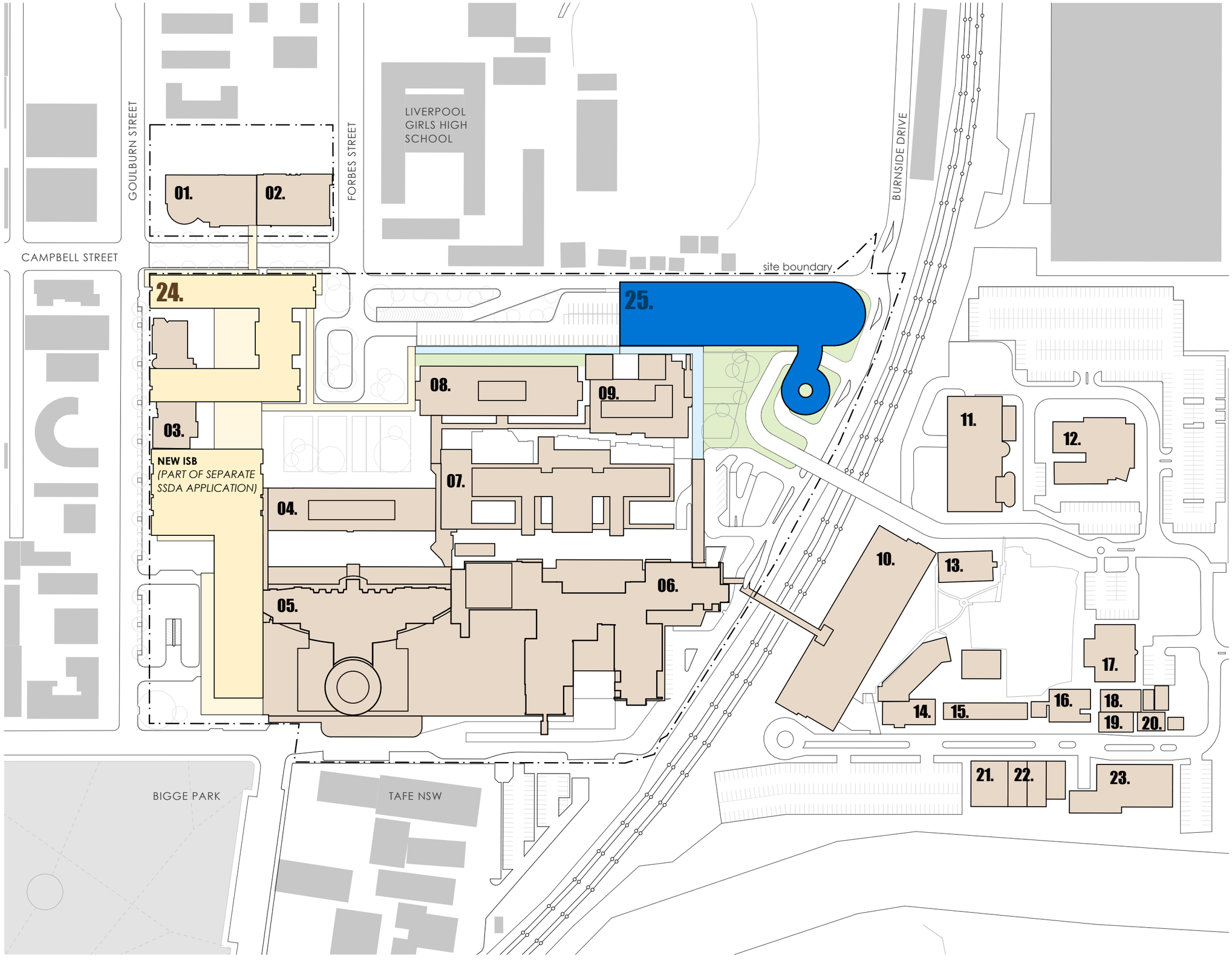
PRINT DATE
15/01/2020

PROJECT NO. 21807
DRAWING NO. A-SSDA-MSCP-04
ISSUE

STATUS
INITIAL DRAFT FOR REVIEW

LEGEND

01. health services building
02. ingham building
03. oncology bunkers
04. caroline chisholm
05. old clinical services building
06. new clinical services bld
07. mental health centre
08. don everett building
09. brain injury unit
10. P4 multi-storey car park
11. central energy building
12. ngara health education
13. bungala building
14. child care centre
15. staff education trainning
16. physical recources
17. admin building
18. multicultural health services
19. biu admin
20. biu nursing area
21. interpret building
22. store shed
23. isd swsahs
24. new integrated services building (ISB) (seperate SSDA)
25. new multi storey car park



landscape works
new multi storey car park
liverpool campus
existing buildings

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ELIZABETH STREET LIVERPOOL NSW

CLIENT
HEALTH INFRASTRUCTURE
14/77 PACIFIC HWY, NORTH SYDNEY NSW 2060

PROJECT NORTH
SCALE 1:2000 @A3
25mm ON ORIGINAL

DRAWING
SITE PLAN

PRINT DATE
15/01/2020

PROJECT NO. 21807
DRAWING NO. A-SSDA-MSCP-05
ISSUE

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PARKING NUMBERS

ON-GRADE	65	(20 ACC)
GROUND LEVEL	102	(2 ACC)
LEVEL 1A + 1B	144	
LEVEL 2A + 2B	152	
LEVEL 3A + 3B	159	
LEVEL 4A + 4B	158	
LEVEL 5A + 5B	158	
LEVEL 6A + 6B	159	
TOTAL	**1097**	

10,800

SIGNAGE

SIGNAGE

ENTRY TO DOCK B

REFER TO LANDSCAPE ARCHITECT'S DRAWINGS FOR DETAILS

Subject to seperate SSD Application

TO MSCP

ENTRY

EXIT

ON GRADE
65 CARS (20 ACC)
RL VARIES

FORBES STREET ENTRY DROP-OFF

MAIN WORKS FORECOURT
(REFER TO LANDSCAPE DRAWINGS FOR DETAILS. MAIN WORKS TO MARRY WITH MSCP WORKS)

RL 10.60

RL 10.56

RL 10.51

RL 10.38

RL 10.44

NEW COVERED WALKWAY (SHOWN DASHED)

RL 10.71

RL 10.05

refer to landscape architect's drawings for landscaping details

NEW RETAINING WALL & FENCE BETWEEN NEW WALKWAY AND DON EVERETT INTERFACE

EXTENT OF REMEDIAL LANDSCAPE WORKS TO EXISTING COURTYARD AREA TO DON EVERETT

EXISTING DON EVERETT BUILDING

EXISTING BRAIN INJURY UNIT

Refer to A-SSDA-MSCP-07 GA GROUND 01

landscape works

works completed under seperate SSD application

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LIVERPOOL HEALTH & ACADEMIC PRECINCT
ELIZABETH STREET LIVERPOOL NSW

CLIENT
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14/77 PACIFIC HWY, NORTH SYDNEY NSW 2060

PROJECT NORTH SCALE 1:500 @A3
25mm ON ORIGINAL

DRAWING
GA GROUND 01 (ROAD LAYOUT)

PRINT DATE
15/01/2020

PROJECT NO. 21807
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ISSUE

STATUS
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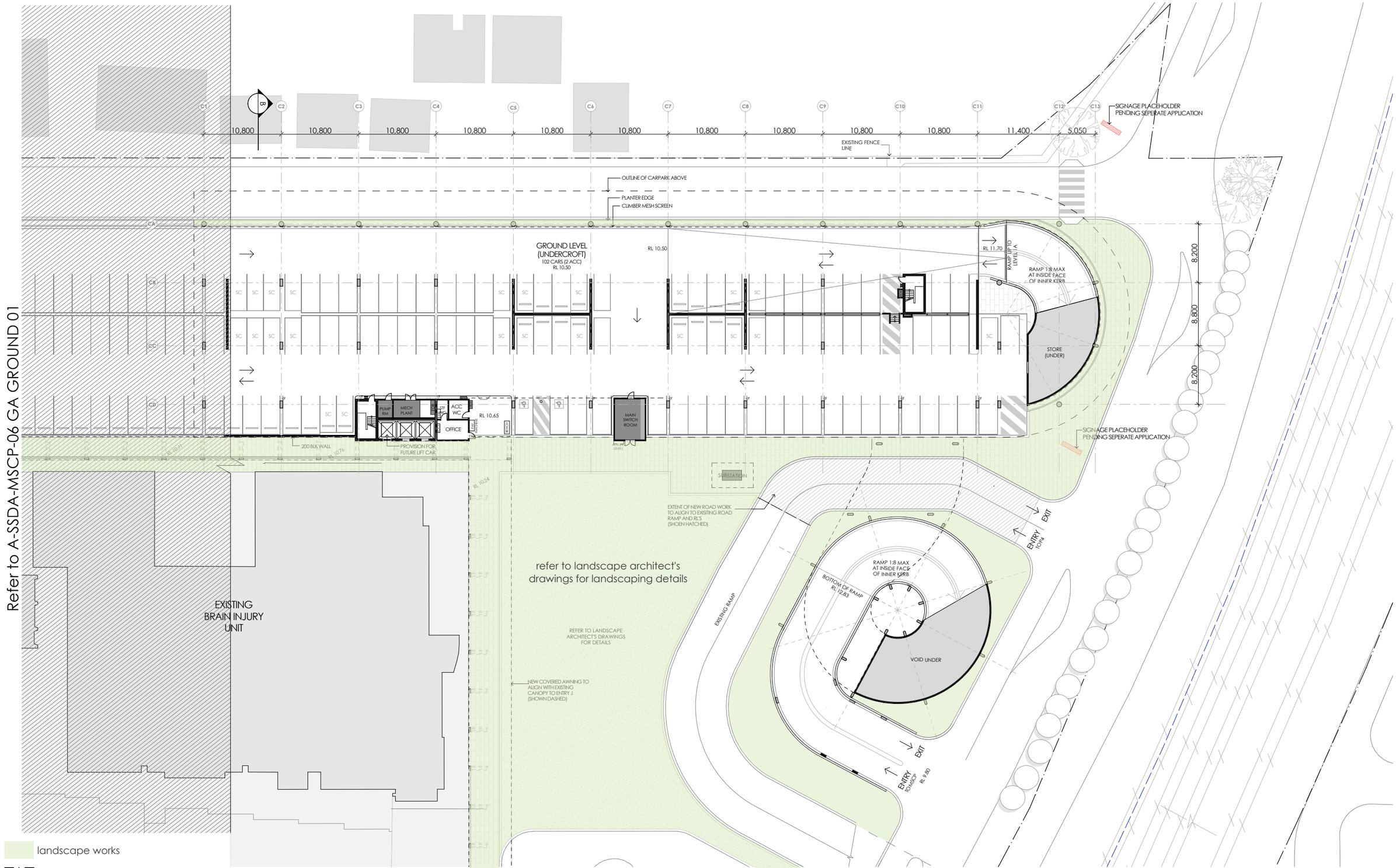
Refer to A-SSDA-MSCP-08

CP-06 GA GROUND 01



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PROJECT NORTH
SCALE 1:500 @A3
25mm ON ORIGINAL

DRAWING
GA GROUND 02 (ROAD LAYOUT)

PRINT DATE
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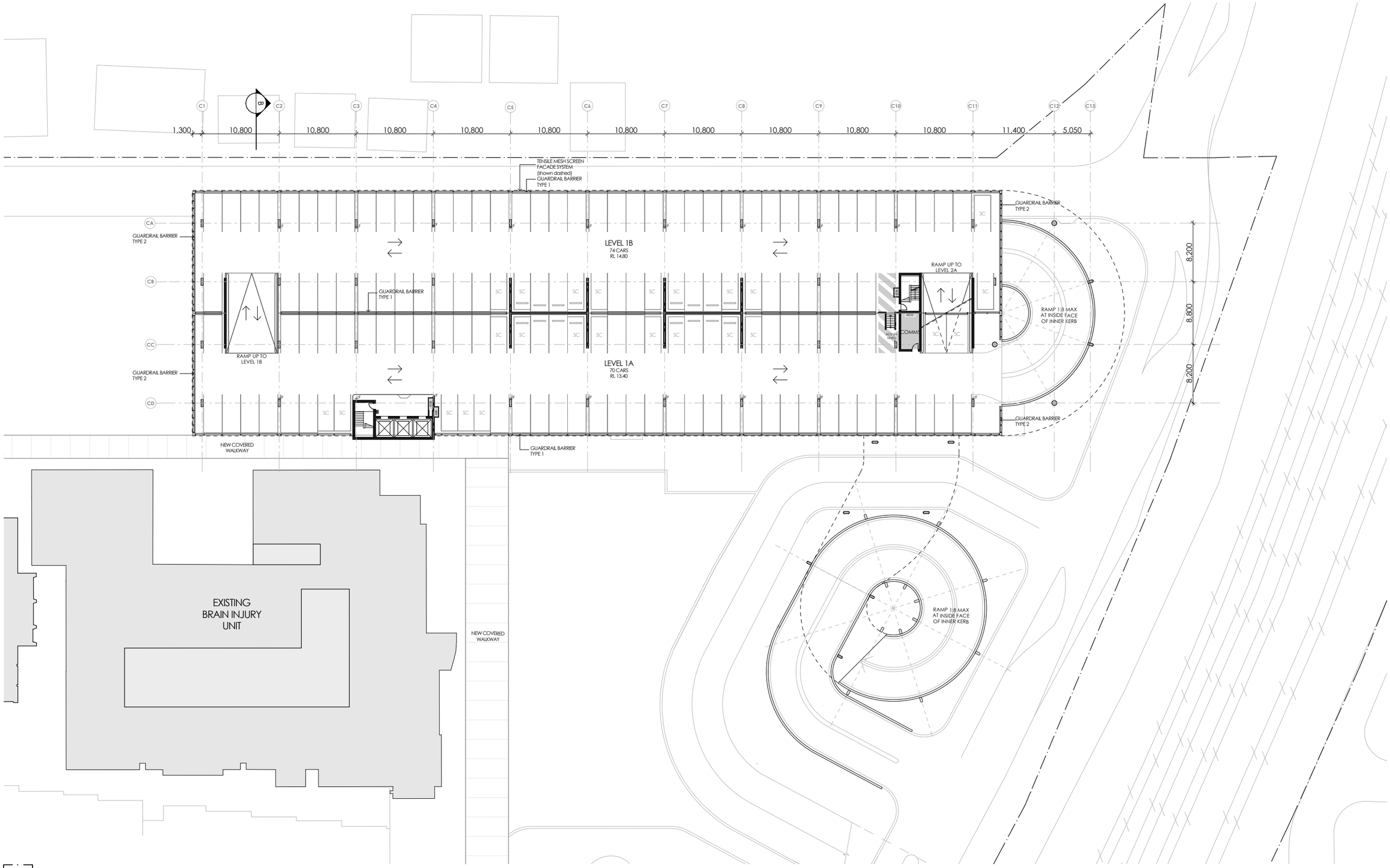

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PROJECT NORTH
SCALE 1:500 @A3
25mm ON ORIGINAL

DRAWING
GA LEVEL 01

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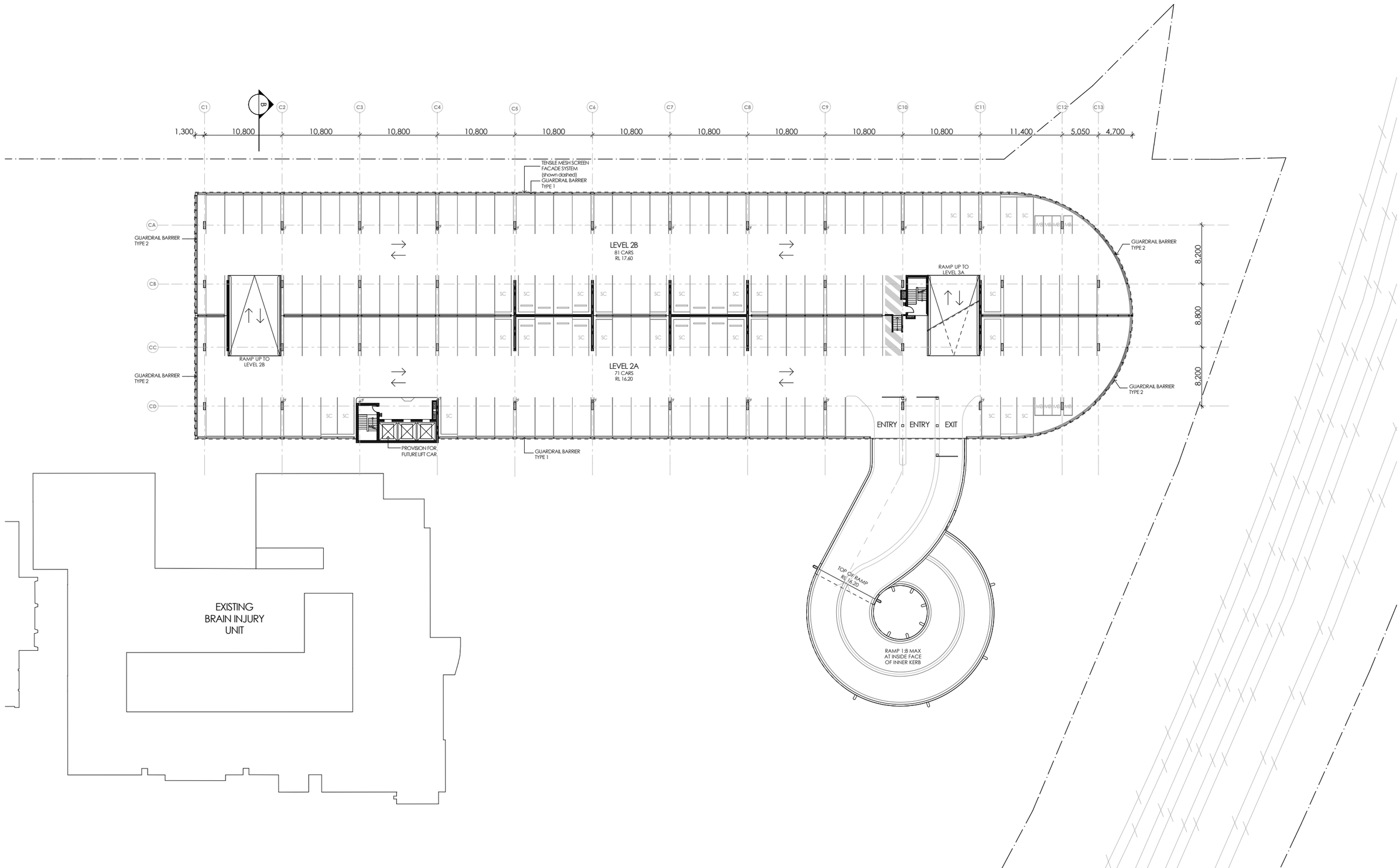

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GA LEVEL 02

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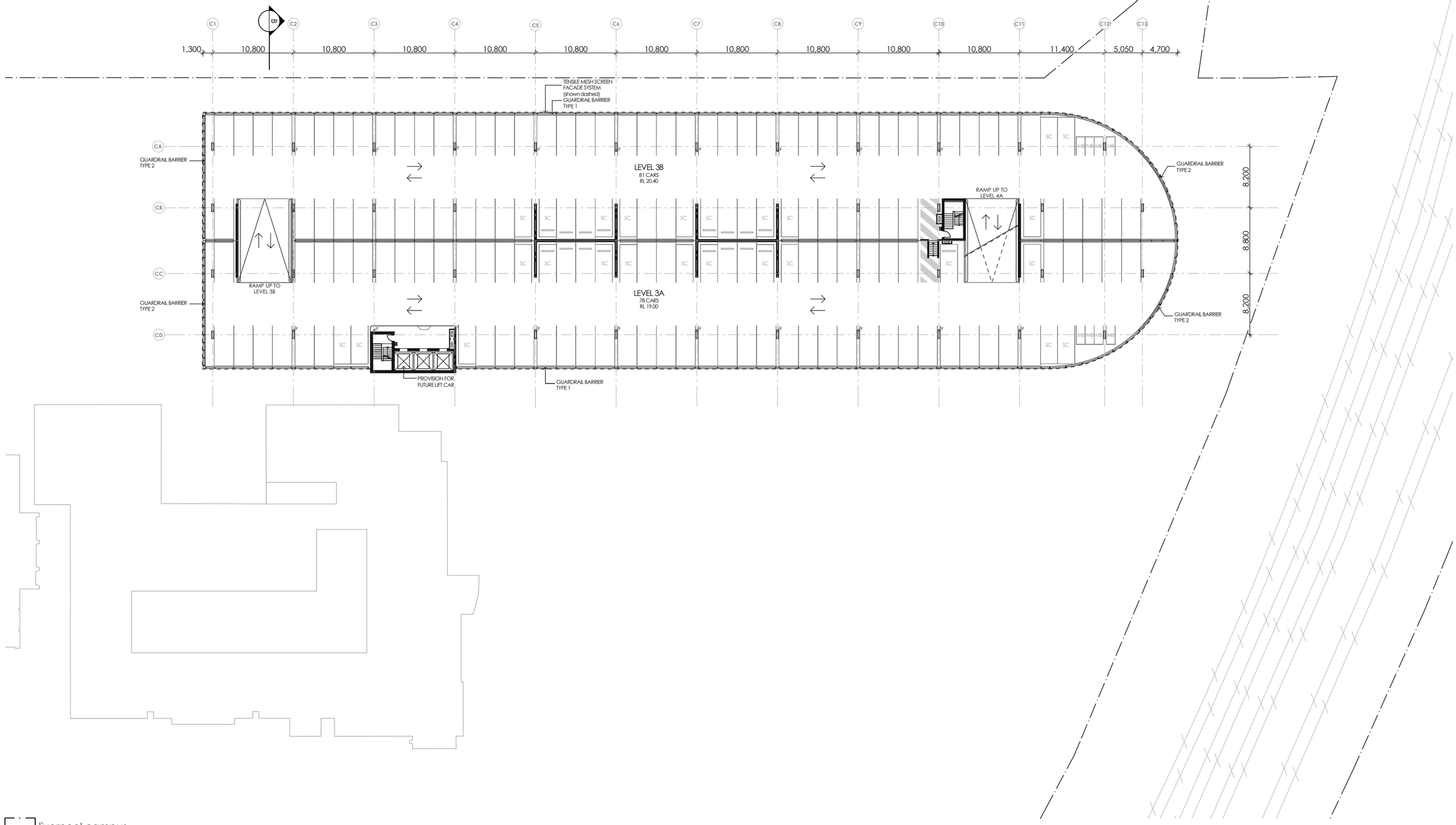

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03	15/01/20	FOR REVIEW	RP

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CLIENT
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PROJECT NORTH SCALE
1:500 @A3
25mm ON ORIGINAL

DRAWING
GA LEVEL 03

PRINT DATE
15/01/2020

PROJECT NO.
21807

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A-SSDA-MSCP-10

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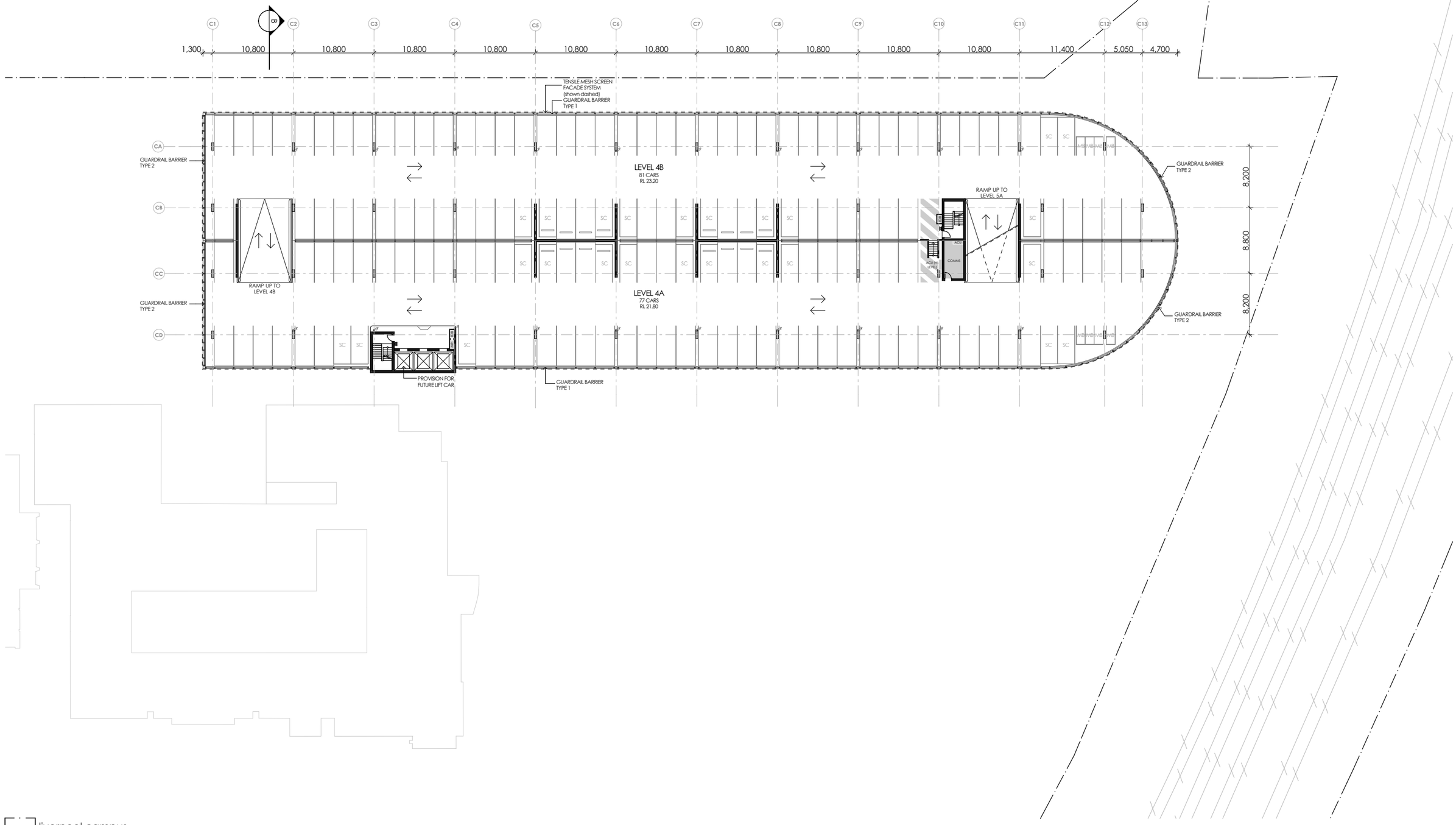

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03	15/01/20	FOR REVIEW	RP

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CLIENT
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PROJECT NORTH
SCALE 1:500 @A3
25mm ON ORIGINAL

DRAWING
GA LEVEL 04

PRINT DATE
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PROJECT NO. 21807
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ISSUE

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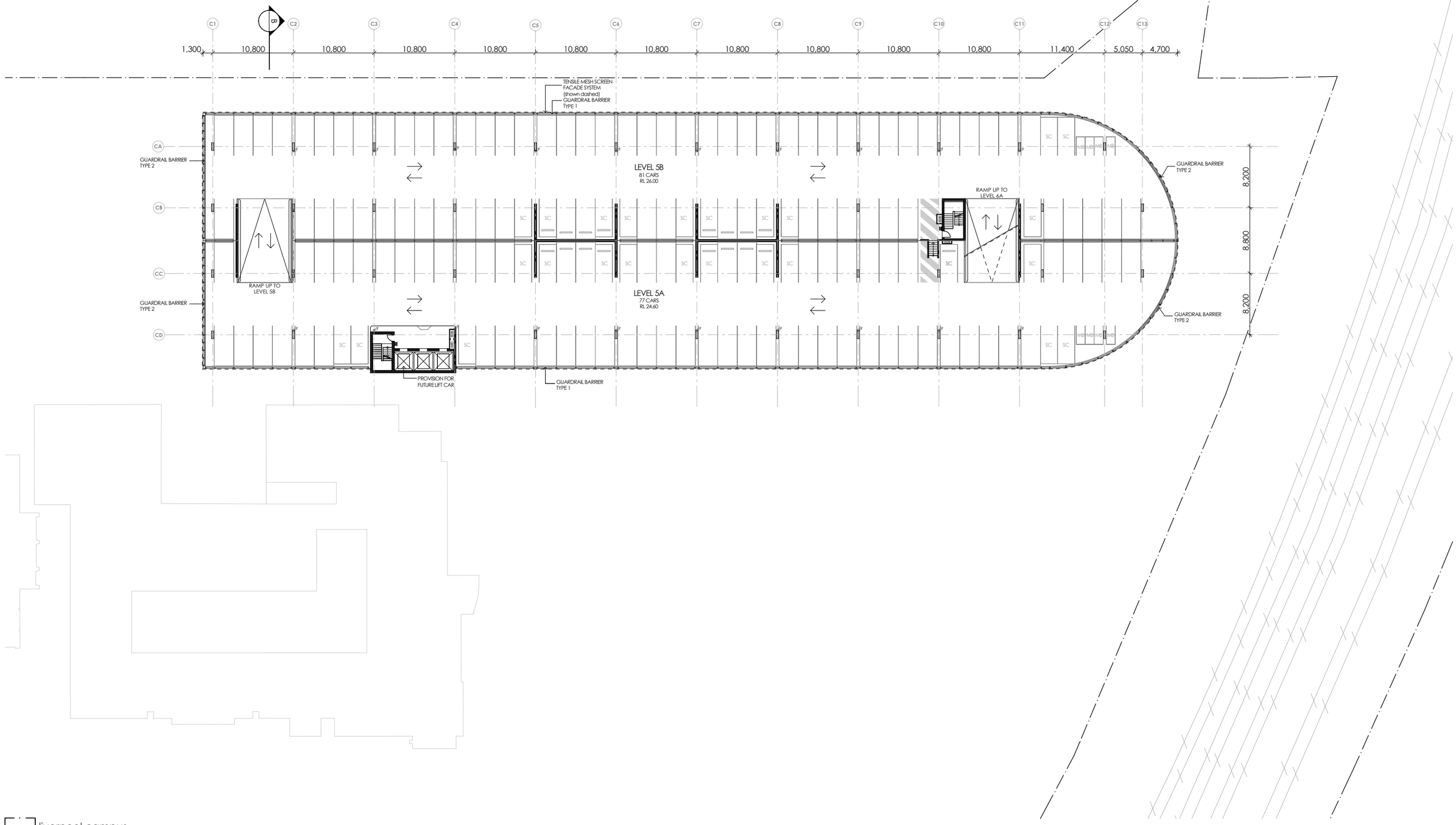

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03	15/01/20	FOR REVIEW	RP

PROJECT
LIVERPOOL HEALTH & ACADEMIC PRECINCT
ELIZABETH STREET LIVERPOOL NSW

CLIENT
HEALTH INFRASTRUCTURE
14/77 PACIFIC HWY, NORTH SYDNEY NSW 2060

PROJECT NORTH SCALE
1:500 @A3
25mm ON ORIGINAL

DRAWING
GA LEVEL 05

PRINT DATE
15/01/2020

PROJECT NO.
21807

DRAWING NO.
A-SSDA-MSCP-12

ISSUE

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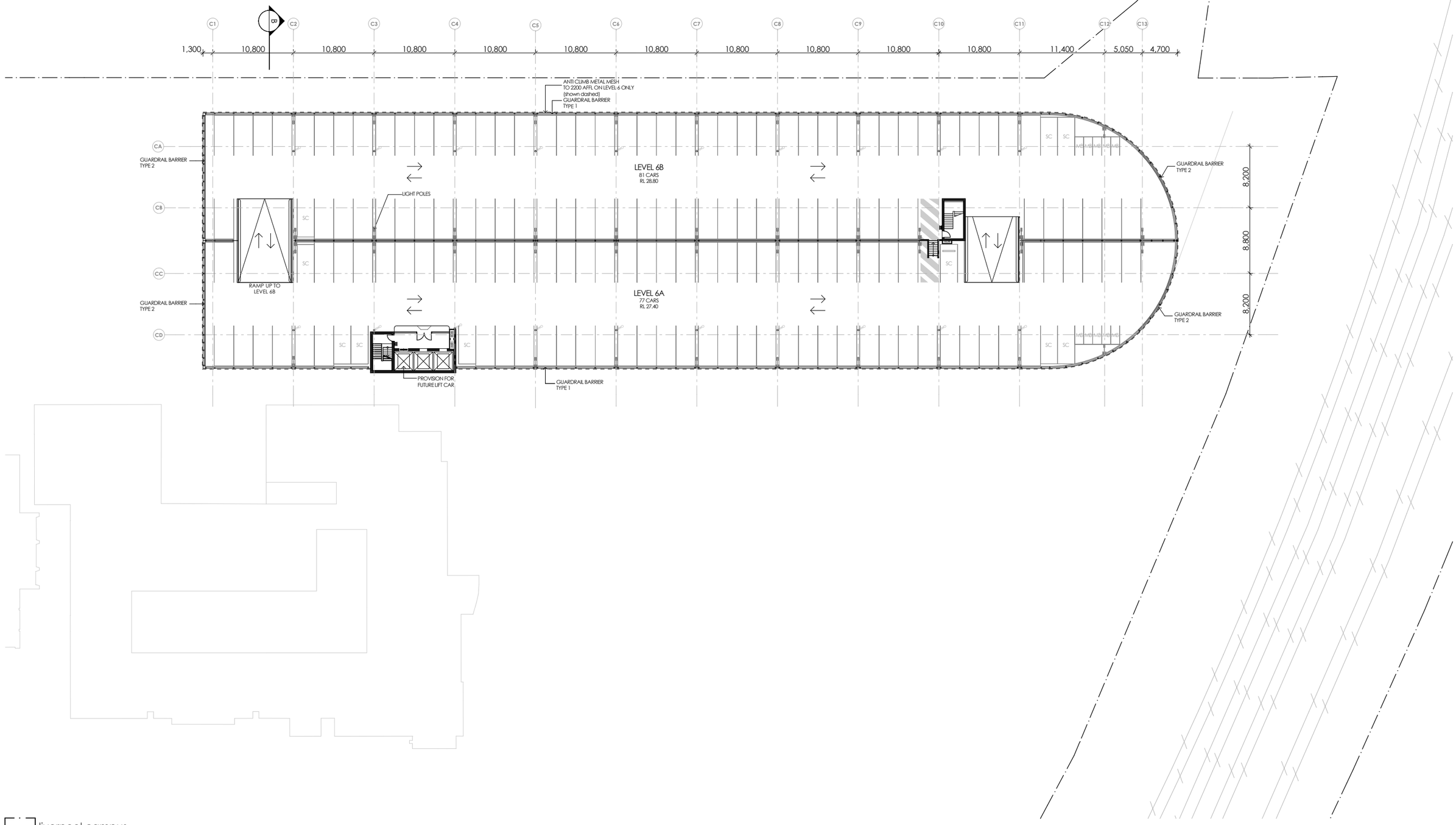

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01	12/12/19	FOR REVIEW	RP
02	10/01/20	FOR REVIEW	RP
03	15/01/20	FOR REVIEW	RP

PROJECT
LIVERPOOL HEALTH & ACADEMIC PRECINCT
ELIZABETH STREET LIVERPOOL NSW

CLIENT
HEALTH INFRASTRUCTURE
14/77 PACIFIC HWY, NORTH SYDNEY NSW 2060

PROJECT NORTH
SCALE 1:500 @A3
25mm ON ORIGINAL

DRAWING
GA LEVEL 06

PRINT DATE
15/01/2020

PROJECT NO. 21807
DRAWING NO. A-SSDA-MSCP-13
ISSUE

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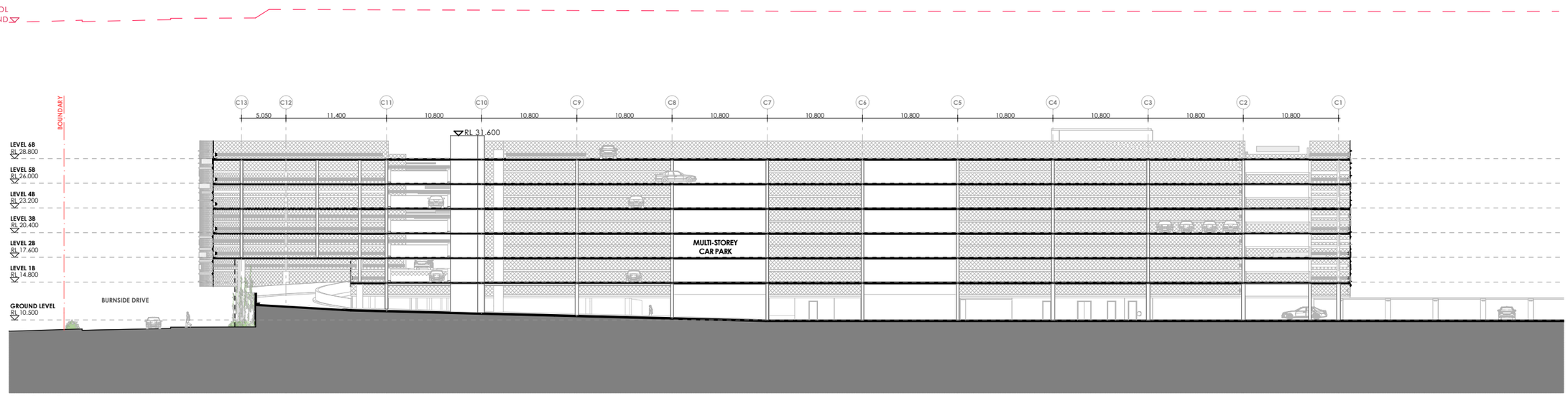

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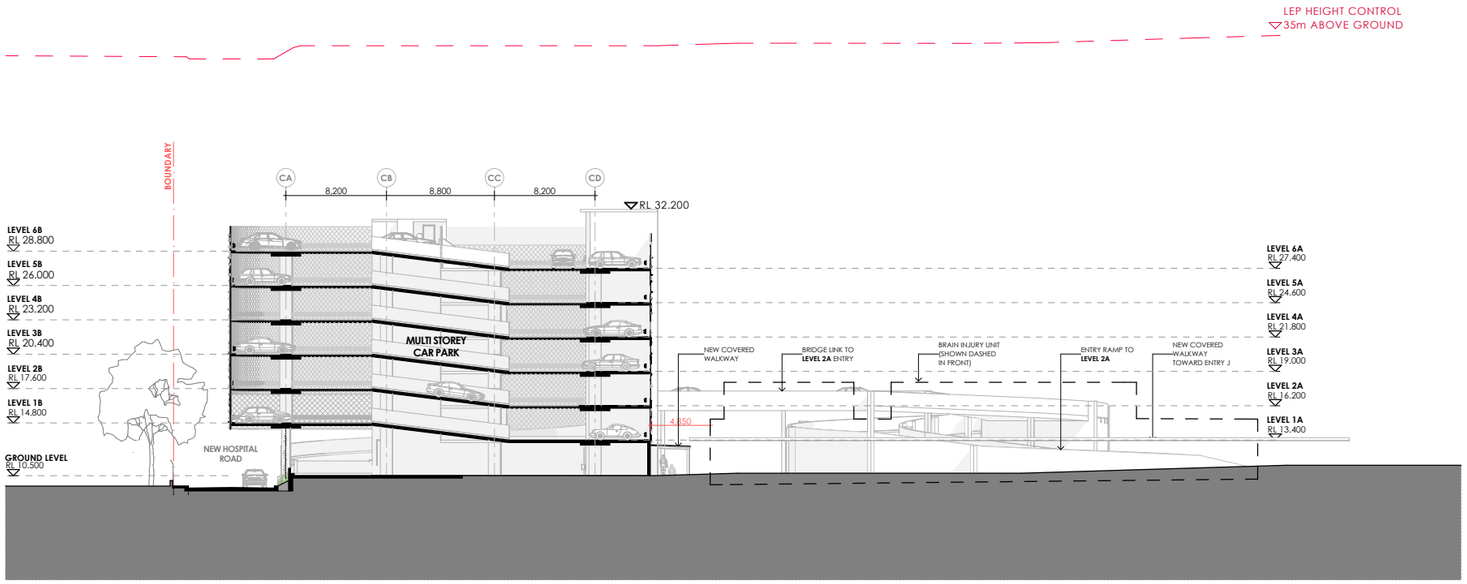

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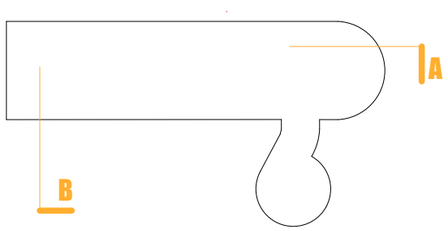

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02	10/01/20	FOR REVIEW	RP
03	15/01/20	FOR REVIEW	RP

PROJECT
LIVERPOOL HEALTH & ACADEMIC PRECINCT
ELIZABETH STREET LIVERPOOL NSW

CLIENT
HEALTH INFRASTRUCTURE
14/77 PACIFIC HWY, NORTH SYDNEY NSW 2060

PROJECT NORTH
SCALE 1:500 @A3
25mm ON ORIGINAL

DRAWING
SECTIONS

PRINT DATE
15/01/2020

PROJECT NO. 21807
DRAWING NO. A-SSDA-MSCP-14
ISSUE
STATUS
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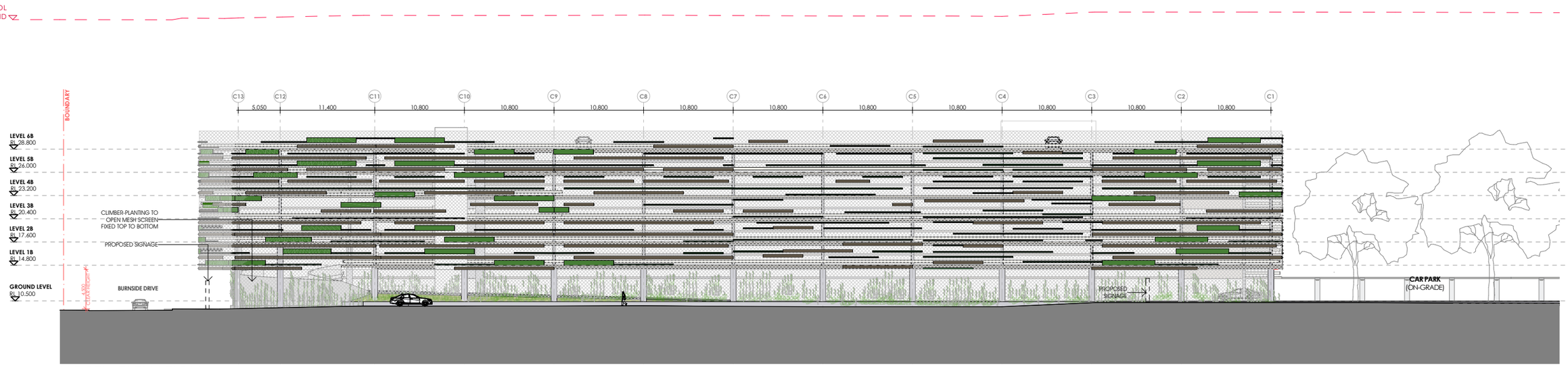
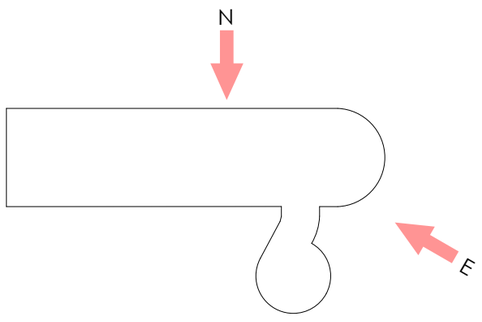


NORTH ELEVATION

EAST ELEVATION



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a. LEVEL 6, 156 CLARENCE STREET, SYDNEY 2000, AUSTRALIA

AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
01	12/12/19	FOR REVIEW	RP
02	10/01/20	FOR REVIEW	RP
03	15/01/20	FOR REVIEW	RP

PROJECT
LIVERPOOL HEALTH & ACADEMIC PRECINCT
ELIZABETH STREET LIVERPOOL NSW

CLIENT
HEALTH INFRASTRUCTURE
14/77 PACIFIC HWY, NORTH SYDNEY NSW 2060

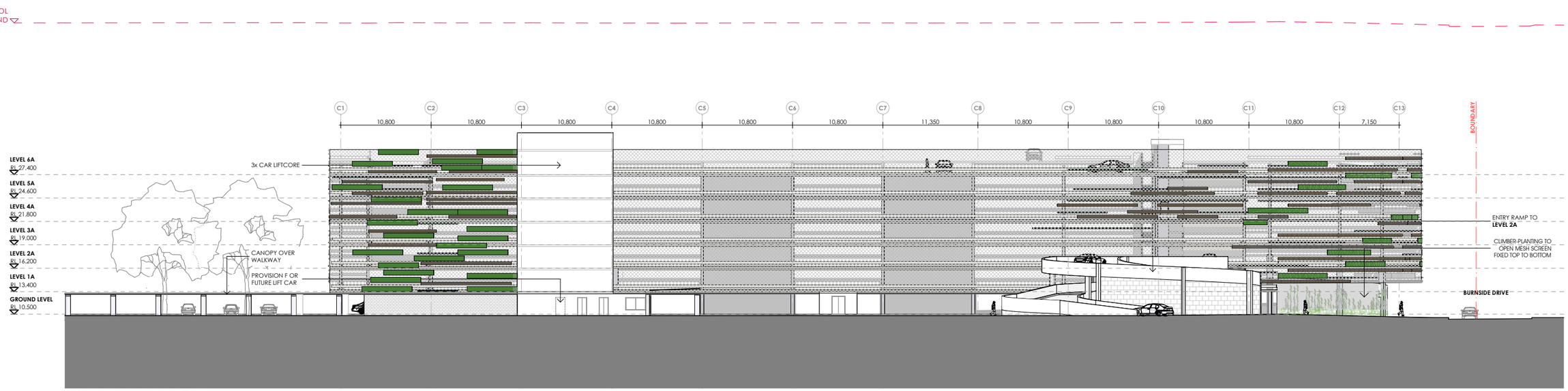
PROJECT NORTH SCALE
1:500 @A3
25mm ON ORIGINAL

DRAWING
ELEVATIONS

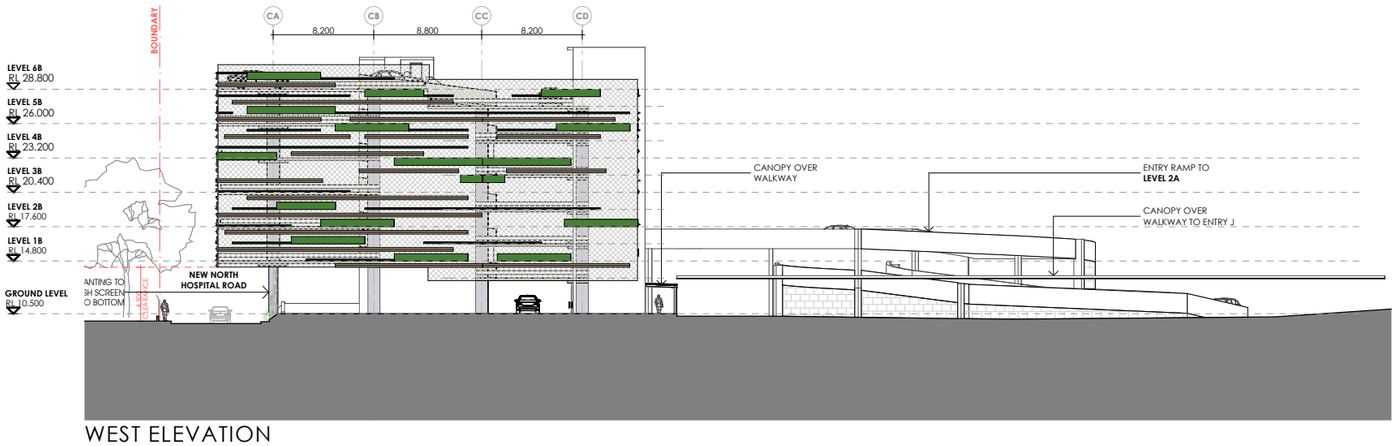
PRINT DATE
15/01/2020

PROJECT NO. 21807
DRAWING NO. A-SSDA-MSCP-15
ISSUE

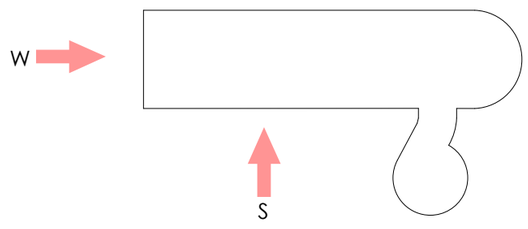
STATUS
INITIAL DRAFT FOR REVIEW



SOUTH ELEVATION



WEST ELEVATION



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p. +61 (0)2 8274 8200 w. www.fitzpatrickpartners.com
a. LEVEL 6, 156 CLARENCE STREET, SYDNEY 2000, AUSTRALIA

AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
01	12/12/19	FOR REVIEW	RP
02	10/01/20	FOR REVIEW	RP
03	15/01/20	FOR REVIEW	RP

PROJECT
LIVERPOOL HEALTH & ACADEMIC PRECINCT
ELIZABETH STREET LIVERPOOL NSW

CLIENT
HEALTH INFRASTRUCTURE
14/77 PACIFIC HWY, NORTH SYDNEY NSW 2060

PROJECT NORTH SCALE
1:500 @A3
25mm ON ORIGINAL

DRAWING
ELEVATIONS

PRINT DATE
15/01/2020

PROJECT NO.
21807

DRAWING NO.
A-SSDA-MSCP-16

ISSUE

STATUS
INITIAL DRAFT FOR REVIEW

Appendix D: Borehole Logs

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE101** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 11.79m

Date: 31/7/2019 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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 COMPLE-TION	■		■		■		0		-	ASPHALTIC CONCRETE: 40mm.t	D			5.4kg BUCKET NO FCF
	■		■		■	N = 15 6,6,9				FILL: Gravelly sand, fine to medium grained, grey, fine to coarse grained igneous gravel, sub angular, trace of sandstone gravel.	w<PL			3.4kg BUCKET NO FCF
							1			FILL: Silty clay, low to medium plasticity, brown, trace of ironstone gravel.				
									CI-CH	Silty CLAY: medium to high plasticity, red brown mottled orange brown, trace of ironstone gravel.	w<PL			ALLUVIAL
	■		■			N > 26 7,15, 11/ 100mm REFUSAL			-	Extremely Weathered siltstone: silty CLAY, medium to high plasticity, grey mottled brown.	XW			BRINGELLY SHALE
							2			END OF BOREHOLE AT 1.9m				
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. JKE102
1/2

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 11.16m

Date: 31/7/2019 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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 COMPLE-TION							0			ASPHALTIC CONCRETE: 100mm.t				
									-	FILL: Gravelly sand, fine to medium grained, red brown, fine to coarse grained, brick, sub angular, trace of concrete, roots and igneous gravel.	D			3.8kg BUCKET NO FCF
											w<PL			
						N = 11 4,5,6				FILL: Silty clay, low to medium plasticity, dark grey, trace of roots, sandstone and igneous gravel and ash.				5.7kg BUCKET NO FCF
							1			FILL: Silty clay, medium to high plasticity, brown, trace of roots and igneous gravel.				5.5kg BUCKET NO FCF
						N = 8 4,4,4			CI-CH	Silty CLAY: medium to high plasticity, grey mottled red brown.	w>PL			ALLUVIAL
							2							
										Silty CLAY: medium to high plasticity, grey mottled yellow brown.				
						N = 9 4,4,5	3							
							4							
						N = 17 5,7,10								
							5		-	Silty clayey SAND: fine to coarse grained, grey.	M			
									SP	SAND: fine to coarse grained, light grey.	D			
						N = 15 12,9,6	6							
									SM	Silty SAND: fine to coarse grained, light brown.	M			
									CI-CH	Silty CLAY: medium to high plasticity, grey.	w>PL			RESIDUAL
									CL-CI	Silty CLAY: low to medium plasticity, red brown mottled grey.	w<PL			
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. JKE102 2/2

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 11.16m

Date: 31/7/2019 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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
▼ ON 16/8/19						N = 11 3,5,6	8		CL-CI	Silty CLAY: low to medium plasticity, red brown mottled grey.	w<PL			
									CI-CH	Silty CLAY: medium to high plasticity, yellow brown mottled grey.				
											w>PL			
▼ ON COMPLE-TION OF AUGER-ING						N = 13 4,5,8	9							
							10		CL-CI	Silty CLAY: low to medium plasticity, brown, ironstone gravel banding.				
										END OF BOREHOLE AT 10.0m				Groundwater monitoring well installed to 10.0m. Class 18 machine slotted 50mm dia. PVC standpipe 10.0m to 2.0m. Casing 2.0m to 0.0m. 2mm sand filter pack 10.0m to 1.7m. Bentonite seal 1.7m to 1.2m. Backfilled with sand (and/or cuttings) to the surface. Completed with a concreted gatic cover.
							11							
							12							
							13							
							14							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE103** **1/1**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** HAND TOOLS **R.L. Surface:** ≈ 10.84m

Date: 31/7/2019 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** A.M./M.D.

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 COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, brown, trace of sandstone gravel.	D			7.8kg BUCKET NO FCF 11.1kg BUCKET NO FCF
										FILL: Sandy gravel, fine to coarse grained, light brown, sandstone, fine to medium grained sand.				HAND TOOLS REFUSAL ON INFERRRED CONCRETE
										END OF BOREHOLE AT 0.4m				
							1							
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE104** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 10.22m

Date: 31/7/2019 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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 COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, brown, trace of sandstone gravel and brick fragments.	D			8.9kg BUCKET NO FCF 11.0kg BUCKET NO FCF
						N = 15 9,8,7				FILL: Sandy gravel, fine to coarse grained, light brown, fine to medium grained sand, sandstone, sub rounded trace of igneous gravel, brick and asphalt fragments.	w<PL			4.0kg BUCKET NO FCF
	■		■				1			FILL: Silty sandy clay, low to medium plasticity, dark grey, fine to medium grained sand, trace of brick fragments.				
	■		■			N = 17 9,8,9			CI-CH	Silty CLAY: medium to high plasticity, red brown mottled grey, trace of ironstone gravel.	w<PL			ALLUVIAL
							2			END OF BOREHOLE AT 2.1m				
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE105** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 11.37m

Date: 1/8/2019 **Datum:** AHD

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

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 COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, brown, trace of igneous gravel and clay fines.	M			9.4kg BUCKET NO FCF
	■		■		■	N = 6 4,3,3				FILL: Silty clay, low to medium plasticity, light brown, with sandstone gravel, trace of igneous and ironstone gravel.	w<PL			6.9kg BUCKET NO FCF
							1			END OF BORHEOLE AT 1.1m				REFUSAL ON INFERRED CONCRETE
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE106** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 11.74m

Date: 1/8/2019 **Datum:** AHD

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

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 COMPLE-TION							0			ASPHALT CONCRETE: 80mm.t				
									-	FILL: Silty clayey sand, fine to coarse grained, light brown, with sandstone gravel, trace of asphalt.	D			6.8kg BUCKET NO FCF
											w>PL			8.3kg BUCKET NO FCF
						N > 15 3,5, 10/ 100mm				FILL: Silty clay, low to medium plasticity, light brown and grey, trace of igneous, sandstone and ironstone gravel.				
						REFUSAL	1			FILL: Silty clay, medium to high plasticity, red brown, trace of igneous gravel.				8.7kg BUCKET NO FCF
						N = 9 4,4,5				FILL: Silty clay, medium to high plasticity, brown, red brown and yellow brown, trace of igneous, ironstone and sandstone gravel and ash.				9.8kg BUCKET NO FCF
							2							
														8.7kg BUCKET NO FCF
						N = 4 2,2,2	3							
										FILL: Silty clay, medium to high plasticity, brown, red brown and yellow brown, trace of igneous, ironstone and sandstone gravel and ash.				8.1kg BUCKET NO FCF
							4							
									CI-CH	Silty CLAY: medium to high plasticity, red brown mottled grey, with ironstone gravel.	w<PL			ALLUVIAL
						N = 10 2,4,6								
							5			END OF BOREHOLE AT 4.95m				
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE107** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 11.90m

Date: 1/8/2019 **Datum:** AHD

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

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 COMPLE-TION							0			FILL: Silty sand, fine to medium grained, brown, trace of sandstone and igneous gravel and brick fragments.	M			GRASS COVER 11.8kg BUCKET NO FCF
						N = 6 8,3,3				FILL: Silty clay, low to medium plasticity, red brown, trace of sandstone, igneous and ironstone gravel, brick fragments, slag and ash.	w>PL			11.6kg BUCKET NO FCF
							1							
						N = 7 3,4,3								9.3kg BUCKET NO FCF
							2							
														7.4kg BUCKET NO FCF
						N = 8 3,3,5	3		CI-CH	Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.	w≈PL			ALLUVIAL
							4			END OF BOREHOLE AT 4.0m				
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE108** **1/2**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 11.74m

Date: 1/8/2019 **Datum:** AHD

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

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 COMPLE-TION							0			CONCRETE: 220mm.t				
									-	FILL: Silty sand, fine to coarse grained, light brown, trace of sandstone gravel.	M			5.1kg BUCKET NO FCF
						N = 8 2,3,5				FILL: Silty clay, medium to high plasticity, brown, red brown and grey, trace of sandstone, ironstone and igneous gravel, brick fragments, slag and ash.	w>PL			9.9kg BUCKET NO FCF
						N = 5 2,2,3	1							9.0kg BUCKET NO FCF
							2							4.0kg BUCKET NO FCF
						N = 7 2,3,4	3		CI-CH	Silty CLAY: medium to high plasticity, brown, trace of root fibres.	w>PL			ALLUVIAL
										as above, but red brown.	w<PL			
						N = 21 5,9,12	4							
							5			as above, but grey.				
						N = 18 5,8,10	6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE108** **2/2**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 11.74m

Date: 1/8/2019 **Datum:** AHD

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

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
									CI-CH	Silty CLAY: medium to high plasticity, grey, trace of root fibres.	w<PL			
									SP	SAND: fine to coarse grained, yellow brown.	D			
		■		■		N = 24 7,11,13	8							
			■						CI-CH	Silty CLAY: medium to high plasticity, light brown.	w<PL			
		■		■			9		SM	Silty SAND: fine to coarse grained, light grey.	M			
		■		■		N = 20 9,10,10				as above, but dark brown.				
							10			END OF BOREHOLE AT 10.0m				Groundwater monitoring well installed to 10.0m. Class 18 machine slotted 50mm dia. PVC standpipe 10.0m to 3.0m. Casing 3.0m to 0.0m. 2mm sand filter pack 10.0m to 2.6m. Bentonite seal 2.6m to 2.0m. Backfilled with sand (and/or cuttings) to the surface. Completed with a concreted gatic cover.
							11							
							12							
							13							
							14							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE109** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 11.70m

Date: 5/8/2019 **Datum:** AHD

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

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 COMPLE-TION							0		-	ASPHALT CONCRETE: 45mm.t	M			5.0kg BUCKET NO FCF
						N = 14 4,7,7				FILL: Gravelly sand, fine to medium grained, brown, fine to coarse grained sandstone, trace of igneous gravel and concrete fragments.				1.5kG BUCKET NO FCF
							1			FILL: Gravelly sand, fine to coarse grained, light brown, fine to medium grained sandstone, trace of clay fines.	w>PL			11.6kg BUCKET NO FCF
										FILL: Silty clay, low to medium plasticity, brown, trace of sandstone, igneous, river and ironstone gravel, brick fragments and slag.				
						N = 8 4,3,5				FILL: Silty clay, medium to high plasticity, red brown, trace of sandstone, igneous and ironstone gravel and brick fragments.				9.7kg BUCKET NO FCF
							2							
							3		CI-CH	Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.	w>PL			ALLUVIAL
						N = 8 2,4,4								
										END OF BOREHOLE AT 3.45m				
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE110** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 10.76m

Date: 2/8/2019 **Datum:** AHD

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

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 COMPLE-TION	■		■		■		0		-	ASPHALT CONCRETE: 40mm.t.	D			7.0kg BUCKET NO FCF
	■		■		■					FILL: Gravelly sand, fine to medium grained, light brown, fine to coarse grained igneous.				6.5kg BUCKET NO FCF
	■		■		■	N = 19 14,11,8				FILL: Gravelly sand, fine to medium grained, light grey, fine to coarse grained sandstone.	w>PL			11.3kg BUCKET NO FCF
					■		1			FILL: Silty clay, low to medium plasticity, brown and red brown, trace of igneous, sandstone and ironstone gravel, brick fragments and ash.				
	■		■		■	N = 7 3,3,4								10.9kg BUCKET NO FCF
					■		2							
	■		■			N = 15 4,6,9	3		CI-CH	Silty CLAY: medium to high plasticity, red brown mottled grey, trace of root fibres.	w<PL			ALLUVIAL
										END OF BOREHOLE AT 3.45m				
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE111** **1/1**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 10.96m

Date: 2/8/2019 **Datum:** AHD

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

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 COMPLE-TION							0			FILL: Sandy gravel, fine to coarse grained, light brown, igneous, fine to medium grained sand, trace of organic material.	D			11.1kg BUCKET NO FCF
						N = 12 4,6,6				FILL: Clayey sand, fine to medium grained, light grey, trace of igneous gravel.	w<PL			1.0kg BUCKET NO FCF
							1			FILL: Silty clay, low to medium plasticity, brown, trace of igneous gravel.				11.2kg BUCKET NO FCF
										FILL: Silty clay, low to medium plasticity, dark brown, trace of igneous, sandstone and ironstone gravel.	w>PL			8.2kg BUCKET NO FCF
						N = 10 4,5,5				FILL: Silty sand, fine to medium grained, grey.	M			1.5kg BUCKET NO FCF
							2			FILL: Silty clay, medium to high plasticity, dark grey and brown, trace of igneous gravel.	w>PL			9.7kg BUCKET NO FCF
									CI-CH	Silty CLAY: medium to high plasticity, red brown mottled grey.	w<PL			ALLUVIAL
						N = 9 2,4,5	3							
										END OF BOREHOLE AT 3.45m				
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE112** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.72m

Date: 5/8/2019 **Datum:** AHD

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

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 COMPLE-TION	■		■		■		0			FILL: Silty clay, low to medium plasticity, brown, trace of igneous gravel, concrete and brick fragments.	w<PL			10.2kg BUCKET NO FCF
	■		■			N = 4 2,2,2				FILL: Silty clay, low to medium plasticity, red brown and brown, trace of igneous, sandstone and ironstone gravel, concrete fragments, slag and ash.	w>PL			10.5kg BUCKET NO FCF
	■		■		■		1							
	■		■			N = 7 3,3,4			CI-CH	Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.	w>PL			ALLUVIAL
										as above, but red brown mottled grey.				
							2			END OF BOREHOLE AT 1.95m				
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE113** **1/1**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** HAND TOOLS **R.L. Surface:** ≈ 10.52m

Date: 7/8/2019 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** A.M./M.D.

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 coarse grained, brown, trace of sandstone gravel, organic material and clay fines	D			MULCH COVER 7.5kg BUCKET NO FCF
											w<PL			
										FILL: Silty clay, low to medium plasticity, brown, trace of sandstone gravel and brick fragments.				NOT ENOUGH SAMPLE FOR BUCKET
										END OF BOREHOLE AT 0.3m				HAND TOOL REFUSAL
							1							
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE114** **1/1**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.51m

Date: 6/8/2019 **Datum:** AHD

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

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 COMPLE-TION	■		■		■		0			FILL: Silty clay, low to medium plasticity, brown, trace of concrete fragments and slag.	w<PL			GRASS COVER 12.1kg BUCKET NO FCF
						N = SPT REFUSAL			-	CONCRETE: 200mm.t				
							1			END OF BOREHOLE AT 0.7m				REFUSAL ON CONCRETE SLAB
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE115** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.25m

Date: 5/8/2019 **Datum:** AHD

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

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	■		■		■	N = 11 5,7,4	0			FILL: Sandy gravel, fine to coarse grained, brown, igneous, fine to medium grained sand, trace of sandstone gravel and concrete fragments.	D			GRASS COVER 10.1kg BUCKET NO FCF 10.5kg BUCKET NO FCF
											w<PL			
	■		■				1		CI-CH	FILL: Silty clay, medium to high plasticity, red brown and brown, trace of igneous, siltstone and ironstone gravel and ash.	w≈PL			ALLUVIAL
										Silty CLAY: medium to high plasticity, red brown mottled grey and brown, trace of root fibres.				
										END OF BOREHOLE AT 1.5m				
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. JKE116 **1/3**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.25m

Date: 5/8/2019 **Datum:** AHD

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

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: Sandy gravel, fine to coarse grained, grey, igneous, fine to medium grained sand, trace of organic material.	D			GRASS COVER 12.6kg BUCKET NO FCF NO SPT DUE TO LOOSE GRAVEL COLLAPSE
									CI-CH	Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.	w<PL			ALLUVIAL
						N = 21 8,9,12	1			as above, but orange brown mottled grey.				
							2							
						N = 19 6,10,9	3		SP	SAND: fine to coarse grained, light brown.	D			
									CL-CI	Sandy CLAY: low to medium plasticity, orange brown mottled grey, fine to medium grained sand.	w<PL			
							4							
						N = 24 7,12,12				Sandy CLAY: low to medium plasticity, grey mottled orange brown, fine to medium grained sand.				
							5			as above, but orange brown mottled grey with ironstone bands.				
						N = 19 6,8,11	6		CL-CI	Silty sandy CLAY: low to medium plasticity, grey with fine to coarse grained sand.	w>PL			
							7		CL-CI	Sandy CLAY: low to medium	w<PL			

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE116** **2/3**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.25m

Date: 5/8/2019 **Datum:** AHD

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

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
									CL-CI	plasticity, orange brown mottled grey, fine to coarse grained sand.	w<PL			
										Sandy CLAY: low to medium plasticity, orange brown mottled grey, fine to coarse grained sand.				
						N = 16 5,8,8			CL-CI	Silty CLAY: low to medium plasticity, grey.	w>PL			
▶							8							
									CL-CI	Sandy CLAY: low to medium plasticity orange brown, fine to coarse grained sand.	w>PL			
▼														
						N = 6 3,3,3	9		CL-CI	Silty CLAY: low to medium plasticity, grey, with fine to coarse grained sand and ironstone banding.	w>PL			
							10							
						N = 18 11,8,10			CI-CL	Sandy CLAY: low to medium plasticity, orange brown, with fine to coarse grained sand, siltstone and ironstone bands.	w>PL			
							11							
							12							
							13			Sandy CLAY: low to medium plasticity, dark grey, trace of river and ironstone gravel.				
						N = 18 11,11,7								
							14							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE116** **3/3**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.25m

Date: 5/8/2019 **Datum:** AHD

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

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
							15		CI-CL	Sandy CLAY: low to medium plasticity, dark grey, trace of river and ironstone gravel.	w>PL			
			■	■					-	Extremely Weathered siltstone: silty CLAY, medium to high plasticity, grey mottled brown.	XW			BRINGELLY SHALE
							16			END OF BOREHOLE AT 15.6m				
							17							
							18							
							19							
							20							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE117** **1/1**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.22m

Date: 5/8/2019 **Datum:** AHD

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

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 COMPLE-TION	■		■		■		0			FILL: Sandy gravel, fine to coarse grained, grey igneous, fine to medium grained sand, trace of concrete and brick fragments.	D			GRASS COVER 11.5kg BUCKET NO FCF
	■		■						CI-CH	Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.	w>PL			NO SPT DUE TO LARGE GRAVEL COLLAPSE ALLUVIAL
							1			END OF BOREHOLE AT 1.0m				
							2							
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Log No. **JKE118** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 10.44m

Date: 6/8/2019 **Datum:** AHD

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

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 COMPLE-TION	■		■		■	N > 17 6,8, 9/100mm REFUSAL	0			FILL: Silty clay, low to medium plasticity, brown, trace of igneous and sandstone gravel and ash.	w<PL			GRASS COVER 12.8kg BUCKET NO FCF
							1							
										END OF BOREHOLE AT 1.5m				REFUSAL ON INFERRED CONCRETE
							2							
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Log No. **JKE119** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.88m

Date: 6/8/2019 **Datum:** AHD

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

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 COMPLE-TION	■		■		■	N > 2 8,2/50mm REFUSAL	0			FILL: Silty clay, low to medium plasticity, brown, with sandstone gravel, trace of igneous gravel and concrete fragments.	w<PL			GRASS COVER 11.8kg BUCKET NO FCF
										END OF BOREHOLE AT 0.7m				REFUSAL ON INFERRED CONCRETE
							1							
							2							
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Log No. JKE120 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 10.33m

Date: 2/8/2019 **Datum:** AHD

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

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 COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, brown, trace of organic material and sandstone gravel.	D			9.8kg BUCKET NO FCF
	■		■		■	N = 30 12,19,11				FILL: Gravelly sand, fine to medium grained, light brown, fine to coarse grained sandstone.				8.6kg BUCKET NO FCF
	■		■		■		1			FILL: Silty clay, low to medium plasticity, dark brown, trace of igneous gravel.	w>PL			6.8kg BUCKET NO FCF
	■		■			N = 9 3,3,6			CI-CH	Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.	w>PL			ALLUVIAL
							2			END OF BOREHOLE AT 1.95m				
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE121** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 10.35m

Date: 2/8/2019 **Datum:** AHD

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

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 COMPLE-TION	■		■		■		0			FILL: Gravelly sand, fine to medium grained, brown, fine to coarse grained igneous, trace of root fibres.	D			GRASS COVER 11.8kg BUCKET NO FCF
	■		■		■	N > 32 15,24, 8/50mm REFUSAL				FILL: Sandy gravel, fine to medium grained, dark brown, igneous, fine to medium grained sand.				7.8kg BUCKET NO FCF
	■		■		■		1			FILL: Silty clay, low to medium plasticity, dark grey, trace of igneous gravel.	w>PL			2.0kg BUCKET NO FCF
									CI-CH	Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.	w≈PL			ALLUVIAL
	■		■			N = 10 4,4,6								
							2			as above, but red brown mottled grey. END OF BOREHOLE AT 1.95m				
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. JKE122 **1/2**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.98m

Date: 6/8/2019 **Datum:** AHD

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

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
							0		-	ASPHALTIC CONCRETE: 40mm.t				
						N = 12 5,7,5				FILL: Gravelly sand, fine to medium grained, brown, fine to coarse grained igneous.	D			8.8kg BUCKET NO FCF
							1			FILL: Silty clay, low to medium plasticity, brown, with fine to coarse grained sand, trace of igneous gravel and ash.	w>PL			4.2kg BUCKET NO FCF
						N = 8 3,3,5			CI-CH	FILL: Silty clay, medium to high plasticity, dark grey, trace of sandstone, ironstone and igneous gravel, brick fragments and ash.	w≈PL			7.3kg BUCKET NO FCF
							2			Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.	w>PL			ALLUVIAL
						N = 20 6,10,10			CL-CI	Silty CLAY: low to medium plasticity, orange brown.				
							3		CI-CH	Silty CLAY: medium to high plasticity, orange brown mottled grey, with ironstone gravel.	w<PL			
						N = 16 8,9,7	4							
							5							
						N = 16 8,7,9	6		SC	Clayey SAND: fine to coarse grained, grey mottled orange brown.	D			
							7		CI-CH	Silty CLAY: medium to high plasticity, orange brown mottled grey, with ironstone banding.	w<PL			

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE122** **2/2**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.98m

Date: 6/8/2019 **Datum:** AHD

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

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
ON 16/8/19 ▼			■	■		N = 20 6,9,11	8		CI_CH	Silty CLAY: medium to high plasticity, orange brown mottled grey, with ironstone banding.	w<PL			
▶			■	■			9		-	Silty clayey SAND: fine to coarse grained, red brown mottled grey.	M			
ON COMPLE-TION OF AUGER-ING ▼			■	■		N = 31 10,15,16	10			END OF BOREHOLE AT 10.0m				Groundwater monitoring well installed to 10.0m. Class 18 machine slotted 50mm dia. PVC standpipe 10.0m to 2.0m. Casing 2.0m to 0.0m. 2mm sand filter pack 10.0m to 1.5m. Bentonite seal 1.5m to 1.0m. Backfilled with sand (and/or cuttings) to the surface. Completed with a concreted gatic cover.
							11							
							12							
							13							
							14							

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ENVIRONMENTAL LOG

Log No. **JKE123** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.74m

Date: 6/8/2019 **Datum:** AHD

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

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 COMPLE-TION	■		■		■		0		-	ASPHALTIC CONCRETE: 30mm.t	M			5.8kg BUCKET NO FCF
										FILL: Gravelly sand, fine to medium grained, brown, fine to coarse grained igneous.	w>PL			6.5kg BUCKET NO FCF
	■		■			N = 6 3,3,3				FILL: Silty clay, medium to high plasticity, brown, trace of igneous and sandstone gravel, brick fragments and ash.				
	■		■				1		CI-CH	Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.	w>PL			ALLUVIAL
										END OF BOREHOLE AT 1.5m				
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE124** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.80m

Date: 7/8/2019 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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		-	ASPHALTIC CONCRETE: 50mm.t.	D			3.2kg BUCKET
	■		■		■					FILL: Silty sand, fine to coarse grained, brown, trace of igneous gravel.	w>PL			NO FCF
											w>PL			3.0kg BUCKET
	■		■			N = 8 6,4,4								NO FCF
	■		■						CI-CH	FILL: Silty clay, low to medium plasticity, brown, trace of igneous and sandstone gravel and tile fragments.	w<PL			5.9kg BUCKET
							1							NO FCF
										FILL: Silty clay, low to medium plasticity, dark grey, trace of igneous gravel.				ALLUVIAL
										Silty CLAY: medium to high plasticity, brown mottled grey.				
										END OF BOREHOLE AT 1.2m				
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE125** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.74m

Date: 7/8/2019 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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	■		■		■	N = 10 5,5,5	0		-	ASPHALTIC CONCRETE: 50mm.t	D			3.7kg BUCKET
	■		■		■					FILL: Gravelly sand, fine to medium grained, brown, fine to medium grained igneous.	M			NO FCF
	■		■								w>PL			2.8kg BUCKET
	■		■							FILL: Sandy gravel, fine to coarse grained, brown, sandstone, fine to coarse grained sand, trace of clay fines.				NO FCF
	■		■				1		CI-CH		w<PL			5.6kg BUCKET
										FILL: Silty clay, medium to high plasticity, dark grey, trace of sandstone and igneous gravel, brick fragments and ash.				NO FCF
														ALLUVIAL
										Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.				
							2			END OF BOREHOLE AT 1.5m				
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. JKE126
1/2

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.76m

Date: 7/8/2019 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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
							0			ASPHALTIC CONCRETE: 80mm.t				
									-	FILL: Silty sand, fine to medium grained, brown, trace of igneous gravel.	D			5.4kg BUCKET
											w>PL			NO FCF
						N = 13 5,6,7			CI-CH	FILL: Silty clay, low to medium plasticity, brown, trace of sandstone gravel.	w<PL			3.1kg BUCKET
							1			Silty CLAY: medium to high plasticity, brown mottled grey.				NO FCF ALLUVIAL
						N = 29 6,10,19								
							2		CI-CH	Silty sandy CLAY: medium to high plasticity, red brown mottled orange brown, fine to coarse grained sand.	w>PL			
						N = 16 8,8,8	3							
							4		CI-CH	Silty CLAY: medium to high plasticity, red brown, trace of ironstone gravel.	w>PL			
						N = 20 5,8,12			CL-CI	Sandy CLAY: low to medium plasticity, grey, fine to coarse grained sand.	w>PL			
							5		SM	Silty SAND: fine to coarse grained, light brown.	D			
						N = 20 9,12,8	6			as above, but light brown mottled grey.				
							7		-	Silty clayey SAND: fine to coarse	M			

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE126** **2/2**

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.76m

Date: 7/8/2019 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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
										grained, orange brown, trace of igneous gravel.	M			
						N = 18 11,10,8	8							
▶									SM	Silty SAND: fine to coarse grained, brown, trace of clay fines.	M			
▼ ON COMPLE-TION OF AUGER-ING						N = 24 10,12,12	9							
									CL-CI	Silty CLAY: low to medium plasticity, grey with siltstone and sand banding.	w<PL			
							10							
						N = 15 5,7,8				as above, but grey mottled brown.	w>PL			
							11							
							12			Silty CLAY: low to medium plasticity, brown, with siltstone banding.				RESIDUAL
							13		-	Extremely Weathered siltstone: silty CLAY, medium plasticity, dark grey.	XW			BRINGELLY SHALE
						N > 20 20,20/ 100mm REFUSAL	14			END OF BOREHOLE AT 13.75m				

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE127** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 9.62m

Date: 7/8/2019 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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 COMPLE-TION	■		■		■		0		-	ASPHALTIC CONCRETE: 60mm.t				
	■		■		■					FILL: gravelly sand, fine to medium grained, brown, fine to coarse grained igneous, trace of sandstone gravel.	D			4.4kg BUCKET NO FCF
											w>PL			5.6kg BUCKET NO FCF
	■		■			N = 9 5,5,4			CI-CH	FILL: Silty clay, low to medium plasticity, brown, with sandstone gravel, trace of ash.	w>PL			ALLUVIAL
							1			Silty CLAY: medium to high plasticity, brown mottled grey.				
										END OF BOREHOLE AT 1.2m				
							2							
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Log No. **JKE128** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** HAND TOOLS **R.L. Surface:** ≈ 9.78m

Date: 9/8/2019 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** A.M./M.D.

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		-	ASPHALTIC CONCRETE: 80mm.t				
										FILL: Gravelly sand, fine to medium grained, grey, fine to medium grained igneous.	D			5.5kg BUCKET NO FCF
	■		■						CI-CH	FILL: Silty clay, low to medium plasticity, brown, with ironstone gravel, trace of igneous gravel.	w<PL			NOT ENOUGH SAMPLE FOR BUCKET
	■		■								w>PL			ALLUVIAL
							1			Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.				
										END OF BOREHOLE AT 0.9m				
							2							
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Log No. **JKE129** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** HAND TOOLS **R.L. Surface:** ≈ 9.91m

Date: 9/8/2019 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** A.M./M.D.

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 COMPLE-TION	■		■		■		0		-	ASPHALTIC CONCRETE: 90mm.t				
										FILL: Gravelly sand, fine to medium grained, grey, fine to medium grained igneous.	D w<PL			4.3kg BUCKET NO FCF NOT ENOUGH SAMPLE FOR BUCKET
							1			FILL: Silty clay, low to medium plasticity, brown, with ironstone gravel, trace igneous and sandstone gravel.				HAND TOOL REFUSAL
										END OF BOREHOLE AT 0.3m				
							2							
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE130** **1/1**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** HAND TOOLS **R.L. Surface:** ≈ 9.99m

Date: 9/8/2019 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** A.M./M.D.

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		-	ASPHALTIC CONCRETE: 70mm.t	D			2.8kg BUCKET NO FCF NOT ENOUGH SAMPLE FOR BUCKET
										FILL: Gravelly sand, fine to medium grained, grey, fine to medium grained igneous.	w<PL			
										FILL: Silty clay, low to medium plasticity, brown, with sandstone gravel.				
							1			END OF BOREHOLE AT 0.25m				HAND TOOL REFUSAL
							2							
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Log No. **JKE131** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** HAND TOOLS **R.L. Surface:** ≈ 10.03m

Date: 9/8/2019 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** A.M./M.D.

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		-	ASPHALTIC CONCRETE: 70mm.t	D			3.4kg BUCKET
										FILL: Gravelly sand, fine to medium grained, grey, fine to medium grained igneous, trace of sandstone gravel.	w<PL			NO FCF
														3.4kg BUCKET
														NO FCF
										FILL: Silty clay, low to medium plasticity, brown, with sandstone gravel, trace of igneous gravel.				HAND TOOL
							1			END OF BOREHOLE AT 0.4m				REFUSAL
							2							
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE132** **1/1**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** HAND TOOLS **R.L. Surface:** ≈ 10.07m

Date: 9/8/2019 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** A.M./M.D.

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		-	ASPHALTIC CONCRETE: 80mm.t FILL: Gravelly sand, fine to medium grained, grey, fine to medium grained igneous.	D			1.5kg BUCKET NO FCF NOT ENOUGH SAMPLE FOR BUCKET
										FILL: Silty clay, low to medium plasticity, brown, with sandstone gravel.				HAND TOOL REFUSAL
							1			END OF BOREHOLE AT 0.3m				
							2							
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Log No. **JKE133** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** HAND TOOL **R.L. Surface:** ≈ 10.35m

Date: 9/8/2019 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** A.M./M.D.

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		-	ASPHALTIC CONCRETE: 80mm.t.	D			3.7kg BUCKET
										FILL: Gravelly sand, fine to medium grained, grey, fine to medium grained igneous, trace of sandstone gravel.	w<PL			NO FCF
														3.9kg BUCKET
														NO FCF
										FILL: Silty clay, low to medium plasticity, brown, with sandstone gravel, trace of igneous gravel.				HAND TOOL
							1			END OF BOREHOLE AT 0.45m				REFUSAL
							2							
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Log No. **JKE134** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 10.66m

Date: 8/8/2019 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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 COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to coarse grained, brown, trace of igneous gravel and root fibres.	D			12.5kg BUCKET NO FCF
	■		■		■	N = 28 10,15,13				FILL: Silty clayey sand, fine to medium grained, red brown, with ironstone gravel, trace of igneous gravel.				8.9kg BUCKET NO FCF
					■		1							
	■		■			N = 30 8,13,17			CI-CH	Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.	w<PL			ALLUVIAL
							2			END OF BOREHOLE AT 1.95m				
							3							
							4							
							5							
							6							
							7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. JKE135
1/2

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 10.87m

Date: 8/8/2019 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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
							0		-	ASPHALTIC CONCRETE: 50mm.t				
										FILL: Gravelly sand, fine to medium grained, grey, fine to medium grained igneous.	D			2.7kg BUCKET NO FCF
						N = 20 9,12,8	1			FILL: Sandy gravel, fine to coarse grained, light brown, sandstone, fine to medium grained sand.	w<PL			NOT ENOUGH SAMPLE FOR BUCKET 11.7kg BUCKET NO FCF
										FILL: Silty clay, low to medium plasticity, brown, trace of sandstone, igneous and ironstone gravel, brick fragment, slag and ash.				
									CI-CH		w<PL			ALLUVIAL
						N = 25 7,10,15	2			Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.				
						N = 13 4,5,8	3			Silty CLAY: medium to high plasticity, grey mottled red brown.	w≈PL			
							4			Silty CLAY: medium to high plasticity, brown.	w>PL			
						N = 15 4,6,9	5			Silty CLAY: medium to high plasticity, grey mottled orange brown, trace of ironstone gravel.	w<PL			
						N = 17 5,7,10	6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE135** **2/2**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 10.87m

Date: 8/8/2019 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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
ON 16/8/19 ▼ ▶		■		■		N = 12 4,5,7	8		CI-CH	Silty CLAY: medium to high plasticity, grey mottled orange brown, trace of ironstone gravel.	w>PL			
											w>PL			
ON COMPLE-TION OF AUGER-ING ▼							9		CL-CI	Silty sandy CLAY: low to medium plasticity, brown, mottled orange brown, fine to coarse grained sand.	w>PL			
						N = 7 4,3,4	10			END OF BORHEOLE AT 10.0m				Groundwater monitoring well installed to 10.0m. Class 18 machine slotted 50mm dia. PVC standpipe 10.0m to 2.0m. Casing 2.0m to 0.0m. 2mm sand filter pack 10.0m to 1.8m. Bentonite seal 1.8m to 1.0m. Backfilled with sand (and/or cuttings) to the surface. Completed with a concreted gatic cover.
							11							
							12							
							13							
							14							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE136** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 10.48m

Date: 8/8/19 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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 COMPLE-TION	■		■		■		0			FILL: Silty clay, low to medium plasticity, brown, trace of sandstone and igneous gravel and ash.	w<PL			11.1kg BUCKET NO FCF
	■		■		■	N = 8 4,4,4				FILL: Silty clay, medium to high plasticity, grey brown, trace of igneous gravel, concrete fragments, ash and root fibres.	w>PL			10.4kg BUCKET NO FCF
					■		1		CI-CH	Silty CLAY: medium to high plasticity, brown mottled grey, trace of root fibres.	w>PL			ALLUVIAL
	■		■			N = 10 4,4,6				as above, but red brown mottled grey.	w>PL			
							2			END OF BOREHOLE AT 1.95m				
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **JKE137** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 10.58m

Date: 8/8/19 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.M./M.D.

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 COMPLE-TION	■		■		■		0		-	ASPHALTIC CONCRETE: 40mm.t	w<PL			5.1kg BUCKET NO FCF
	■		■		■	N = 22 8,9,13				FILL: Silty clay, low to medium plasticity, brown, trace of sandstone and igneous gravel, brick fragments and ash.				2.5kg BUCKET NO FCF
	■		■						CI-CH	FILL: Silty clay, low to medium plasticity, grey and light brown, trace of ash.	w<PL			ALLUVIAL
							1			Silty CLAY: medium to high plasticity, brown, mottled grey, trace of root fibres.				
										END OF BOREHOLE AT 1.5m				
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE138** **1/1**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** HAND TOOLS **R.L. Surface:** ≈ 9.43m

Date: 30-8-2019 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** A.M./M.D.

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 clay, low to medium plasticity, brown, trace of igneous gravel, root fibres and ash.	w>PL w<PL			GRASS COVER NO FCF 0.1m 8.5kg BUCKET NO FCF 2.5kg BUCKET NO FCF
										FILL: Silty clay, medium to high plasticity, light brown, trace of sandstone and ironstone gravel, concrete fragments and ash.				
							1			END OF BOREHOLE AT 0.3m				HAND TOOL REFUSAL
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE139** **1/1**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** HAND TOOLS **R.L. Surface:** ≈ 9.42m

Date: 30-8-2019 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** A.M./M.D.

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 COMPLE-TION							0			FILL: Silty clayey sand, fine to coarse grained, brown, trace of igneous gravel, brick fragments and root fibres.	M			GRASS COVER NO FCF 0.1m 10.2kg BUCKET NO FCF 5.3kg BUCKET NO FCF 3.0kg BUCKET NO FCF HAND TOOL REFUSAL
										FILL: Silty clay, low to medium plasticity, light brown, with igneous gravel, trace of sandstone gravel, brick fragments and ash.	w<PL w>PL			
							1			FILL: Silty clay, medium to high plasticity, orange brown, trace of igneous and sandstone gravel, brick fragments and ash.				
										END OF BOREHOLE AT 0.8m				
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **JKE140** **1/1**

Client: JOHNSTAFF PROJECTS PTY LTD

Project: PROPOSED LIVERPOOL HOSPITAL - CIVIC & INFRSTUCTURE WORKS

Location: ELIZABETH STREET, LIVERPOOL, NSW

Job No.: E32465BD **Method:** HAND TOOLS **R.L. Surface:** ≈ 10.19m

Date: 30-8-2019 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** A.M./M.D.

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 sandy clay, low to medium plasticity, brown, fine to coarse grained sand, trace of asphalt, igneous and sandstone gravel.	w>PL			MULCH COVER NO FCF 0.1m 10.5kg BUCKET
											w>PL			NO FCF
										FILL: Silty clay, low to medium plasticity, brown, trace of ash and slag.	w<PL			2.2kg BUCKET NO FCF
							1		CI-CH	FILL: Silty clay, low to medium, plasticity, grey and brown, trace of ash.	w>PL			NOT ENOUGH SAMPLE FOR BUCKET
										Silty CLAY: medium to high plasticity, brown mottled grey.				ALUVIAL
										as above, but red brown mottled grey.				
										END OF BOREHOLE AT 1.4m				
							2							
							3							
							4							
							5							
							6							
							7							

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
Fine 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:

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

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:

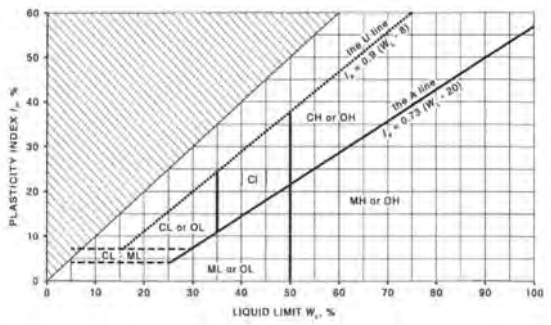
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

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.

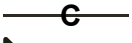
3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

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.
		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 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)	$w > PL$ $w \approx PL$ $w < PL$ $w \approx LL$ $w > LL$	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)	VL L MD D VD ( )	**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)** VERY LOOSE ≤ 15 / 0 – 4 LOOSE > 15 and ≤ 35 / 4 – 10 MEDIUM DENSE > 35 and ≤ 65 / 10 – 30 DENSE > 65 and ≤ 85 / 30 – 50 VERY DENSE > 85 / > 50 Bracketed symbol indicates estimated density based on ease of drilling or other assessment.
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

Term		Abbreviation		Definition
Residual Soil		RS		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.
Extremely Weathered		XW		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.
Highly Weathered	Distinctly Weathered (Note 1)	HW	DW	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.
Moderately Weathered		MW		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.
Slightly Weathered		SW		Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh		FR		Rock shows no sign of decomposition of individual minerals or colour changes.

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)	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 E: Laboratory Report/s & COC Documents

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CERTIFICATE OF ANALYSIS 223302

Client Details

Client	Environmental Investigation Services
Attention	Mitchell Delaney
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E32465BD, Liverpool**
Number of Samples	59 soil, 1 water
Date samples received	06/08/2019
Date completed instructions received	06/08/2019

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	14/08/2019
Date of Issue	13/08/2019

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vTRH(C6-C10)/BTEXN in Soil						
Our Reference		223302-1	223302-3	223302-5	223302-6	223302-7
Your Reference	UNITS	JKE101	JKE101	JKE102	JKE102	JKE102
Depth		0.04-0.2	1.4-1.7	0.1-0.3	0.3-0.5	1.2-1.6
Date Sampled		31/07/2019	31/07/2019	31/07/2019	31/07/2019	31/07/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	07/08/2019	07/08/2019	07/08/2019	07/08/2019	07/08/2019
Date analysed	-	08/08/2019	08/08/2019	08/08/2019	08/08/2019	08/08/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	110	105	102	116	110

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		223302-8	223302-9	223302-10	223302-11	223302-12
Your Reference	UNITS	JKE102	JKE103	JKE103	JKE104	JKE104
Depth		1.6-2.0	0-0.1	0.1-0.4	0-0.1	0.1-0.3
Date Sampled		31/07/2019	31/07/2019	31/07/2019	31/07/2019	31/07/2019
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	07/08/2019	07/08/2019	07/08/2019	07/08/2019	07/08/2019
Date analysed	-	08/08/2019	08/08/2019	08/08/2019	08/08/2019	08/08/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	112	97	107	91	110