TAFE NSW

Salinity Assessment and Management Plan

TAFE NSW Construction Centre of Excellence
2-44 O'Connell Street, Kingswood, NSW

5 February 2021

59831/135362 (Rev A)

JBS&G Australia Pty Ltd

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1. Introduction

1.1 Background and Objectives

JBS&G Australia Pty Ltd (JBS&G) was engaged by TAFE NSW (TAFE, the client) to prepare a salinity assessment and management plan (SAMP) to support the State Significant Development Application (SSDA) SSD_ 8571481 relating to the development of an educational facility at the TAFE Nepean Kingswood Campus (the TAFE Kingswood Campus) located at 2 – 44 O'Connell Street, Kingswood NSW. The TAFE Kingswood Campus comprises a rectangular lot with an area of approximately 23 hectares (ha). This assessment was limited to the extent of proposed development activities comprising an L- shaped portion of the TAFE Kingswood Campus (herein referred to as 'the site'). The site is legally identified as part Lot 1 in Deposited Plan (DP) 866081 and covers an area size of approximately 9.5 ha. The site location and site layout are shown in **Figure 1** and **Figure 2**, respectively.

Specifically, the SSDA seeks development consent for the construction and operation of the TAFE NSW Construction Centre of Excellence (TAFE CCoE) a multi-level, integrated educational facility designed to accommodate specialised training and education for construction-related TAFE NSW courses (the project). The TAFE CCoE will be a new learning environment with an emphasis on flexibility and adaptability, to encourage cross-disciplinary collaboration, industry engagement and educational excellence. On 27 February 2019, the NSW Government announced the delivery and associated funding for the CCoE.

The proposed development is classified as State Significant Development (SSD) on the basis that it falls within the requirements of clause 4, Schedule 19 of the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP), being 'development for the purpose of a tertiary institution… that has a capital investment value of more than $30 million'.

The Minister for Planning, or their delegate, is the consent authority for the SSDA and this application is lodged with the NSW Department of Planning, Industry and Environment (NSW DPIE) for assessment.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) issued for the project. Specifically, this report has been prepared to respond to item 24 (partial) relating to salinity assessment and salinity management plan.

The objective of this SAMP is to present practical recommendations about how to manage and, where possible, mitigate the existing saline conditions (where encountered), so as to:

- limit any impact of salinity on the built environment; and
- limit the impact of development on the processes of urban salinity and the impact of salinity on the environment.

This SAMP includes the following:

- site condition and setting;
- general information on the cause and effects of urban salinity;
- salinity, aggressivity and sodicity assessment based on the findings of soil sampling conducted; and
- recommendations and management measures for site development.

1.2 Proposed Development

The proposed building of TAFE CCoE is to be constructed within the northeastern portion of the site, whilst the remainder of the site is proposed to be developed as vehicle access and parking. It is understood that the existing campus buildings within the site will be retained. The proposed development works will include:

- Site preparation works including tree removal and excavation;
- Construction of a 2-3 storey Construction Hub accommodating approximately 9,200m² of gross floor area (GFA). The building will include learning and workshop spaces, workspaces and areas for industry engagement;
- Provision of additional car parking; and
- Landscaping works.

The proposed development plans provided by the client are included as **Appendix A**.

Based on the review of Civil Engineering Design Report (Northrop 2020[1]), it is understood that the site will be subject to cut and fill operations to establish working platform levels consistent and reflective of the proposed design. The levels are to be designed to optimise and balance cut to fill material across the site where possible. Due to the sloping nature of the site and the layout of the proposed development, the site will predominantly be in cut to cater for the proposed development. Surplus material generated from the proposed development is to be spread over existing open areas.

[1] Civil Engineering SSDA Design Report, TAFE NSW Construction Centre of Excellence, 2-44 O'Connell Street, Kingswood, Northrop Consulting Engineers, 18 December 2020.

2. Site Condition and Surrounding Environment

2.1 Site Identification

The location of the site is shown in **Figure 1**. The site details are summarised in **Table 2.1** with the site layout shown in **Figure 2**.

Table 2.1 Summary Site Details

Lot Numbers	Part Lot 1 in DP 866081
Street Address	2-44 O'Connell Street, Kingswood, NSW
Site Area	Approximately 9.5 ha
Local Government Authority	Penrith City Council
Geographic Coordinates (MGA 56)	E: 290620 N: 6261420 (approximate centre of the site)
Current Land-use	Agricultural/ rural residential and tertiary education establishment
Proposed Land-use	Tertiary education establishment

2.2 Site Description

A detailed site inspection was completed by one of JBS&G's qualified and experienced field scientists on 17 November 2020. Relevant site observations are discussed below. The site layout is shown in **Figure 2**.

The site comprised an L-shaped parcel of land located within the broader TAFE Kingswood Campus, bound by Great Western Highway to the north, O'Connell Street to the west, vacant rural property to the south and Western Sydney University (WSU) Werrington Campus to the east.

The southern extent of the site comprised various campus buildings, carparks, landscaped areas and associated access roads whilst the northern extent remained grassed and undeveloped. The broader TAFE Kingswood Campus was fenced from the northern, western and southern boundaries and was freely accessible from the WSU Werrington Campus located to the east. The site was accessed via a secured gate from O'Connell Street.

Seven buildings were present on site, of which Buildings B, C, E, N, T and P were used for educational purposes, whilst Building D was used by campus administration/security for office and storage purposes. The building identifiers are shown on the proposed development plans provided in **Appendix A**. Five distinct asphalt paved carpark areas were located on site in the eastern section west of Building B, between Buildings C and E, west of Building D, south of Building N and west of Buildings P and T. The pavement was observed to be in good condition with minor cracking observed.

A stockpile containing mulch was observed in the southern portion of the site adjacent to building N, in addition to three above ground storage tanks (AST) likely used for rainwater collection. Wooden pallets, some metal, concrete slab and cottonseed oil containers were observed on the grassed area south of Building D. Brick and concrete fragments were observed within exposed surface soil to the south of Block P, to the north and east of Building D, and adjacent to the drainage line in the northern portion of the site.

Two unnamed ephemeral tributaries/drainage lines of Werrington Creek were located in the northern extent of the site oriented and flowing approximately southeast to northwest and east to west respectively. The drainage lines merge at a surface dam located adjoining the northwestern site boundary. A separate surface depression/drainage line was located parallel and to the south of the drainage line flowing east to west. A linear mound was observed extending from this drainage line to the north towards Great Western Highway.

The southern portion of the site sloped to the west towards O'Connell Street whilst the northern portion of the site sloped toward local drainage lines as described above.

At the time of the inspection there were no signs of underground waste storage (i.e. no surface gatic covers, breathers or associated infrastructure). In addition, there was no evidence of surface staining associated with chemical spills, no signs of distressed vegetation or other potential visual indicators of significant contamination issues at the site. No evidence of asbestos containing materials (ACM) waste/debris was observed on the ground surfaces.

2.3 Surrounding Land Use

Surrounding land uses are described following:

- North – Broader TAFE Kingswood Campus, Great Western Highway, WSU Werrington Campus and low-density residential properties beyond;
- East – WSU Werrington Campus followed by low density residential properties;
- South – Rural residential properties, followed by Werrington Creek, WSU Kingswood Campus and low density residential properties beyond; and
- West – O'Connell Street followed by low density residential properties.

2.4 Topography

A review of regional topographic data provided on SIX Maps[2] indicated that the site is situated at an elevation of approximately 45-55 m Australian Height Datum (AHD). The site was gently undulating and with minor slopes toward local drainage lines, shown on **Figure 2**.

2.5 Hydrology

As discussed in **Section 2.2**, two unnamed ephemeral tributaries/drainage lines of Werrington Creek were located in the northern extent of the site oriented and flowing approximately southeast to northwest and east to west respectively. The drainage lines merge at a surface dam located adjoining the northwestern site boundary and flows into Werrington Creek approximately 900m to the northwest of the site which in turn flows into South Creek approximately 2.4 km to the northeast of the site.

As discussed in **Section 2.2**, the southern portion of the site is predominantly sealed with asphaltic hardstands and building footprints with some landscaped areas. As such, surface water generated in these areas during periods of rainfall is anticipated to migrate from the site via surface water flow entering the local stormwater catchment system with subsurface infiltration and seepage.

The northern extent of the site is unsealed. Given the expected shallow clay soil and shale characteristics, infiltration into the local, shallow groundwater table is expected to be limited. During periods of heavy rainfall, excess surface waters are expected to flow overland into the onsite surface water bodies, or infiltrate into the shallow groundwater.

A review of the Section 10.7(2) and (5) Certificates (**Section 3.4**) indicated that all or part of the site is subject to flood related development controls. The Section 10.7(5) certificates note that:

- Development on the land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) (if such uses are permissible on the land) is subject to flood related development controls.
- Development on the land or part of the land for industrial or commercial purposes (if such uses are permissible on the land) is subject to flood related development controls. Development on the land or part of the land for purposes other than industrial or

[2] https://maps.six.nsw.gov.au/, accessed 16 November 2020

commercial, or for purposes other than those referred to above, will be considered on a merits based approach and flood related development controls may apply.

2.6 Geology

Review of the Penrith 1:100 000 geological map (DME 1991[3]) indicates that the site is underlain by the Wianamatta Group Bringelly Shale, comprising carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone, rare coal and tuff.

Reference to the online ESPADE 2.0 tool hosted by the NSW Office of Environmental and Heritage (OEH 2017[4]) indicates that the site is located on Luddenham erosional soil landscape group. The landscape is characterised by undulating to rolling low hills on Wianamatta Group shales often associated with sandstone. Dark podzolic soils are fairly shallow with massive earthy clays on crests, moderately deep red podzolic soils on upper slopes and moderately deep yellow podzolic soils and prairie on lower slopes and drainage lines. Limitations of this soil landscape group are moderately reactive soils, water erosion hazards, localised steep slopes, localised mass movement hazards and localised impermeable highly plastic subsoil.

2.7 Salinity Potential

The Salinity Potential in Western Sydney map (DIPNR 2003[5]) indicates that the site exists within an area of 'moderate salinity potential' outside of drainage line areas. Areas with this classification exhibit scattered scalding and indicator vegetation, but soil concentrations have not been mapped. Saline areas are identified as potentially existing within these areas.

Within soils surrounding a drainage line of Werrington Creek located adjoining the northwestern site boundary, a 'high salinity potential' is noted. These areas are typically on lower slopes of drainage systems where water accumulation occurs. No such areas are noted to exist within the proposed built form and access.

During a site inspection and intrusive sampling at the site, there was no indication of saline soils on the ground surface and there was no evidence of salt scarring identified at the site.

2.8 Hydrogeology

A search for registered groundwater bore information, undertaken on the Water NSW website[6] indicated thirteen groundwater bores were located within a 1500 m radius of the site and are summarised in **Table 2.2** below.

[3] Penrith 1:100 000 Geological Sheet 9030, 1st Edition, 1991, Geological Survey of NSW, Department of Planning Industry & Environment (DPIE 1991), accessed 16 November 2020
[4] *ESPADE 2.0*, NSW Office of Environment and Heritage, Accessed 15 May 2019, OEH (2017)
[5] *Salinity Potential in Western Sydney*. Department of Infrastructure, Planning and Natural Resources, March 2003, DIPNR (2003)
[6] http://allwaterdata.water.nsw.gov.au/water.stm accessed 16 November 2020.

Table 2.2: Groundwater Bore Summary Details

Bore ID	Location	Intended Purpose	Depth (m bgs)	SWL (m bgs)	Lithological Summary
GW019680	0.42 m north of site	Waste Disposal	53.3	-	0 – 16.1 m – Clay 16.1 – 53.3 m – Shale
GW020069	0.42 m north of site	Waste Disposal	75.6	-	0 – 8.3 m – Clay 8.3 – 75.6 m – Shale
GW020547	0.43 m north of site	Waste Disposal	91.4	-	0 – 0.9 – Top Soil 0.9 – 9.1 m – Clay 9.1 – 91.4 m – Shale
GW060794	1.6 km south west of site	Stock, Domestic	78.1	-	0 – 6.2 m – Clay 6.2 – 78.1 m – Slate
GW103764	1.6 km south west of site	Irrigation	231.6	-	0 – 0.6 – Top Soil 0.6 – 6.4 m – Clay 6.4 – 123.4 m – Shale 123.4 – 216.4 – Sandstone 216.4 – 217.3 – Shale 217.3 – 231.6 – Sandstone
GW112643	1.6 km east of site	Monitoring Bore	6.0	-	0 – 1.0 – Fill 1.0 – 3.0 m – Sand 3.0 – 6.0 m – Clay
GW112644	1.6 km east of site	Monitoring Bore	6.0	-	0 – 1.0 – Fill 1.0 – 3.0 m – Sand 3.0 – 6.0 m – Clay
GW112645	1.6 km east of site	Monitoring Bore	6.0	-	0 – 1.0 – Fill 1.0 – 3.0 m – Sand 3.0 – 6.0 m – Clay
GW0113279	1.5 km west of site	Monitoring Bore	7.5	-	
GW113280	1.5 km west of site	Monitoring Bore	8.2	-	-
GW113281	1.5 km west of site	Monitoring Bore	2.85	-	-
GW113282	1.5 km west of site	Monitoring Bore	7.0	-	-
GW113283	1.5 km west of site	Monitoring Bore	2.8	-	-

2.9 Acid Sulfate Soils

A review of the ESPADE acid sulfate soil risk mapping indicated that the site is located within an area of 'no known occurrence of Acid Sulfate Soils'. This classification relates to sites where ASS or Potential ASS (PASS) conditions are not known or not likely to occur.

Review of the Section 10.7 (2) & (5) Planning Certificates identified that the land is not affected by a policy adopted by the council that restricts the development of the land because of the likelihood of acid sulfate soils.

When considering the local topography, the site is located approximately between 45-55 m AHD. Further, no visual or olfactory indicators of ASS were observed during the current intrusive investigations. On this basis, no further consideration of requirements in relation to assessment and/or management of ASS is necessary with regard to the proposed development.

3. Urban Salinity

3.1 The Cause of Urban Salinity

Soils containing elevated levels of salts occur naturally in western Sydney due to underlying geological formations. In undisturbed areas the salts are generally stored below the plant root zone where they have minimal impact. The development of Western Sydney has disturbed the soil profile, altered hydrological processes and, in some areas, led to concentrations of salts on soil surfaces, in building materials, and waterways. Some areas are located within a soil landscape that is predisposed to developing salinity issues.

Although saline soils and groundwater are a natural part of the Australian landscape, land management practices are now increasingly recognised as significant contributors to the expansion of salt affected areas. In particular, urban salinity is increasingly occurring around populated areas due to clearing and site development.

Salinity occurs when salts found naturally in the soil or groundwater are mobilised. Capillary rise and evaporation concentrate the salt on, and close to, the ground surface. Urban salinity becomes a problem when the natural hydrogeological balance is disturbed by human interaction. This may occur in urban areas due to changes to the water balance, increases in the volume of water into a natural system altering subsurface groundwater flows and levels, exposure of saline soils, and removal of deep-rooted vegetation (large trees within the Cumberland Woodland) reducing rates of evapotranspiration. Even small changes in sensitive areas can result in the balance being irrecoverably altered and salinization occurring.

Some building methods may also contribute to the process of urban salinity. In particular, compacted surfaces and filling can restrict groundwater flow and result in a concentration of salt in one area. Cutting into slopes for building can result in saline soils or ground water being exposed and intercepted. The use of imported fill material may be an additional source of salt or the filling may be less permeable, preventing good drainage. These issues may also result in problems with the design and construction of roads. In particular, the building of embankments and the compaction of layers can interfere with groundwater flow. Also, the inappropriate positioning, grading and construction of drains can result in surface and groundwater mixing and stagnant pools forming that evaporate leaving salt encrusted ground.

Salinity issues may also arise as the result of cumulative impacts. A common example is from the gradual removal of vegetation across a site, which can contribute to a change in the hydrological regime from reduced evapotranspiration, a consequential rise in the groundwater table, and subsequent concentration of surface drainage into constructed culverts resulting in the appearance of ground level salinity problems. Where vegetation is gradually removed the water table rises as a result of a smaller volume of water being used by the plants, allowing salts to be mobilised. Of more relevance in an urban landscape is the potential for an increase in water inputs into the hydrological regime. These increased inputs commonly come from watering of gardens and playing fields, infiltration of stormwater and sewage and other services leakage.

These inputs may seem minor on their own but their cumulative effects over time produce an elevated groundwater table and eventually high levels of salinity.

3.2 Effects of Salinity

Excess salinity in an urban environment can result in significant problems. It can manifest itself in a number of ways.

The effects of salinity can be observed in damage to building materials, infrastructure including pipework and roads and in the death or poor health of vegetation. The effect of urban salinity is the result of both physical and chemical actions of the salt on concrete, bricks and metals. Salt moves

into the pores of concrete and bricks and becomes concentrated when the water evaporates and can result in breakdown of materials and corrosion. Evidence of this may include crumbling, eroding or powdering of mortar or bricks, flaking of brick facing and cracking or corrosion of bricks. Salinity may also result in the corrosion of steel pipes, structural steel and reinforcement and can damage underground service pipes resulting in significant financial costs.

High levels of salinity can result in damage to and even death of plants. Signs that vegetation is under stress from salinity include the discolouration and wilting of leaves and the death of less salt tolerant plant species. It may also be hard to establish lawns in areas that are subject to high salinity.

High levels of salinity may also affect soil structure, chemistry and productivity. This can reduce plant growth which in turn alters soil structure, chemistry and nutrient levels. As soils become more saline, plants and microorganisms decline and soil structure deteriorates.

Water logging may also occur following a decline in nutrient levels. Over time, the alteration of soil structure can lead to the formation of gullies and other forms of soil erosion.

While groundwater seepage was not observed during the soil investigations, these conditions may potentially change in periods of heavy or enduring rainfall. Damage to pipes has the potential to exacerbate the problem by further recharging the aquifer.

Salinity can also have a significant effect on buildings and associated infrastructure where cutting and filling exposes buildings/structures to elevated salinity levels present in soils previously occurring at depth. This may include:

- degradation of bricks, concrete, road base and kerbing materials leading to expansion, cracking, strength and mass loss;
- corrosion of reinforcement and loss of structural integrity;
- rising/falling damp; and
- non-structural impacts, such as efflorescence on bricks.

These impacts can be prevented, minimised, or mitigated by the implementation of appropriate management measures as outlined in **Section 6**.

4. Assessment Criteria

4.1 Regulatory Guidelines

The investigation was undertaken with consideration to aspects of the following guidelines, as relevant:

- *Acid Sulfate Soil Manual.* NSW Acid Sulfate Soil Management Advisory Committee. August 1998 (ASSMAC 1998).
- *What Do All the Numbers Mean? A Guide for the Interpretation of Soil Test Results.* Hazelton and Murphy for Department of Land and Water Conservation (DLWC 1992);
- *Site Investigations for Urban Salinity*. Department of Land and Water Conservation. 2002, (DLWC 2002); and
- *Australian Standard: Piling Design and Installation.* AS2159-2009, 2009, (SA 2009).

4.2 Assessment Criteria

As per the process for data interpretation presented in DLWC (2002), a set of site assessment criteria was adopted and used for evaluation of the environmental data collected.

4.2.1 Salinity Criteria

The criteria used to classify saline soil is presented in **Table 4.1**. Salinity ratings (EC_e) are calculated by multiplying the electrical conductivity (EC) of a 1:5 soil:water extract by a factor dependant on soil texture ranging from 6 to 17 depending on soil type. Hazelton and Murphy (DLWC 1992) classify soil salinity on the basis of extract electrical conductivity (EC_e) and describe the implications of the salinity classes on agriculture and/or plant growth below.

Table 4.1 Soil Salinity Classes

Class	ECe (dS/cm)	Implication
Non Saline	<2	Salinity effects mostly negligible
Slightly Saline	2 – 4	Yields of sensitive crops affected
Moderately Saline	4 – 8	Yields of many crops affected
Very Saline	8 – 16	Only tolerant crops yield satisfactorily
Highly Saline	>16	Only a few very tolerant crops yield satisfactorily

Representative soil profile sample results were corrected for soil texture and the results compared against the above criteria to place material types into salinity classes.

4.2.2 Aggressivity

Laboratory analysis data for soil samples were compared to sulfate, chloride and pH criteria to identify appropriate exposure classification or soil aggressivity levels for concrete and steel piles, developed from *AS 2159 – 2009 Piling Design and Installation*, presented in **Table 4.2** and **4.3** below.

Table 4.2 Exposure Classification for Concrete Piles

Exposure Conditions		Exposure Classification (Aggressivity)
Sulfates (as SO_3) in soil (mg/kg)	pH	Soil conditions – B (low permeability soils such as silts and clays)
<4000	> 5.5	Non-Aggressive
4000 – 8000	4.5 – 5.5	Mild
8000 – 16 000	4 – 4.5	Moderate
>16 000	<4	Severe

Table 4.3 Exposure Classification for Steel Piles

Exposure Conditions				Exposure Classification (Aggressivity)
Chlorides (as SO_3) in soil (mg/kg)	Chlorides (as SO_3) in groundwater (mg/L)	pH	Resistivity (Ohms.cm)	Soil conditions – B (low permeability soils such as silts and clays)
<5000	<1000	> 5	>5000	Non-Aggressive
5000 – 20 000	1000 – 10 000	4 – 5	2000 – 5000	Non-Aggressive
20 000 – 50 000	10 000 – 20 000	3 – 4	1000 – 2000	Mild
>50 000	>20 000	<3	<1000	Moderate

4.2.3 Sodicity

Sodic soils may be affected by very severe surface crusting, very low infiltration and hydraulic conductivity, very hard and dense subsoils and high susceptibility to gully erosion and tunnel erosion. Sodicity also affects the shrink – swell properties of a soil. Sodicity characterisation of site soils were identified via comparison of the laboratory analysis data against the sodicity ratings as shown in **Table 4.4** below, derived from DLWC (2002[7]).

Table 4.4 Sodicity Ratings

ESP %	Rating
<5	Non-sodic
5 – 15	Sodic
> 15	Highly Sodic

[7] *Site Investigations for Urban Salinity*, Department of Land and Water Conservation, 2002 (DLWC 2002)

5. Salinity Assessment

5.1 Lithology and Soil Observations

A total of 14 boreholes were advanced during the combined contamination and geotechnical investigations completed to support the SSDA as documented separately. Sample locations are provided on **Figure 3**. The investigation locations encountered soil and lithology conditions broadly representative of the anticipated conditions based on the regional setting. Soil observations on borelogs are presented in **Appendix B**, a summary of observations of lithology and soil are summarised following.

Filling

Generally, the soil profile comprised heterogenous brown silty clay fill with a low proportion of gravels to depths ranging between of 0.2-1.5 m bgs. Anthropogenic inclusions were generally not observed with the exceptions of ash and plastic in HA03.

Residual soil

Residual soils were encountered at every investigation location with the exceptions of shallow boreholes advanced via hand auger (HA01 to HA04). The soils comprised stiff red to brown homogenous clay soils of high plasticity.

5.2 Soil Analytical Results

Detailed laboratory reports and chain of custody documentation are provided in **Appendix C**. Summarised soil analytical data from the current assessment are presented in **Table A**.

5.2.1 Salinity

A total of 12 soil samples were submitted for analysis of salinity (two from surface soils, two from subsurface fill soils and eight from subsurface natural soils. Results for EC obtained from a 1:5 extract at 25°C were multiplied by soil texture factors in accordance with DLWC (2002) and the resulting EC_e values are discussed below:

- Surface Soils (0-0.1 m bgs): EC_e exhibited an average value of 0.68 dS/m within the non-saline range.
- Shallow Soils (0.1-1.0 m bgs): EC_e exhibited an average value of 0.542 dS/m within the non-saline range.
- Deep Soils (>1.0 m bgs): EC_e exhibited an average value of 2.064 dS/m within the slightly saline range. Review of the sample locations identified an area of slightly to moderately saline soil within the western extent of the site.

5.2.2 Aggressivity

A total of 10 soil samples were submitted for analysis of aggressivity parameters including pH, sulfate and chloride.

A summary of results are as follows:

- pH ranged from 6.3 to 9.7 pH units with an average of 8.6 pH units. pH values were within the non-aggressive range;
- Sulfate concentrations ranged from <30 to 94 mg/kg, all within the non-aggressive range with respect to concrete piles;
- Chloride concentrations ranged from <5 to 630 mg/kg, all within the non-aggressive range with respect to steel piles;

- Based on the above, drainage soils are considered 'non-aggressive' with respect to both concrete and steel pile exposure.

5.2.3 Sodicity

A total of 10 soil samples were submitted for analysis of sodicity parameters. Characteristics of soil which determine sodicity (exchangeable sodium percentage, ESP %) were generally consistent between material types with the following overall comments:

- One sample reported to have an ESP within the highly sodic range (>15 %);
- Three samples were reported to have an ESP within the sodic range (5-15 %);
- Six samples were reported to have an ESP within the non sodic range (<5 %);
- No evident pattern to the distribution of moderately/non sodic soils was observed within the data set; and
- On this basis, all soils at the site are considered to be sodic to highly sodic.

5.3 Groundwater

One groundwater well was installed at BH01 as identified on **Figure 3.** A summary of physicochemical parameters encountered during the groundwater monitoring event (GME) conducted on 26 November 2020 is presented in **Table 5.1** below.

Table 5.1 Groundwater Field Physicochemical Parameters

Well Reference	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH (units)	Oxidation Reduction Potential (mV)	Temperature (°C)
BH01/MW01	1.13	7585	6.94	-18.37	19.2

Review of the field parameters as presented above indicates that the groundwater is characterised as saline.

6. Management Recommendations

As discussed in **Section 5**, most of the site's soils are considered to be non-saline. One borehole (BH10) located within the south western extent of the site proposed for vehicular access/ car parking, was identified as having deep soil (>1.0 m bgs) with slight to moderate salinity potential. It is noted that the ECe of deeper soils (>1 m bgs) was substantially higher than of shallow soils (0.2-0.3 m bgs) at BH10. This indicates that shallow residual soils may have undergone salt leaching processes via rainwater infiltration over time and as such, retention of shallow soils over the underlying sub-soils acts to minimise the impact of the more saline soils on built infrastructure.

Further, site soils are considered to be sodic to highly sodic and as such are characterised as being dispersive, representing increased risk of highly erosive soil conditions upon disturbance.

It is understood that the site will be subject to cut and fill as part of the proposed development. The site will predominantly be in cut with surplus material generated from the proposed development is to be spread over existing open areas.

Appropriate consideration of the site soil and groundwater conditions is necessary during the civil, hydraulics, landscaping and structural design of the proposed development to ensure appropriate management of the existing site conditions and minimise the risk of exacerbating soil limitations.

Management of these erosional characteristics and salinity hazards are consistent with standard development techniques adopted for broad scale earthworks programs in Western Sydney and should be incorporated into a construction environmental management plan (CEMP) for the redevelopment of the site.

To effectively manage the soil limitations at the site, the following management objectives should be established:

- minimisation of erosion rates and resulting sediment loss to down-gradient areas during and following completion of the proposed earthworks;
- minimisation of the alteration to existing natural soil profiles and exposure of soils to the extent practicable to reduce the potential for erosional and other hazards to arise; and
- Minimisation of the alteration to existing natural soil profiles and exposure of sub-surface soils to the extent practicable in areas of identified slight to moderate salinity potential to reduce the potential for mobilisation of salt and the erosion hazard.

Where practicable, it is recommended that the existing soil profile and landforms are maintained with minimal disturbance. Where excavation and/or cut activities are required to achieve development objectives, including the installation of underground services, foundations, etc implementation of appropriate management controls for soil will be required. In addition, construction of inground infrastructure including drainage pits/pipes, foundations, floor slabs etc must consider the potential additional requirements with regard to aggressivity ratings in accordance with industry guidance and Australian Standards to maximise the lifetime of built structures and/or infrastructure associated with the development.

For any material to be imported to establish site levels, an importation management protocol will be required as part of a CEMP that defines the assessment requirements to demonstrate that only non-saline soil/fill material of suitable low aggressivity is placed at the site.

A detailed CEMP is required to include a detailed Soil and Water Management Plan section during the works. This plan will be required to be prepared and implemented in accordance with the

guidance presented in Landcom's *Managing Urban Stormwater: Soils and Construction* (The Blue Book, 4th ed, 2004[8]).

In addition to the above, the following management practices are required to be implemented:

- Where practicable site cut (excavation) works should be limited to the exposure of soils up to depths of no more than 1.0 m below current levels to minimise the exposure and/or excavation of the more sodic soils.
- Where excavation is required to depths greater than 1.0 m, the subsoil materials should be identified prior to the commencement of works as material to be used as initial layers in areas of significant filling (i.e. greater than 1 m in depth below final development levels), so as to replace the materials at a similar depth to that which they were sourced. Where possible, this material should be excavated and placed with minimum requirement for stockpiling and then immediately covered with soils known to be of low or no salinity risk and have low sodic properties.
- Topsoil in various areas of the site should be scraped into stockpiles in proximity to their source area and then returned to the various areas of the site rather than being mixed and randomly returned to various areas of the site.
- The earthworks design should contemplate minimisation of the opportunity for water collection in low lying areas, depressions, behind fill embankments, etc (where these occur) that could result in water logging of soils that may result in concentration of salts at the soil surface or in topsoil, degradation and compaction of soil structure and vegetation die off.
- Where cut activities result in the exposure of moderately saline and/or highly sodic soils, application of topsoil and revegetation of these soils should be completed as a priority. This may require the works to be staged so as to minimise the duration of exposure.
- All site sediment and erosion controls should be established prior to the commencement of any vegetation clearance and/or soil disturbance activities. Further suitable locations should be identified for stockpile locations so as to minimise alterations to natural surface water flow pathways.
- Where cut activities result in the exposure of subsurface soils, appropriate sub-soil drainage should be provided for batters, retaining walls etc to minimise the potential for saline seepage to down-gradient surface soils.
- Where areas are designed as surface water detention basins, the basins should be designed as shallow retention or alternatively an appropriate liner should be installed via use of site won clay (see below) or a synthetic liner.
- Basin embankments should be constructed identified non-saline and non-sodic soils, or otherwise lime and/or gypsum stabilisation should be implemented prior to use of the low-quality soil materials. This will minimise the opportunity for detained water to leak through the embankment and also for the intrusion of subsoil seepage into the basin that may have a higher salt content than the overlying surface water.
- Dish drains and swales should be considered where appropriate to reduce overland surface water movement rates and divert water away from slope faces so as to minimise erosion rates. Such features should be carefully designed to avoid concentration of water infiltration locations which may result in generation of permanent water logged areas with high soil-water salinity conditions.

[8] Information available at: https://www.environment.nsw.gov.au/stormwater/publications.htm

- The programming and staging of works at the site should be considered to minimise the total length of time soils will remain exposed and where possible, vegetative cover will be maintained along and adjacent to drainage lines other than during the immediate period of works in each area, so as to act as a further sedimentation control measure.
- All underground water supply, stormwater and sewage pipelines should be appropriately designed and installed so as to minimise the potential for future leakage to the subsoils.

7. Limitations

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

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

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

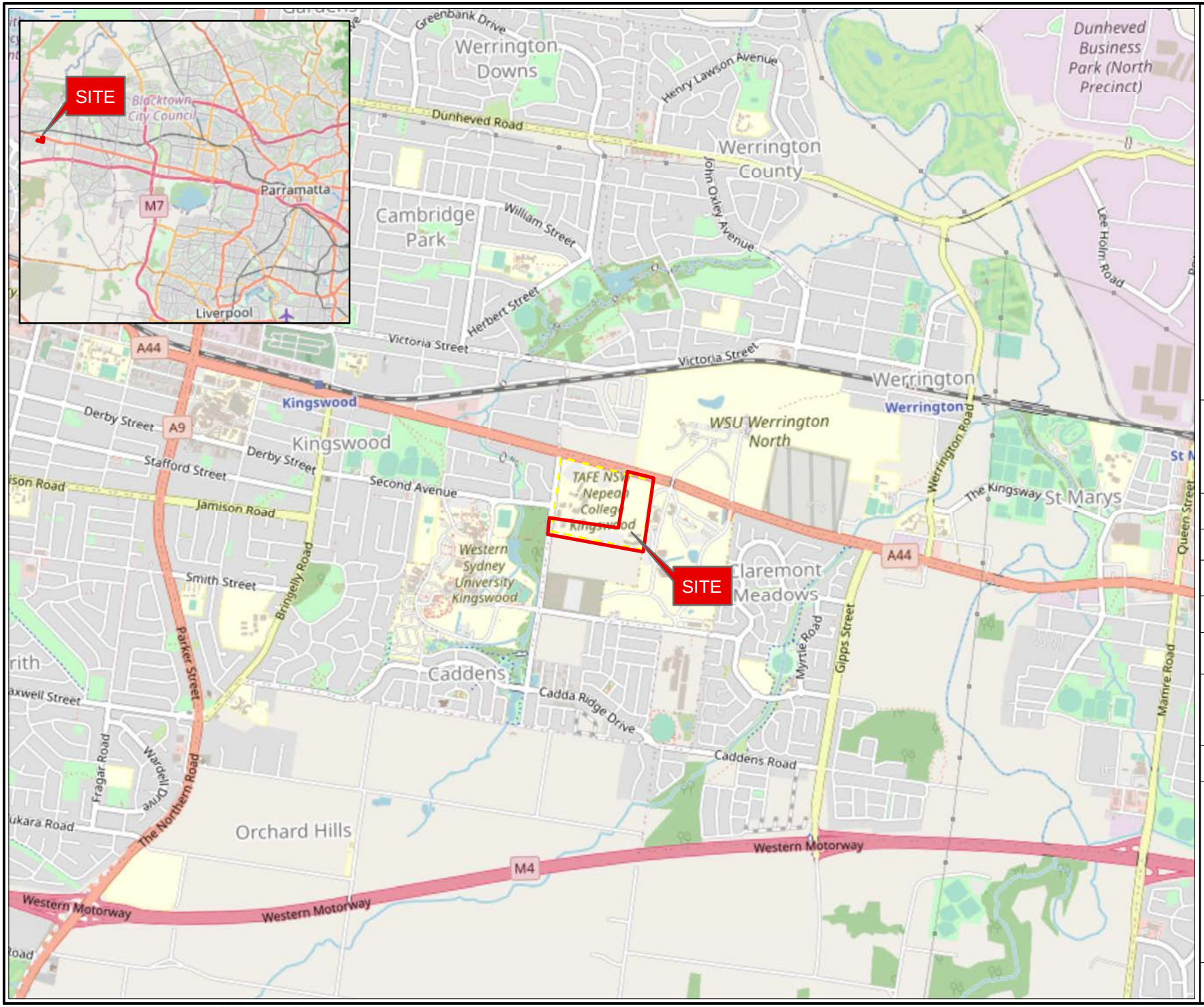
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the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

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

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

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

Figures



Legend:

- Approximate Site Boundary
- TAFE Kingswood Boundary

JBS&G

Job No: 59831	
Client: TAFE NSW	
Version: R01 Rev A	Date 11/11/2020
Drawn By: AS	Checked By: SG

Scale 1:30,000

0 500 1,000

metres

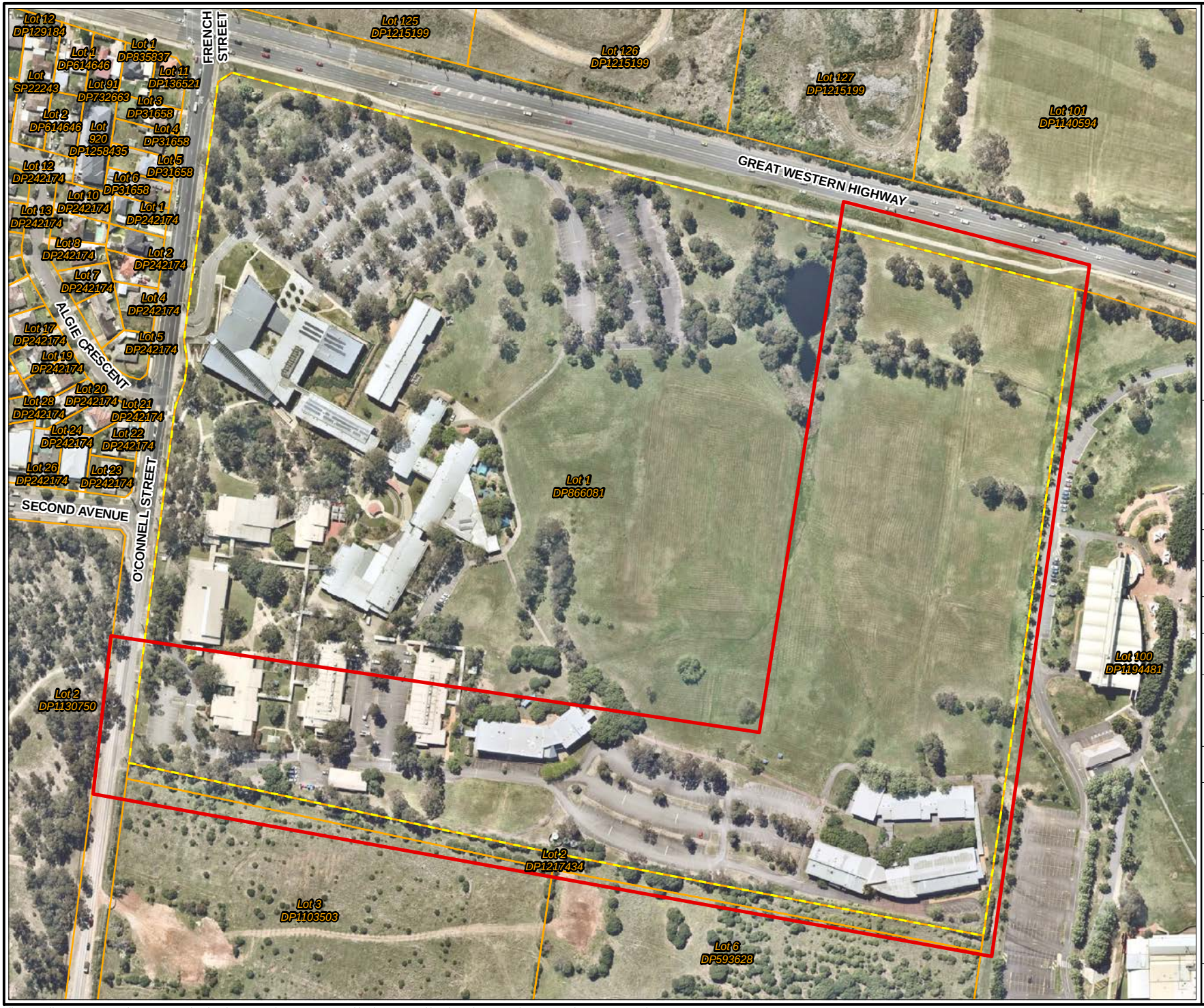
Coord. Sys. GDA 1994 MGA Zone 56

2-44 O'Connell Street, Kingswood NSW

SITE LOCATION

FIGURE 1

File Name: N:\Projects\TAFE NSW\59831 WSCH combined DSI Geotech\GIS\Maps\R01 Rev A\59831_01_SiteLocation.mxd



Legend:

- Approximate Site Boundary
- TAFE Kingswood Boundary
- NSW Cadastre (DFSI, 2020)

JBS&G

Job No: 59831	
Client: TAFE NSW	
Version: R01 Rev A	Date 11/11/2020
Drawn By: AS	Checked By: SG
Scale 1:3,200	

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 56

2-44 O'Connell Street, Kingswood NSW

SITE LAYOUT

FIGURE 2

File Name: \\JBSG-NSW-FS01\Company Data\Projects\TAFE NSW\59831 WSCH combined DSI Geotech\GIS\Maps\R01 Rev A\59831_02_SiteLayout_AS.mxd
Reference: www.nearmap.com - Imagery 01-10-2020

Legend:

- Approximate Site Boundary
- TAFE Kingswood Boundary

Sampling Locations

- JBS&G Hand Auger
- PSM Boreholes (Auger)
- PSM Boreholes (Cored)
- PSM Boreholes (Cored)/ Monitoring Well

JBS&G

Job No: 59831	
Client: TAFE NSW	
Version: R01 Rev A	Date 1/12/2020
Drawn By: AS/RH	Checked By: SG
Scale 1:3,200	

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 56

2-44 O'Connell Street, Kingswood NSW

SAMPLING LOCATIONS

FIGURE 3

File Name: N:\Projects\TAFE NSW\59831 WSCH combined PSI Geotech\GIS\Maps\R01 Rev A\59831_03_SamplingLocs_v2.mxd
Reference: www.nearmap.com - Imagery 01-10-2020, Basemap adapted from Gray Puksand, 'TAFE NSW Western Sydney Construction Hub'

Legend:

- Approximate Site Boundary
- TAFE Kingswood Boundary

Sampling Locations

- JBS&G Hand Auger
- PSM Boreholes (Auger)
- PSM Boreholes (Cored)
- PSM Boreholes (Cored)/ Monitoring Well

JBS&G

Job No: 59831	
Client: TAFE NSW	
Version: R01 Rev A	Date 1/12/2020
Drawn By: AS	Checked By: SG
Scale 1:3,200	

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 56

2-44 O'Connell Street, Kingswood NSW

PROPOSED DEVELOPMENT PLAN

FIGURE 4

File Name: N:\Projects\TAFE NSW\59831 WSCH combined PSI Geotech\GIS\Maps\R01 Rev A\59831_04_ProposedDevelopmentPlan.mxd
Reference: www.nearmap.com - Imagery 01-10-2020, Basemap adapted from Gray Puksand, 'TAFE NSW Western Sydney Construction Hub'

Tables

Table A Soil Analytical Results
Project Number: 59831
Project Name: WSCH PSI

			Metals & Metalloids								TRHs (NEPC 2013)							BTEXN															
			Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C6-C10	C10-C16	C16-C34	C34-C40	C10-C40 (Sum of total)	F1 (C6-C10 minus BTEX)	F2 (C10-C16 less Naphthalene)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Naphthalene	Naphthalene - MAH	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ calc (Half)	Benzo(a)pyrene TEQ calc (Zero)
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			2	0.4	1	1	1	0.1	1	1	20	50	100	100	50	20	50	0.1	0.1	0.1	0.1	0.2	0.3	0.1	0.5	0.1	0.1	0.1	0.1	0.05	0.5	0.5	0.5
CRC Care 2011 Table A4 Direct Contact Intrusive Maintenance Worker											82000	62000	85000	120000				1100	120000	85000			130000	29000	29000								
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil			3000[#1]	900	3600[#2]	240000	1500[#3]	730[#4]	6000	400000																				40[#5]	40[#5]	40[#5]
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Clay																																
0-1m																310[#8]	NL[#9]	4[#10]	NL[#10]	NL[#10]			NL[#10]	NL[#10]	NL[#10]								
NEPM 2013 Table 1B(1-5) Generic EIL - Comm/Ind			160[#11]		960	330	1800[#14]		490	1200														370	370								
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Fine Soil													2500[#17]	6600[#17]		215[#18]	170[#19]	95[#17]	135[#17]	185[#17]			95[#17]							1.4[#20]			
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil											800[#21]	1000[#21]	5000	10000																			
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil																																	
Field_ID	**Lab_Report_Number**	**Sampled_Date_Time**																															
BH01 0.2-0.3	758440	18/11/2020	19	<0.4	23	30	28	<0.1	18	80	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
BH01 0.5-0.6	758440	18/11/2020	11	<0.4	19	27	17	<0.1	16	57	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
BH02 0-0.1	758440	19/11/2020	7.7	<0.4	21	31	13	<0.1	22	42	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
BH02 1.0-1.1	758440	19/11/2020	24	<0.4	23	32	11	<0.1	35	76	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
BH03 0.2-0.3	758440	18/11/2020	8.1	<0.4	19	31	24	<0.1	16	75	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
BH04 0.2-0.3	758440	18/11/2020	9	<0.4	21	22	14	<0.1	21	36	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
BH04 1.5-1.6	758440	18/11/2020	24	<0.4	15	41	16	<0.1	41	72	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
BH09 0.5-0.6	758440	19/11/2020	5.1	<0.4	32	32	13	<0.1	42	85	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
BH09 0-0.1	758440	19/11/2020	9.6	<0.4	25	32	11	<0.1	27	62	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
BH10 0.2-0.3	758440	19/11/2020	4.7	<0.4	24	38	12	<0.1	19	68	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
BH10 1.0-1.1	758440	19/11/2020	5.4	<0.4	19	43	11	<0.1	11	42	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
HA01 0.5-0.6	757514	17/11/2020	8.1	<0.4	32	31	17	<0.1	41	63	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
HA02 0.2-0.3	757514	17/11/2020	5.7	<0.4	26	30	24	<0.1	24	85	<20	54	250	<100	304	<20	54	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
HA03 0-0.1	757514	17/11/2020	5.7	<0.4	24	25	20	<0.1	25	63	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
HA04 0.5-0.6	757514	17/11/2020	5.6	<0.4	22	36	16	<0.1	21	56	<20	<50	<100	<100	<100	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
QA181120	758440	18/11/2020	10	<0.4	24	28	16	<0.1	20	46	<20	<50	<100	130	130	<20	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5
QC18/11/20	256393	18/11/2020	7	<0.4	18	23	15	<0.1	15	31	<25	<50	<100	<100	<50	<25		<0.2	<0.5	<1	<1	<2	<3	<0.1		<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5

Table A Soil Analytical Results
Project Number: 59831
Project Name: WSCH PSI

			PAH												Organochlorine Pesticides																							
			Benzo(b+j)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene - PAH	Phenanthrene	Pyrene	PAHs (Sum of total)	4,4-DDE	a-BHC	b-BHC	d-BHC	g-BHC (Lindane)	Aldrin	Dieldrin	Aldrin + Dieldrin	Chlordane	Chlordane (cis)	Chlordane (trans)	DDT	DDD	DDT+DDE+DDD	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.5	0.2	0.1	0.5	0.1	0.1	0.1	0.1	0.1	0.5	0.1	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
CRC Care 2011 Table A4 Direct Contact Intrusive Maintenance Wo												29000																									
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil															4000[#6]								45	530					3600				100			
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion																																					
0-1m												NL[#10]																									
NEPM 2013 Table 1B(1-5) Generic EIL - Comm/Ind												370															640										
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Fine Soil																																					
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil																																					
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil																																					
Field_ID	**Lab_Report_Number**	**Sampled_Date_Time**																																			
BH01 0.2-0.3	758440	18/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH01 0.5-0.6	758440	18/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH02 0-0.1	758440	19/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH02 1.0-1.1	758440	19/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH03 0.2-0.3	758440	18/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH04 0.2-0.3	758440	18/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH04 1.5-1.6	758440	18/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH09 0.5-0.6	758440	19/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH09 0-0.1	758440	19/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH10 0.2-0.3	758440	19/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH10 1.0-1.1	758440	19/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HA01 0.5-0.6	757514	17/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HA02 0.2-0.3	757514	17/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HA03 0-0.1	757514	17/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HA04 0.5-0.6	757514	17/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
QA181120	758440	18/11/2020	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
QC18/11/20	256393	18/11/2020		<0.2	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	

Table A Soil Analytical Results
Project Number: 59831
Project Name: WSCH PSI

						Polychlorinated Biphenyls								Chlorinated Benzenes	Ionic Balance			Inorganics	Particle Size	Asbestos - Eurofins											
		Heptachlor	Heptachlor Epoxide	Methoxychlor	Toxaphene	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	Hexachlorobenzene	CEC	Conductivity (1:5 aqueous extract)	pH (aqueous extract)	Moisture	% Clay*	Approximate Sample Mass	Mass ACM	Mass Asbestos in ACM	Asbestos from ACM in Soil	Mass FA	Mass Asbestos in FA	Mass AF	Mass asbestos in AF	Asbestos from FA & AF in Soil	Mass Asbestos in FA & AF	ACM - Comment	FA- Comment
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	MEQ/100G	US/CM	pH Units	%	%	g	g	g	% (w/w)	g	g	g	g	% (w/w)	g	Comment	Comment
EQL		0.05	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.05	10	0.1	0.1	1												
CRC Care 2011 Table A4 Direct Contact Intrusive Maintenance Wo																															
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil		50		2500	160								7[#7]	80																	
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion																															
0-1m																															
NEPM 2013 Table 1B(1-5) Generic EIL - Comm/Ind																															
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Fine Soil																															
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil																															
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil																							0.05[#22]					0.001[#23]			
Field_ID	**Lab_Report_Number**	**Sampled_Date_Time**																													
BH01 0.2-0.3	758440	18/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05						701	0	0	0	0	0	0	0	0	0	1[#4]	1[#4]
BH01 0.5-0.6	758440	18/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05																	
BH02 0-0.1	758440	19/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05						499	0	0	0	0	0	0	0	0	0	1[#4]	1[#4]
BH02 1.0-1.1	758440	19/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05																	
BH03 0.2-0.3	758440	18/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05						462	0	0	0	0	0	0	0	0	0	1[#4]	1[#4]
BH04 0.2-0.3	758440	18/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	11	23	6.4		10	475	0	0	0	0	0	0	0	0	0	1[#4]	1[#4]
BH04 1.5-1.6	758440	18/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05																	
BH09 0.5-0.6	758440	19/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05																	
BH09 0-0.1	758440	19/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	33	70	7.1		12	639	0	0	0	0	0	0	0	0	0	1[#4]	1[#4]
BH10 0.2-0.3	758440	19/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05						453	0	0	0	0	0	0	0	0	0	1[#4]	1[#4]
BH10 1.0-1.1	758440	19/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05																	
HA01 0.5-0.6	757514	17/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05						430	0	0	0	0	0	0	0	0	0	1[#4]	1[#4]
HA02 0.2-0.3	757514	17/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05						524	0	0	0	0	0	0	0	0	0	1[#4]	1[#4]
HA03 0-0.1	757514	17/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05						488	0	0	0	0	0	0	0	0	0	1[#4]	1[#4]
HA04 0.5-0.6	757514	17/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05						592	0	0	0	0	0	0	0	0	0	1[#4]	1[#4]
QA181120	758440	18/11/2020	<0.05	<0.05	<0.2	<0.1	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05						416	0	0	0	0	0	0	0	0	0	1[#4]	1[#4]
QC18/11/20	256393	18/11/2020	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				30													

Table A Soil Analytical Results
Project Number: 59831
Project Name: WSCH PSI

								Asbestos - Envirolab				Other	
			AF - Comment	Organic Fibres - Comment	Respirable Fibres - Comment	Synthetic Fibres - Comment	Asbestos Reported Result	Asbestos ID in Soil	Total Asbestos	Asbestos (ACM >7mm) Estimation	Asbestos in soil (<2mm AF/FA) (%w/w)	Moisture Content (dried @ 103°C)	TOC
			Comment	Comment	Comment	Comment	Comment	g/kg	g/kg	% (w/w)	% (w/w)	%	mg/kg
EQL									0.1	0.01	0.001	1	0.1
CRC Care 2011 Table A4 Direct Contact Intrusive Maintenance Wo													
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil													
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion													
0-1m													
NEPM 2013 Table 1B(1-5) Generic EIL - Comm/Ind													
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Fine Soil													
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil													
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil										0.05[#22]	0.001[#23]		
Field_ID	**Lab_Report_Number**	**Sampled_Date_Time**											
BH01 0.2-0.3	758440	18/11/2020	1[#4]	1[#3]	0	1[#4]	1[#1]					15	
BH01 0.5-0.6	758440	18/11/2020										13	
BH02 0-0.1	758440	19/11/2020	1[#4]	1[#3]	1[#2]	1[#4]	1[#1]					13	
BH02 1.0-1.1	758440	19/11/2020										9.5	
BH03 0.2-0.3	758440	18/11/2020	1[#4]	1[#3]	1[#2]	1[#4]	1[#1]					20	
BH04 0.2-0.3	758440	18/11/2020	1[#4]	1[#3]	1[#2]	1[#4]	1[#1]					33	1.1
BH04 1.5-1.6	758440	18/11/2020										13	
BH09 0.5-0.6	758440	19/11/2020										6.3	
BH09 0-0.1	758440	19/11/2020	1[#4]	1[#3]	1[#2]	1[#4]	1[#1]					8.1	0.6
BH10 0.2-0.3	758440	19/11/2020	1[#4]	1[#3]	1[#2]	1[#4]	1[#1]					12	
BH10 1.0-1.1	758440	19/11/2020										13	
HA01 0.5-0.6	757514	17/11/2020	1[#4]	1[#3]	0	1[#4]	1[#1]					17	
HA02 0.2-0.3	757514	17/11/2020	1[#4]	1[#3]	1[#2]	1[#4]	1[#1]					11	
HA03 0-0.1	757514	17/11/2020	1[#4]	1[#3]	1[#2]	1[#4]	1[#1]					12	
HA04 0.5-0.6	757514	17/11/2020	1[#4]	1[#3]	1[#2]	1[#4]	1[#1]					15	
QA181120	758440	18/11/2020	1[#4]	1[#4]	1[#2]	1[#4]	1[#1]					15	
QC18/11/20	256393	18/11/2020						0	<0.1	<0.01	<0.001		

Table A Soil Analytical Results
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	Metals & Metalloids								TRHs (NEPC 2013)							BTEXN																
	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C6-C10	C10-C16	C16-C34	C34-C40	C10-C40 (Sum of total)	F1 (C6-C10 minus BTEX)	F2 (C10-C16 less Naphthalene)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Naphthalene	Naphthalene - MAH	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ calc (Half)	Benzo(a)pyrene TEQ calc (Zero)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	2	0.4	1	1	1	0.1	1	1	20	50	100	100	50	20	50	0.1	0.1	0.1	0.1	0.2	0.3	0.1	0.5	0.1	0.1	0.1	0.1	0.05	0.5	0.5	0.5
CRC Care 2011 Table A4 Direct Contact Intrusive Maintenance Worker									82000	62000	85000	120000				1100	120000	85000			130000	29000	29000								
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil	3000[#1]	900	3600[#2]	240000	1500[#3]	730[#4]	6000	400000																					40[#5]	40[#5]	40[#5]
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Clay																															
0-1m														310[#8]	NL[#9]	4[#10]	NL[#10]	NL[#10]			NL[#10]	NL[#10]	NL[#10]								
NEPM 2013 Table 1B(1-5) Generic EIL - Comm/Ind	160[#11]		960	330	1800[#14]		490	1200														370	370								
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Fine Soil											2500[#17]	6600[#17]		215[#18]	170[#19]	95[#17]	135[#17]	185[#17]			95[#17]							1.4[#20]			
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil									800[#21]	1000[#21]	5000	10000																			
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil																															

Field_ID **Lab_Report_Number** **Sampled_Date_Time**

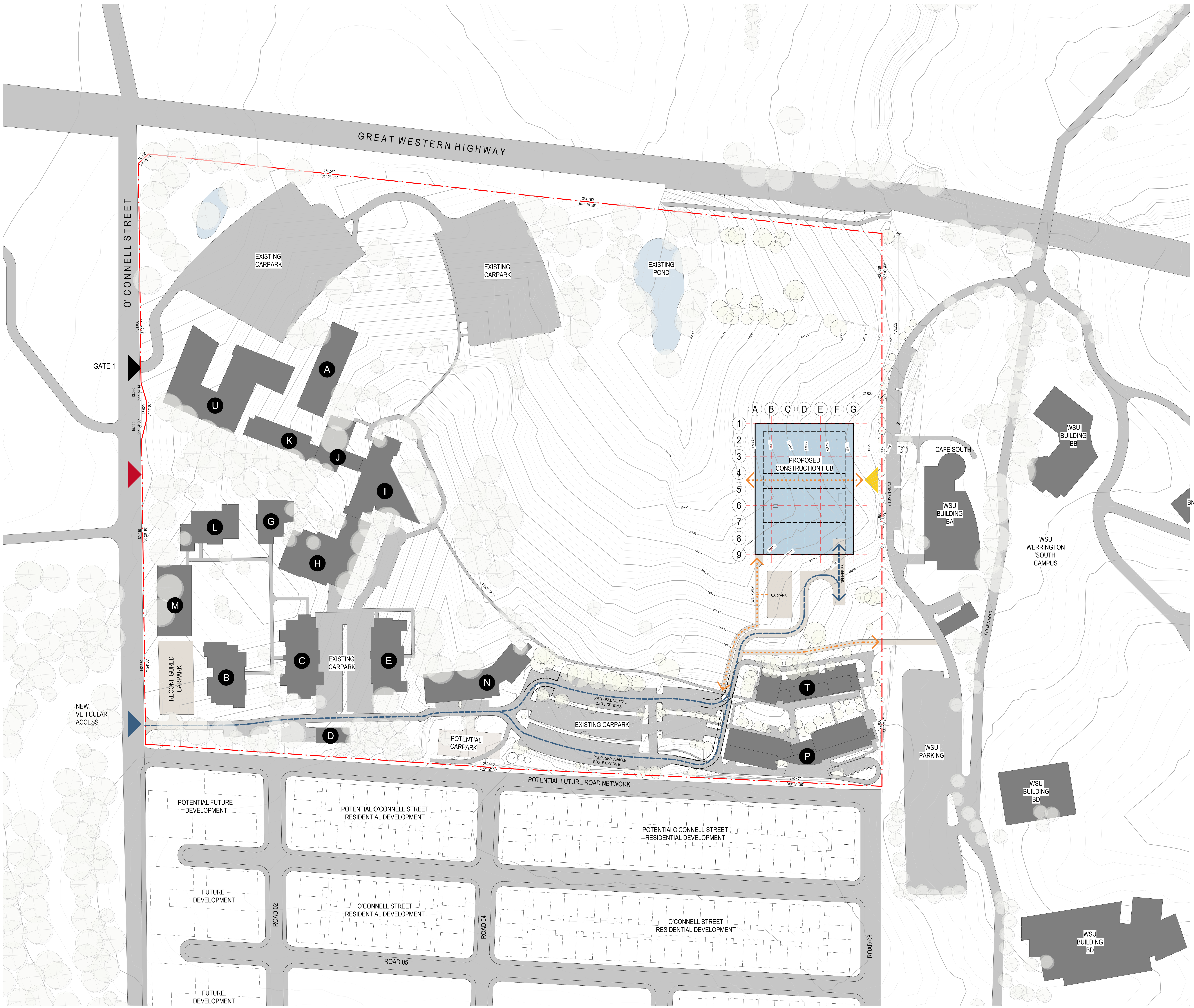
Env Stds Comments

#1:Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important and should be considered where appropriate (refer Shedule B7).
#2:Trigger Value adopted from Chromium (VI)
#3:Lead: HILs A,B,C based on blood lead models (IEUBK & HIL D on adult lead model for where 50% bioavailability considered. Site-specific bioavailability should be considered where appropriate.
#4:Elemental mercury: HIL does not address elemental mercury. a site specific assessment should be considered if elemental mercury is present, or suspected to be present.
#5:Carcinogenic PAHs: HIL based on 8 carc. PAHs & their TEFs (rel to BaP ref Schedule 7) BaP TEQ calc by multiplying the conc of each carc. PAH in sample by its BaP TEF (ref Table 1A(1)) & summing
#6:Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should consider presence of carcinogenic PAHs (should meet BaP TEQ HIL) & napthalene (should meet relevant HSL)
#7:PCBs: HIL refers to non-dioxin like PCBs only. Where PCB source is known, or suspected at a site, a site-specific assessment of exposure to all PCBs (inc dioxin like PCBs) should be undertaken
#8:Derived soil HSL exceeds soil saturation concentraiton. To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#9:Derived soil HSL exceeds soil saturation concentraiton. To obtain F2 subtract naphthalene from the >C10-C16 fraction
#10:Derived soil HSL exceeds soil saturation concentraiton
#11:Aged values apply to arsenic contamination present in soil > 2 years. Refer Schedule B5c for < 2 years.
#12:Trigger Value taken for Chromium (III), Clay Content of 1%
#13:Trigger Value taken for pH 4.5
#14:Aged values apply to lead contamination present in soil > 2 years. Refer Schedule B5c for < 2 years.
#15:Trigger Value taken for CEC 5
#16:Trigger Value taken for pH 4 and CEC 5
#17:ESLs are of low reliability.
#18:Moderate reliability. To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#19:Moderate reliability. To obtain F2 subtract napthalene from the >C10 - C16 fraction.
#20:ESLs are of low reliability. Revised as per NEPC errata 6 Feb 2014
#21:Separate management limits for BTEX & naphthalene are not available hence should not be subtracted from the relevant fractions to obtain F1 & F2
#22:Commercial/industrial D includes premises such as shops, offices, factories and industrial sites.
#23:Only applies where the FA and AF are able to be quantified by gravimetric procedures (refer Section 4.10). This screening level is not applicable to free fibres.
#24:Trigger value adopted from Chromium VI
#25:Approximate range of petroleum hydrocarbon fractions: petrol C6–C9, kerosene C10–C18, diesel C12–C18, and lubricating oils above C18. Refer to NSW Waste Criteria Nov 2014 p.12 footnote 7
#26:There may be a need for the laboratory to concentrate the sample to achieve the TCLP limit value for benzo(a)pyrene with confidence. Refer to NSW Waste Criteria Nov 2014 p.11 footnote 2
#27:Polychlorinated biphenyls must be managed in accordance with the EPA's polychlorinated biphenyl (PCB) chemical control order 1997. Refer to NSW Waste Criteria Nov 2014 p.12 footnote 8
#28:Refer to NSW Waste Criteria Nov 2014 p.17 footnote 13
#29:Calculated from Hazardous Waste: Identification and Listing (USEPA 2012a). Refer to NSW Waste Criteria Nov 2014 p.16 footnote 3, 4
#30:Refer to NSW Waste Criteria Nov 2014 p.17 footnote 12

Data Comments

#1 No asbestos detected at the reporting limit of 0.001% w/w.*Organic fibre detected.No trace asbestos detected.
#2 No respirable fibres detected.
#3 Organic fibres detected.
#4 Nil

Appendix A Proposed Development Plan



1 SITE PLAN - PROPOSED
1 : 1000

LEGEND

- EXISTING PEDESTRIAN ACCESS
- PROPOSED PEDESTRIAN ACCESS
- EXISTING VEHICULAR ACCESS
- PROPOSED VEHICULAR ACCESS
- BOUNDARY LINE
- EXISTING BUILDING NAME
- PROPOSED VEHICULAR ROUTE CARPARK RECONFIGURATION
- PROPOSED PEDESTRIAN PATH
- PROPOSED CONSTRUCTION HUB
- PROPOSED ROADS WALKWAYS AND RECONFIGURED CARPARK
- EXISTING ROADS, WALKWAYS AND CARPARKS
- PROPOSED LANDSCAPE

GRAY PUKSAND

Contractors to use Architectural drawings for set out.
Contractors to check & verify all Dimensions on Site prior to Construction/Fabrication.
Figured Dimensions take precedence over Scaled Dimensions.
Any Discrepancies should be immediatley referred to the Architect.
All work to comply with N.C.C. Statutory Authorities & Relevant Australian Standards.

NSW Nominated Architects Scott Moylan 7147 Craig Saltmarsh 6569

REV	DESCRIPTION	DATE
A	For Information	03-12-20

PROJECT NO	220090
DRAWN	RD
CHECKED	SS
APPROVED	BH

TAFE NSW Western Sydney Construction Hub
12-44 O'connell St, Kingswood NSW 2747

PRELIMINARY

SITE PLAN - PROPOSED

DWG #	A0102	REV	A
SCALE @ A0	As indicated		

0 10000 25000 50000
1 : 1000

Appendix B Borehole Logs

GROUNDWATER WELL BH01

PROJECT NUMBER 59831	**DRILLING COMPANY** Total Drilling	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 18-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**ELEVATION** N/A
PERMIT NO. N/A	**DRILLING METHOD** SFA:Solid Flight Auger	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**TOTAL DEPTH** 8.5 m bgl	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** SG/RH
COMPLETION Roadbox	**CASING** Class 18 PVC - 50mm	**SCREEN INTERVAL** 5.5 - 8.5 m bgl

COMMENTS

Drilling Method	Water (m bgl)	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA			0		Fill	Silty clay, brown, dry/damp, heterogeneous, soft, low plasticity.	SM	BH01 0.2-0.3	0.2	No ACM, odour or staining observed.
			0.5		Fill	Silty clay, dark brown, dry/damp, heterogeneous, soft, low plasticity, with inclusion of carbonaceous shale fragments.	SM	BH01 0.5-0.6	0.2	No ACM, odour or staining observed.
			1		CH-MH	Silty clay, light brown, dry/damp, homogeneous, medium plasticity, with inclusion of weathered shale.	SM	BH01 1.0-1.1	0.1	No ACM, odour or staining observed.
			1.5							
			2		CH	Clay, grey/yellow, dry/damp, mottled, high plasticity, with inclusion of shale fragments.	SM			No ACM, odour or staining observed.
			2.5							
			3							
			3.5							
			4							
			4.5		Shale	Shale.	SM			No ACM, odour or staining observed.
			5							
			5.5							
			6							
			6.5							
			7							
			7.5							
			8							
			8.5			Termination Depth at: 8.5 m.				

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SOIL BOREHOLE BH02

PROJECT NUMBER 59831	**DRILLING COMPANY** Total Drilling	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 19-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** SFA:Solid Flight Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** SG/RH

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA		0		Fill	Silty clay, dark brown, damp, heterogeneous, soft, low plasticity, with inclusion of gravel and rootlets.	SM	BH02 0.0-0.1	0.4	No ACM, odour or staining observed.
							BH02 0-0.1	0.2	
				CH-MH		SM	BH02 0.3-0.4	0.3	No ACM, odour or staining observed.
		1			Silty clay, brown, dry/damp, soft, medium plasticity, with inclusion of weathered shale from 1.0 m.		BH02 0.5-0.6	0.1	
							BH02 1.0-1.1		
		2							
		3							
		4							
		5							
		6							
		7		Shale	Shale.	SM			No ACM, odour or staining observed.
		8							
		9							
		10							
		11							
		12							
		13							
		14							
					Termination Depth at: 14.5 m.				

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SOIL BOREHOLE BH03

PROJECT NUMBER 59831	**DRILLING COMPANY** Total Drilling	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 18-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** SFA:Solid Flight Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** SG/RH

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA		0.2 0.4 0.6 0.8 1		Fill	Silty clay, dark brown, dry, heterogeneous, soft, low plasticity, with inclusion of gravel and rootlets.	D	BH03 0.2-0.3 BH03 0.5-0.6	0.4 0.2	No ACM, odour or staining observed.
		1.2 1.4		CL-ML	Silty clay, light brown, dry, homogeneous, soft, low plasticity, with inclusion of weathered shale.	D	BH03 1.0-1.1	0.3	No ACM, odour or staining observed.
		1.6 1.8 2 2.2 2.4 2.6 2.8 3 3.2 3.4 3.6 3.8 4 4.2 4.4 4.6 4.8 5		CH-MH	Silty clay, light brown, dry, homogeneous, stiff, medium/high plasticity, with inclusion of weathered shale.	D	BH03 1.5-1.6	0.1	No ACM, odour or staining observed.
		5.2 5.4			Termination Depth at: 5.0 m.				

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SOIL BOREHOLE BH04

PROJECT NUMBER 59831	**DRILLING COMPANY** Total Drilling	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 18-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** SFA:Solid Flight Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** SG/RH

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA		0.2		Fill	Silty clay, dark brown, dry, heterogeneous, soft, low plasticity, with inclusion of gravel and rootlets.	D	BH04 0.2-0.3	0.3	No ACM, odour or staining observed.
		0.4							
		0.6		Fill	Silty clay, dark brown, dry, heterogeneous, soft, low plasticity.	D	BH04 0.5-0.6	0.2	No ACM, odour or staining observed.
		0.8							
		1		Fill	Silty clay, light brown, dry, homogeneous, soft, low plasticity.	D	BH04 1.0-1.1	0.1	No ACM, odour or staining observed.
		1.2							
		1.4							
		1.6		CL-ML-SM	Silty sandy clay, light brown, dry, homogeneous, soft, low plasticity, with inclusion of gravel.	D	BH04 1.5-1.6	0.1	No ACM, odour or staining observed.
		1.8							
		2							
		2.2							
		2.4					BH04 2.4-2.5	0.1	
		2.6		CH-MH	Silty clay, light brown, dry, homogeneous, soft, low plasticity, with inclusion of small gravel.	D			No ACM, odour or staining observed.
		2.8		Shale	Weathered shale, yellow/grey, dry, homogeneous, firm, medium plasticity.	D	BH04 2.7-2.8	0.1	No ACM, odour or staining observed.
		3							
		3.2							
		3.4							
		3.6							
		3.8							
		4							
		4.2							
		4.4							
		4.6							
		4.8							
		5			Termination Depth at: 5.0 m.				
		5.2							
		5.4							

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SOIL BOREHOLE BH05

PROJECT NUMBER 59831	**DRILLING COMPANY** Total Drilling	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 18-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** SFA:Solid Flight Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** SG/RH

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA		0.2		Fill	Silty clay, brown, dry/damp, heterogeneous, soft, low/medium plasticity, with inclusion of gravel and rootlets.	SM	BH05 0.0-0.1	0.2	No ACM, odour or staining observed.
							BH05 0.2-0.3	0.3	
		0.4		CH-MH	Silty clay, light brown, dry/damp, firm, medium plasticity.	SM			No ACM, odour or staining observed.
		0.6					BH05 0.5-0.6	0.1	
		0.8							
		1		CH-MH	Silty clay, red/grey, damp, mottled, high plasticity.	SM	BH05 1.0-1.1	0.1	No ACM, odour or staining observed.
		1.2							
		1.4							
		1.6		CL-ML	Silty clay, brown/grey, dry, mottled, low plasticity.	D			No ACM, odour or staining observed.
		1.8							
		2							
		2.2							
		2.4							
		2.6							
		2.8							
		3							
		3.2							
		3.4							
		3.6							
		3.8							
		4							
		4.2							
		4.4							
		4.6							
		4.8							
		5							
		5.2							
		5.4							
					Termination Depth at: 5.5 m.				

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SOIL BOREHOLE BH06

PROJECT NUMBER 59831	**DRILLING COMPANY** Total Drilling	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 19-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** SFA:Solid Flight Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** SG/RH

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA		0.2		Fill	Silty clay, dark brown, dry/damp, heterogeneous, soft, low plasticity.	SM	BH06 0.0-0.1	0.4	No ACM, odour or staining observed.
		0.4					BH06 0.3-0.4	0.2	
		0.6		CH-MH	Silty clay, brown, damp, soft, medium plasticity.	SM	BH06 0.5-0.6	0.2	No ACM, odour or staining observed.
		0.8							
		1					BH06 1.0-1.1	0.2	
		1.2		CH-MH	Silty clay, grey/yellow, mottled, soft, medium plasticity.	SM			No ACM, odour or staining observed.
		1.4							
		1.6					BH06 1.5-1.6	0.2	
		1.8							
		2							
		2.2							
		2.4							
		2.6							
		2.8							
		3							
		3.2							
		3.4							
		3.6							
		3.8							
		4							
		4.2							
		4.4							
		4.6							
		4.8							
		5			Termination Depth at: 5.0 m.				
		5.2							
		5.4							

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SOIL BOREHOLE BH07

PROJECT NUMBER 59831	**DRILLING COMPANY** Total Drilling	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 19-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** SFA:Solid Flight Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** SG/RH

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA		0.2		Fill	Silty clay, dark brown, heterogeneous, medium plasticity.	D	BH07 0.0-0.1	0.6	No ACM, odour or staining observed.
		0.4					BH07 0.3-0.4	0.5	
		0.6		CH-MH	Silty clay, brown, medium plasticity, with inclusion of shale and gravel.	D	BH07 0.5-0.6	0.2	No ACM, odour or staining observed.
		0.8							
		1					BH07 1.0-1.1	0.4	
		1.2							
		1.4							
		1.6							
		1.8							
		2							
		2.2							
		2.4							
		2.6							
		2.8							
		3							
		3.2							
		3.4							
		3.6							
		3.8							
		4							
		4.2							
		4.4							
		4.6							
		4.8							
		5			Termination Depth at: 5.0 m.				
		5.2							
		5.4							

SOIL BOREHOLE BH08

PROJECT NUMBER 59831	**DRILLING COMPANY** Total Drilling	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 18-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** SFA:Solid Flight Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** SG/RH

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA		0.2		Fill	Silty clay, brown, dry, with inclusion of anthropogenic material and roots.	D	BH08 0.2-0.3	0.6	No ACM, odour or staining observed.
		0.4		Fill	Silty clay, brown, dry, heterogeneous, soft, low plasticity, with inclusion of gravel and rootlets.	D	BH08 0.5-0.6	0.4	No ACM, odour or staining observed.
		0.6		CL-ML	Silty clay, light brown, dry, homogeneous, soft, non/low plasticity, with inclusion of weathered shale.	D			No ACM, odour or staining observed.
		0.8							
		1					BH08 1.0-1.1	0.4	
		1.2			Termination Depth at: 1.1 m.				
		1.4							
		1.6							
		1.8							
		2							
		2.2							
		2.4							
		2.6							
		2.8							
		3							
		3.2							
		3.4							
		3.6							
		3.8							
		4							
		4.2							
		4.4							
		4.6							
		4.8							
		5							
		5.2							
		5.4							

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SOIL BOREHOLE BH09

PROJECT NUMBER 59831	**DRILLING COMPANY** Total Drilling	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 19-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** SFA:Solid Flight Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** SG/RH

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA		0.2		Fill	Silty clay, dark brown, dry, soft, non plastic, with inclusion of roots and gravel.	D	BH09 0-0.1	0.6	No ACM, odour or staining observed.
		0.4		CL-ML	Silty clay, brown, non plastic.	D	BH09 0.3-0.4	0.4	No ACM, odour or staining observed.
		0.6					BH09 0.5-0.6	0.4	
		0.8							
		1		CL-ML	Silty clay, light brown, dry, soft, non plastic.	D	BH09 1.0-1.1	0.4	No ACM, odour or staining observed.
		1.2							
		1.4							
		1.6		CL-ML	Silty clay, grey, dry, soft, non plastic.	D	BH09 1.5-1.6	0.5	No ACM, odour or staining observed.
		1.8							
		2							Refusal.
		2.2			Termination Depth at: 2.0 m.				
		2.4							
		2.6							
		2.8							
		3							
		3.2							
		3.4							
		3.6							
		3.8							
		4							
		4.2							
		4.4							
		4.6							
		4.8							
		5							
		5.2							
		5.4							

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SOIL BOREHOLE BH10

PROJECT NUMBER 59831	**DRILLING COMPANY** Total Drilling	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 19-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** SFA:Solid Flight Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** SG/RH

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA		0.2 0.4 0.6		Fill	Silty clay, dark brown, dry/damp, heterogeneous, soft, low plasticity.	SM	BH10 0.2-0.3 BH10 0.5-0.6	0.8 0.4	No ACM, odour or staining observed.
		0.8 1 1.2 1.4		CL-ML	Silty clay, red/grey, dry, soft/firm, low/medium plasticity.	D	BH10 1.0-1.1	0.5	No ACM, odour or staining observed.
		1.6 1.8 2 2.2 2.4 2.6 2.8 3 3.2 3.4 3.6 3.8 4 4.2 4.4 4.6 4.8 5		CL-ML	Silty clay, grey/brown, dry, mottled, firm, medium plasticity.	D	BH10 1.5-1.6	0.5	No ACM, odour or staining observed.
		5.2 5.4			Termination Depth at: 5.0 m.				

SOIL BOREHOLE HA01

PROJECT NUMBER 59831	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 17-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** Hand Auger:Hand Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** MN

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
HA		0.05 0.1 0.15 0.2		Fill	Silty clay, dark brown, dry, heterogeneous, firm, low plasticity, with inclusion of rootlets.	D	HA01 0.0-0.1	1.5	No ACM, odour or staining observed.
		0.25 0.3		Fill	Silty clay, light brown, dry, heterogeneous, firm, low plasticity, with inclusion of gravel.	D	HA01 0.2-0.3	1.4	No ACM, odour or staining observed.
		0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8 0.85 0.9 0.95 1		Fill	Sandy silty clay, brown/red, dry, stiff, high plasticity, with inclusion of ash.	D	HA01 0.5-0.6 HA01 0.9-1.0	0.8 0.5	No ACM, odour or staining observed.
		1.05			Termination Depth at: 1.0 m.				

SOIL BOREHOLE HA02

PROJECT NUMBER 59831	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 17-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** Hand Auger:Hand Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** MN

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
HA		0.05 0.1 0.15 0.2 0.25 0.3		Fill	Sandy silt, brown, dry, heterogeneous, loose, low plasticity, with inclusion of rootlets and traces of gravel.	D	HA02 0.0-0.1 HA02 0.2-0.3	1.1 22.9	No ACM, odour or staining observed. Refusal on concrete.
		0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8 0.85 0.9 0.95 1 1.05			Termination Depth at: 0.3 m.				

SOIL BOREHOLE HA03

PROJECT NUMBER 59831	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 17-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** Hand Auger:Hand Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** MN

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
HA		0.05 0.1 0.15 0.2		Fill	Clayey sandy silt, brown, dry, heterogeneous, loose, with inclusion of rootlets and plastic bag.	D	HA03 0-0.1	1.8	No ACM, odour or staining observed.
		0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8		Fill	Silty clay, brown, dry, heterogeneous, soft, low plasticity, with inclusion of ash and plastic bag pieces.	D	HA03 0.2-0.3 HA03 0.5-0.6 HA03 0.7-0.8	1.2 1.3 1	No ACM, odour or staining observed.
		0.85		Fill	Silty clay, grey/brown, dry, heterogeneous, soft, low plasticity.	D			No ACM, odour or staining observed.
		0.9 0.95 1 1.05			Termination Depth at: 0.9 m.				Refusal.

SOIL BOREHOLE HA04

PROJECT NUMBER 59831	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME WSCH Environmental and Geot	**DRILLING DATE** 17-Nov-20	**NORTHING** N/A
CLIENT	**DRILL RIG**	**COORD SYS** GDA94_MGA_zone_54
ADDRESS 2-44 O'Connell Street, Kingswood NSW	**DRILLING METHOD** Hand Auger:Hand Auger	**COORD SOURCE**
	DIAMETER 50 mm	**LOGGED BY** MN

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
HA		0.05 0.1 0.15 0.2 0.25 0.3		Fill	Silty clay, brown, dry, heterogeneous, soft, low plasticity, with inclusion of rootlets and gravel.	D	HA04 0.0-0.1 HA04 0.2-0.3	1.1 0.9	No ACM, odour or staining observed.
		0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7		Fill	Silty clay, beige, dry, heterogeneous, stiff, high plasticity, with inclusion of rootlets and gravel.	D	HA04 0.5-0.6	1.3	No ACM, odour or staining observed.
		0.75 0.8 0.85 0.9 0.95 1		Fill	Sandy silty clay, brown, dry, heterogeneous, stiff, high plasticity, with inclusion of gravel.	D	HA04 0.9-1.0	0.7	No ACM, odour or staining observed.
		1.05			Termination Depth at: 1.0 m.				

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Appendix C Laboratory Reports

JBS & G Australia (NSW) P/L
Level 1, 50 Margaret St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Sahani Gunatunge**

Report **769714-S**
Project name ADDITIONAL - TAFE KINGSWOOD
Project ID 59831
Received Date Jan 25, 2021

Client Sample ID			**BH03 0.2-0.3**	**BH03 1.0-1.1**	**BH4 1.5-1.8**	**BH06 1.5-1.6**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Ja30811**	**S21-Ja30812**	**S21-Ja30813**	**S21-Ja30814**
Date Sampled			**Nov 18, 2020**	**Nov 18, 2020**	**Nov 18, 2020**	**Nov 18, 2020**
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	49	150	68	250
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	6.3	9.7	9.2	9.2
% Moisture	1	%	16	15	13	14
Chloride	5	mg/kg	-	110	< 5	360
Resistivity*	0.5	ohm.m	-	68	150	41
Sulphate (as SO4)	30	mg/kg	-	37	33	94
Exchangeable Sodium Percentage (ESP)	0.1	%	-	8.3	2.6	33
Magnesium (exchangeable)	0.1	meq/100g	-	14	5.0	10
Potassium (exchangeable)	0.1	meq/100g	-	0.3	0.2	0.3
Sodium (exchangeable)	0.1	meq/100g	-	3.5	1.3	8.5
Cation Exchange Capacity						
Calcium (exchangeable)	0.1	meq/100g	-	25	43	6.3
Cation Exchange Capacity	0.05	meq/100g	-	43	50	26

Client Sample ID			**BH07 0.0-0.1**	**BH07 0.5-0.6**	**BH09 0.3-0.4**	**BH09 1.0-1.1**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Ja30815**	**S21-Ja30816**	**S21-Ja30818**	**S21-Ja30819**
Date Sampled			**Nov 18, 2020**	**Nov 18, 2020**	**Nov 18, 2020**	**Nov 18, 2020**
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	100	64	66	70
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	7.9	8.2	8.8	8.8
% Moisture	1	%	10.0	8.8	6.5	6.5
Chloride	5	mg/kg	110	120	130	9.5
Resistivity*	0.5	ohm.m	98	160	150	140
Sulphate (as SO4)	30	mg/kg	< 30	< 30	< 30	< 30
Exchangeable Sodium Percentage (ESP)	0.1	%	0.8	0.7	1.3	1.1
Magnesium (exchangeable)	0.1	meq/100g	6.9	10	9.1	7.9
Potassium (exchangeable)	0.1	meq/100g	1.2	0.4	0.3	0.4
Sodium (exchangeable)	0.1	meq/100g	0.3	0.4	0.6	0.5
Cation Exchange Capacity						
Calcium (exchangeable)	0.1	meq/100g	27	35	31	37
Cation Exchange Capacity	0.05	meq/100g	35	47	41	46

Client Sample ID			BH10 0.2-0.3	BH10 1.0-1.1	BH10 1.5-1.6
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Ja30820**	**S21-Ja30821**	**S21-Ja30822**
Date Sampled			**Nov 18, 2020**	**Nov 18, 2020**	**Nov 18, 2020**
Test/Reference	LOR	Unit			
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	92	420	590
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	9.0	9.5	9.4
% Moisture	1	%	11	13	11
Chloride	5	mg/kg	170	540	630
Resistivity*	0.5	ohm.m	110	24	17
Sulphate (as SO4)	30	mg/kg	36	< 30	< 30
Exchangeable Sodium Percentage (ESP)	0.1	%	3.1	10	9.9
Magnesium (exchangeable)	0.1	meq/100g	16	19	33
Potassium (exchangeable)	0.1	meq/100g	0.3	0.3	0.2
Sodium (exchangeable)	0.1	meq/100g	1.6	5.5	5.3
Cation Exchange Capacity					
Calcium (exchangeable)	0.1	meq/100g	35	28	16
Cation Exchange Capacity	0.05	meq/100g	53	53	54

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Conductivity (1:5 aqueous extract at 25°C as rec.)	Melbourne	Jan 30, 2021	7 Days
- Method: LTM-INO-4030 Conductivity			
Magnesium (exchangeable)	Melbourne	Feb 02, 2021	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity and ESP			
Potassium (exchangeable)	Melbourne	Feb 02, 2021	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity and ESP			
Sodium (exchangeable)	Melbourne	Feb 02, 2021	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity and ESP			
Cation Exchange Capacity	Melbourne	Feb 02, 2021	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage			
pH (1:5 Aqueous extract at 25°C as rec.)	Melbourne	Jan 30, 2021	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Chloride	Melbourne	Jan 30, 2021	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Sulphate (as SO4)	Melbourne	Jan 30, 2021	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
% Moisture	Melbourne	Jan 27, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			
Exchangeable Sodium Percentage (ESP)	Melbourne	Feb 02, 2021	28 Days
- Method: LTM-MET-3060 - Cation Exchange Capacity (CEC) & Exchangeable Sodium Percentage (ESP)			

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NATA # 1261 Site # 20794

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IANZ # 1290

Company Name: JBS & G Australia (NSW) P/L
Address: Level 1, 50 Margaret St
Sydney
NSW 2000

Project Name: ADDITIONAL - TAFE KINGSWOOD
Project ID: 59831

Order No.:
Report #: 769714
Phone: 02 8245 0300
Fax:

Received: Jan 25, 2021 8:46 PM
Due: Feb 2, 2021
Priority: 5 Day
Contact Name: Sahani Gunatunge

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						CANCELLED	Conductivity (1:5 aqueous extract at 25°C as rec.)	pH (1:5 Aqueous extract at 25°C as rec.)	Aggressivity Soil Set	Eurofins Suite B20	Moisture Set	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									X	X	X	X
Sydney Laboratory - NATA Site # 18217						X	X	X	X		X	X
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
Mayfield Laboratory												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	BH03 0.2-0.3	Nov 18, 2020		Soil	S21-Ja30811		X	X				X
2	BH03 1.0-1.1	Nov 18, 2020		Soil	S21-Ja30812				X	X	X	
3	BH4 1.5-1.8	Nov 18, 2020		Soil	S21-Ja30813				X	X	X	
4	BH06 1.5-1.6	Nov 18, 2020		Soil	S21-Ja30814				X	X	X	
5	BH07 0.0-0.1	Nov 18, 2020		Soil	S21-Ja30815				X	X	X	
6	BH07 0.5-0.6	Nov 18, 2020		Soil	S21-Ja30816				X	X	X	
7	BH09 0.0-0.1	Nov 18, 2020		Soil	S21-Ja30817	X						
8	BH09 0.3-0.4	Nov 18, 2020		Soil	S21-Ja30818				X	X	X	
9	BH09 1.0-1.1	Nov 18, 2020		Soil	S21-Ja30819				X	X	X	

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Address: Level 1, 50 Margaret St
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NSW 2000

Project Name: ADDITIONAL - TAFE KINGSWOOD
Project ID: 59831

Order No.:
Report #: 769714
Phone: 02 8245 0300
Fax:

Received: Jan 25, 2021 8:46 PM
Due: Feb 2, 2021
Priority: 5 Day
Contact Name: Sahani Gunatunge

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						CANCELLED	Conductivity (1:5 aqueous extract at 25°C as rec.)	pH (1:5 Aqueous extract at 25°C as rec.)	Aggressivity Soil Set	Eurofins Suite B20	Moisture Set	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									X	X	X	X
Sydney Laboratory - NATA Site # 18217						X	X	X	X		X	X
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
Mayfield Laboratory												
External Laboratory												
10	BH10 0.2-0.3	Nov 18, 2020		Soil	S21-Ja30820				X	X	X	
11	BH10 1.0-1.1	Nov 18, 2020		Soil	S21-Ja30821				X	X	X	
12	BH10 1.5-1.6	Nov 18, 2020		Soil	S21-Ja30822				X	X	X	
Test Counts						1	1	1	10	10	11	11

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Exchangeable Sodium Percentage (ESP)	%	< 0.1			0.1	Pass	
Magnesium (exchangeable)	meq/100g	< 0.1			0.1	Pass	
Potassium (exchangeable)	meq/100g	< 0.1			0.1	Pass	
Sodium (exchangeable)	meq/100g	< 0.1			0.1	Pass	
Method Blank							
Cation Exchange Capacity							
Calcium (exchangeable)	meq/100g	< 0.1			0.1	Pass	
Cation Exchange Capacity	meq/100g	< 0.05			0.05	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Sulphate (as SO4)	M21-Ja34642	NCP	mg/kg	830	940	13	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	S21-Ja30813	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C as rec.)	S21-Ja30816	CP	uS/cm	64	66	3.2	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	S21-Ja30816	CP	pH Units	8.2	8.3	pass	30%	Pass	
Resistivity*	S21-Ja30816	CP	ohm.m	160	150	3.2	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S21-Ja30819	CP	%	6.5	6.8	5.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Ursula Long	Analytical Services Manager
Charl Du Preez	Senior Analyst-Inorganic (NSW)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Scott Beddoes	Senior Analyst-Inorganic (VIC)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Sample Receipt Advice

Company name:	JBS & G Australia (NSW) P/L
Contact name:	Sahani Gunatunge
Project name:	ADDITIONAL - TAFE KINGSWOOD
Project ID:	59831
Turnaround time:	5 Day
Date/Time received	Jan 25, 2021 8:46 PM
Eurofins reference	769714

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	Sample Temperature of a random sample selected from the batch as recorded by Eurofins Sample Receipt : 8.7 degrees Celsius.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

No sample left in BH09 0.0-0.1 left, analysis cancelled.
Samples received by the laboratory after 5.30pm are deemed to have been received the following working day.

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Ursula Long on phone : or by email: UrsulaLong@eurofins.com

Results will be delivered electronically via email to Sahani Gunatunge - sgunatunge@jbsg.com.au.

Global Leader - Results you can trust

#AU04_Enviro_Sample_NSW

To: Ursula Long
Subject: RE: Samples from lab batch 758440

From: Sahani Gunatunge <SGunatunge@jbsg.com.au>
Sent: Monday, 25 January 2021 4:16 PM
To: Ursula Long <UrsulaLong@eurofins.com>
Cc: John De Martin <JDeMartin@jbsg.com.au>
Subject: Re: Samples from lab batch 758440

EXTERNAL EMAIL*

Hi Ursula,
can I please request the following additional analysis on this lab batch on standard TAT.

Eurofins Labs

B20	ion exchange suite	CEC / ESP%/ exchangeable Ca, Mg, Na and K
L2	aggressivity suite pH/EC only	pH / EC / resistivity / Cl/ SO4-)

Samples				Ion exch suite	aggressivity suite	pH/EC
	BH03	0.2 - 0.3	Fill: silty clay			X
		1.0-1.1	Silty clay with inc shale	X	X	
	BH4	1.5-1.8	silty sandy clay, light brown	X	X	
	BH06	1.5-1.6	silty clay: yellow grey	X	X	
	BH07	0.0-0.1	Fill: silty clay	X	X	
		0.5-0.6	silty clay brown with shale gravel	X	X	
	BH09	0.0-0.1	Fill: silty clay			X
		0.3-0.4	Silty clay: brown	X	X	
		1.0-1.1	Silty clay: light brown	X	X	
	BH10	0.2-0.3	Fill: silty clay	X	X	
		1.0-1.1	silty clay: red/grey	X	X	
		1.5-1.6	silty clay: grey brown	X	X	

Sahani Gunatunge
JBS&G
0410240607

Document Distribution

Rev No.	Copies	Recipient	Date
A	1 x electronic	Sam Gibson Cadence Australia Via email: sgibson@cadenceaust.com	05/02/2021

Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	Sahani Gunatunge Environmental Consultant	John De Martin Principal	John De Martin Principal	Draft for Client Review	05/02/2021