Greater Connect
ALLIANCE

Great Eastern Highway Bypass Interchanges WP4 – Acid Sulfate Soil and Dewatering Management Plan



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Abbreviations

Abbreviation	Details
AASS	Actual acid sulfate soils
Al	Aluminium
ALS	ALS environmental laboratory group
ANC	Acid neutralising capacity
ANZECC	Australian and New Zealand Environment. Conservation Council
ANZG	Australian and New Zealand Guidelines
As	Arsenic
ASS	Acid sulfate soils
ASSDMP	Acid Sulfate Soil and Dewatering Management Plan
BH	Bore hole
Cd	Cadmium
CoC	Chain of Custody
CBD	Central Business District
CSB	Contaminated Site Branch
Cu	Copper
DBYD	Dial before you dig
DER	DWER formerly Department of Environment Regulation (DER)
DoH	Department of Health
DO	Dissolved Oxygen
DPLH	Department of Planning, Lands and Heritage
DPP	Direct Push Probing Pty Ltd
DVG	Default guideline value
DWER	Department of Water and Environmental Regulation
DQO	Data quality objectives
EC	Electrical conductivity
Eh	Redox potential
ENV	Effective neutralising value
Fe	Iron
FW	Freshwater ecosystems trigger value
GCA	Greater Connect Alliance
GDE	Groundwater dependent ecosystems
GEH	Great Eastern Highway
GEHB	Great Eastern Highway Bypass
GEHBI	Great Eastern Highway Bypass Interchange
GME	Groundwater monitoring event
GW	Groundwater well
IFC	Issued for Construction
kL	Kilolitres
Mbgl	Meters below ground level
MDI	Maximum Depth of Investigation

Abbreviation	Details
MW	Monitoring well
NATA	National Association of Testing Authorities accredited laboratory
NPUG	Non-potable use groundwater
PASS	Potential acid sulfate soil
PEC	Priority ecological communities
pH Field	pH_F
pH Fox	pH_{FOX}
PFAS	Per – and poly – fluoroalkyl substances
PSI	Preliminary site investigation
PSP	Principle shared path
QA/QC	Quality analysis / quality control
RIWI	Rights in Water and Irrigation Act 1914
RL mAHD	relative level to meters Australian height datum
Scr	chromium reducible sulfur
SPUI	single point urban interchanges
STI	short term irrigation guidelines
TALK	total alkalinity
TEC	threatened ecological communities
TSS	total suspended solids
TTA	total titratable acidity
WP	work package
WEP	wastewater evaporation pond
Zn	Zinc

1. Executive Summary

1.1 Background

The Greater Connect Alliance (GCA) has prepared this acid sulfate soil and dewatering management plan (ASSDMP) for Work Package 4 (WP4) – Roe Highway, Hazelmere (the Site), which forms part of the Great Eastern Highway Bypass Interchanges (GEHBI) project. The site is located approximately 16 km north-east of the Perth central business district (CBD).

WP4 includes the upgrade of the current Roe Highway – Great Eastern Highway Bypass intersection, duplication of the Roe Highway Helena River Bridge (1899), installation of a principle shared path along the length of the alignment including a footbridge (BR9495) and underpass (UP9494), retaining walls, construction of 12 new drainage basins and new drainage network.

This ASSDMP presents the results of the WP4 ASS investigation, summarises the presence and extent of ASS and results of the WP4 groundwater monitoring event, as well as detailing the dewatering requirements and associated management strategies to be implemented.

1.2 Objectives

The objectives of the ASSDMP are to:

- Identify the presence of actual and potential ASS (AASS/PASS) within WP4 where disturbance via excavation and/or exposure due to the active lowering of the water table (dewatering) is anticipated to occur.
- Identify the dewatering requirements within WP4 where groundwater disturbance via excavation and/or dewatering is anticipated.
- Develop an ASSDMP in line with current best management practices and Department of Water and Environmental Regulation (DWER) acid sulfate soil and dewatering guidelines (DER 2015b).
- Develop a strategy to effectively manage the potential extent and severity of impacts of ASS disturbance via excavation and dewatering in relation to WP4 scope of work.
- Provide practicable ASS and dewatering management measures to be implemented during the construction of WP4, while reducing environmental impacts both on-site and within proximity to the site.
- Minimise off-site disposal of ASS impacted material, through treating and re-using on-site.
- Minimise groundwater extraction volumes.

1.3 Scope of Work

The following scope of works were undertaken as part of this ASSDMP:

- Desktop review of available site data prior to undertaking intrusive site works.
- ASS, Ground and Surface water investigation including:
    - Supervision of the mechanical drilling of 46 ASS soil bore holes across WP4, to a depth of between approximately 4.0 to 9.0 meters below ground level (mbgl).
    - Collection and submission of approximately 1,160 primary soil samples (plus 51 QC samples) to ALS Environmental Laboratory Group (ALS), a National Association of Testing Authorities (NATA) accredited laboratory for analysis of ASS pH field (pHF) and ASS pH peroxide test (pHFOX) screening.
    - Collection and submission of approximately 615 soil samples (plus 37 QC samples) to ALS for chromium reducible sulfur (Scr) suite analysis.
    - Installation of four groundwater monitoring wells (GW03, GW04, GW06 and GW15).
    - Groundwater and surface monitoring event of the four new groundwater monitoring wells plus one existing well (MW03) and two surface water sampling locations (SW07 and SW08).
- Review of current issue for construction 100% design plans to identify dewatering requirements and develop a hierarchy of dewatering effluent disposal options.
- Development of an ASSDMP including contingency measures in accordance with DWER (2015b) ASS management guidelines and industry best practice.

1.4 Summary of ASS Investigation

ASS was identified at eight key areas across WP4, with the majority of the ASS encountered north of the trumpet (Roe Highway – Great Eastern Highway intersection).

Field screening identified potential ASS in 24 of the 46 bore holes across the site, with coffee rock encountered in two (BH22 and BH112). Laboratory analysis (Scr) recorded net acidity levels ranging between 0.03 %S to 0.25 %S in 23 bore holes across the majority of WP4 except around the proposed trumpet. ASS was encountered a various depths from existing ground level to the maximum investigation depth i.e. up to 6.0 mbgl.

As piling has the potential to neutralise ASS depending on the methodology, the ASS investigation did not extend to the depth of piling. Consequently, pile spoil is proposed to be stockpiled and ASS verification sampling be undertaken prior to treatment occurring to limit the likelihood of over liming occurring.

1.5 Summary of Previous Investigations

1.5.1 Groundwater Investigation

To identify baseline groundwater quality conditions across WP4 and to inform treatment and management requirements during dewatering operations, a GME was conducted in October 2021.

The GME quality results generally indicate groundwater underlying WP4 is being affected by or has already been affected by the oxidation of sulfides associated with ASS with pH ranging between 4.76 and 5.91. This is supported by results from GW04, GW16 and MW03 recording high concentrations (>1,000 µg/L) of total Al and Fe and dissolved Fe, which are indicators of ASS (DER 2015a), as well as exceedances of DWER dewatering effluent treatment trigger values.

Total aluminium, cadmium, copper, iron, lead and zinc exceeded the ANZG (2018) 95% freshwater, non-potable use groundwater (NPUG), and/or DWER ASS / acidic water indicator trigger values in multiple groundwater monitoring wells.

Elevated total nitrogen was recorded in GW03 and MW03 above the ANZECC (2000) guidelines – lowland rivers and streams criteria.

No PFAS exceedances above the adopted 95% protection levels however sum of PFOS and PFHxS were recorded above the LOR in all wells except GW15.

Based on the GME results, treatment is required for total and dissolved metals and pH amendment prior to discharge to water bodies i.e. via the stormwater system.

Due to exceedances of the Short Term Irrigation (STI) and NPUG criteria, treatment of dewatering is anticipated to be required for total Al and Fe prior to infiltration onsite.

A pH adjustment unit will also be required to increase pH and alkalinity while decreasing total acidity.

1.5.2 Surface Water Investigation

Surface water sampling was undertaken by GCA as part of the Contaminated Site Investigation (GCA 2022b) for WP4 at SW07 and SW08. In addition, as part of the GCA's Infrastructure Sustainability Council of Australia and New Zealand (ISC) commitment, GCA undertakes monthly surface water quality sampling at SW07 and SW08 for heavy metals and nutrients. Sampling has been undertaken since August 2021.

The results of these investigations identified:

- Surface water of Helena River to be fresh with neutral to slightly alkaline conditions at both SW07 and SW08 (pH 6.07 – pH 7.84). Electrical conductivity levels fluctuated between fresh to brackish as flow rates decreased (November, December).
- Total copper, lead and zinc have consistently exceeded the 95% freshwater criteria at SW08, while downstream concentrations were below the adopted criteria.
- Total aluminium concentrations continuously exceeded the adopted criteria at SW07 and SW08 between August 2021 and December 2022.
- Elevated concentrations were recorded for calcium, potassium and magnesium at SW07 and SW08.
- PFAS sampling was undertaken as part of the October 2021 sampling event. PFOA and PFOS concentrations were below the adopted assessment criteria but above the LOR, ranging in concentration 0.0125 to 0.0644 µg/L.

Discharge of dewatering effluent to Helena River is not proposed. All Dewatering effluent is to be infiltrated on site.

1.6 ASS Management

Based on the GCA 100% design, ASS management is anticipated to be required during the construction and installation of:

- Basin 14. Proposed excavation depth 28.8 mAHD.
- Basin 18 and associated subsoil drainage. Proposed excavation depth of approximately RL 8.8 mAHD (Figure 21).
- RW-U10: All material excavated from RW-U10 is to be treated as ASS (Figure 21a).
- RW-U3: all material excavated from RW-U3 is to be treated as ASS (Figure 21a).
- Thirty-four new drainage pipelines, as shown on Figure 21a and Figure 21b, ranging in (maximum) depth from approximately 0.8 mbgl to 3.5 mbgl.
- ASS management is required for the following Bridge 1899 structures (Figure 21a):
    - Pile caps at pier 1 and 2, excavation to approximately RL 4.98mAHD and RL 5.69 mAHD respectively.
- Confirmation ASS sampling is anticipated to be required for the following piles which extend below the MDI, and which may be neutralised during piling.
    - Piles for pier 1 and 2
    - Piles for abutment 1 and 2
    - piles for gantry signs VSM001 and VSM002.

In addition, spoil from streetlights and similar shallow structures that are anticipated to be installed within the ASS areas (Figure 17a to Figure 17d) will require ASS sampling once stockpiled to determine if ASS treatment is required.

Approximately 4,129 m3 (6,139 m3 bulked by a factor of 1.5) of ASS is proposed to be excavated during the construction works in WP4, with an additional 1194.3 m3 (1,777.8 m3 bulked) of material requiring ASS verification sampling.

All ASS including Coffee Rock is proposed to be temporarily stockpiled and treated on site in accordance with DWER (2015) ASS management guidelines and Section 16 of this ASSDMP.

Liming rates for WP4 range between 3.74 kg $CaCO_3$ / m^3 and 8.20 kg $CaCO_3$ / m^3, which equates to a combined total of approximately 24,963.69 kg $CaCO_3$ / m^3 of lime.

1.7 Dewatering Management

Dewatering is anticipated to be required to draw down the water table to a maximum depth of 1.0 m below the base of each excavation. Dewatering drawdown depths are anticipated to range between 1.0 and 4.6 m across WP4, with majority of dewatering required in the north around Helena River.

Dewatering is anticipated to be required for the following structures and services:

- Bridge 1899 pier 1 and pier 2 pile caps.
    - Dewatering is anticipated to be required to a maximum depth of approximately 2.0 mbgl, to RL 4.98 mAHD.
- Basin 18 main subsoil drainage line (SS-20).
    - Dewatering is anticipated to be required to a maximum depth of approximately 1.5 mbgl, to RL 7.64 mAHD.
- Approximately 2,498 m of drainage pipeline across WP4.
    - Dewatering is anticipated to a maximum depth of between 0.2 m to 5.65 m across 104 lines, predominantly in the northern portion of WP4 (Figure 21a).
- Construction of two retaining walls (RW) – RW-U3 and RW-U10.
    - Dewatering is proposed to be completed in four sections up to 70 m in length, with the worst case being that the water table will need to be lowered between 0.2 m to 3.33 m, based on the seasonal groundwater high.

Dewatering is anticipated to be required for a combined total of approximately 34 weeks between March 2023 and March 2024. The longest consecutive period of dewatering is approximately 17 weeks between October 2023 and March 2024 when the two piers for Bridge 1899 and RW-U3 and RW-U10 are constructed.

Initial drawdown rates are anticipated to range between 1.14 L/sec at Basin 18 Subsoil to 5.59 L/sec at RW-U10.

Radius of influences are anticipated to range between approximately 15.50m to 48.12 m.

Total volume of dewatering effluent anticipated to be extracted is 111,252.28 kL. Based on the estimated dewatering volumes a 5C Licence to take water is required.

Dewatering is proposed to be undertaken primarily using dewatering spears or a combination of dewatering spears and sump pumps. The final dewatering method will be determined by the dewatering contractor and take into consideration conditions encountered on-site.

All dewatering effluent will be discharged onsite via purpose built infiltration basins and/or drainage basins (Figure 20).

Based on groundwater quality results all dewatering effluent across the site will need to be treated for total metals via either a lined settlement trench or baffled settling trap prior to infiltration on site. The size of the lined basin or settling trap will vary between locations based on proposed flow rates.

Due to low pH and buffering capacity of the dewatering effluent, all dewatering effluent will need to be treated prior to infiltration via a pH amendment unit.

2. Project Overview

Roe Highway and Great Eastern Highway Bypass (GEHB) are strategic road corridors in Perth's north-east, (Figure 1). They provide critical connections between Great Eastern Highway (GEH), Tonkin Highway and the Perth Metropolitan Road network and support access to many key economic zones including Perth Airport precinct, the Kewdale, Hazelmere and Canning Vale industrial areas and freight distribution centres.

The intersections of Roe Highway/GEHB and GEHB/ Abernethy Road experience high congestion and a high number of accidents, directly associated with the volume and diverse mix of traffic. In addition, heavy vehicle movements on the Bypass are currently constrained by the height of the existing overhead rail bridge located between Kalamunda Road and Abernethy Road. As a result, heavy vehicles seeking access between Abernethy Road and the northern part of the Perth Airport site must use Tonkin Highway. This creates a significant, inefficient diversion which inhibits ongoing development of the Perth Airport precinct.

In response to the above constraints, the Australian and State Governments have allocated funds for the:

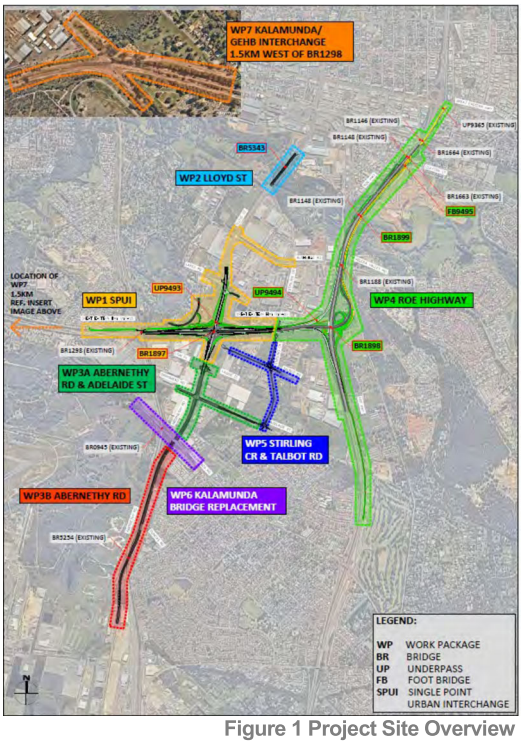


Figure 1 Project Site Overview

- planning, development and construction of two new grade-separated interchanges on Great Eastern Highway Bypass, at the intersections with Roe Highway and Abernethy Road (Great Eastern Highway Bypass Interchanges project); and
- replacement of the existing load limited Kalamunda Road Bridge over the freight rail line with a new four lane bridge with full load carrying capacity, and construction of a new grade separated interchange at the intersection of Great Eastern Highway Bypass and Kalamunda Road (Perth Airport Precinct Northern Access Project).

The Great Eastern Highway Bypass Interchanges project will reduce congestion and improve freight efficiency, connectivity and travel time. The Perth Airport Precinct Northern Access project will address wait times and future-proof the Great Eastern Highway Bypass and Kalamunda Road intersection for future growth; and the new full load carrying capacity rail bridge on Kalamunda Road over the freight rail line will provide heavy vehicles with an alternative route, improving access and efficiency for the freight industry.

Together, these two projects will remove one of the last remaining signalised intersections on Roe Highway and the last remaining signalised intersection on the Great Eastern Highway Bypass between Roe Highway and Great Eastern Highway. They will also remove constraints that currently prevent heavy vehicles travelling freely on Kalamunda Road between Great Eastern Highway Bypass and Abernethy Road.

2.1 Major Elements of the Project

- Major interchanges at:
  - -the Bypass and Roe Highway
  - -the Bypass and Abernethy Road
- An extension of Lloyd Street to the Bypass, including a new bridge over the Helena River
- Upgrades to the Bypass, including removal of the existing intersection at Stirling Crescent
- Upgrades to parts of Abernethy Road including a new heavy vehicle standard (RAV 7) connection at Adelaide Street
- Upgrade of Roe Highway between Talbot Road and Clayton Street, including a bridge duplication over Helena River.
- Completion of the 30km Principal Shared Path network on Roe Highway between Great Eastern Highway and Kwinana Freeway
- Replacement of the Kalamunda Road bridge over the freight rail line

- Planning and development for a new grade separated interchange of Great Eastern Highway Bypass and Kalamunda Rd.

In its delivery, the Project provides opportunity for innovative design and construction approaches to bring superior value for money and minimised risk to Main Roads, and to provide upskilling and employment opportunities for lower-tier contractors and Aboriginal people.

2.2 Scope of Project

Greater Connect Alliance will be responsible for completing all the outstanding project development activities, then commence design and construction. The main project development deliverables the Participants must undertake during the project development phase are as below:

- Complete detailed site surveys
- Complete geotechnical and hydrogeological investigations
- Undertake a pavement condition assessment
- Identify the location of potentially contaminated sites
- Prepare a materials sourcing strategy
- Prepare 3D design models to assess design options
- Update land dealing plans
- Identification of complex or costly accommodation works
- Undertake noise assessment and develop a mitigation strategy
- Recommend the extent and type of street lighting
- Prepare conceptual layout of guide signs
- Develop safety barrier strategy
- Identification of major service relocations
- Determination of the extent of visual screening
- Undertake traffic analysis
- Obtain Network Operations sign-off of traffic analysis
- Develop RAV and OSOM network requirements
- Review detailed design criteria
- Establish operational requirements of the intelligent transport systems
- Undertake design optioneering
- Develop an Urban and Landscape Design Strategy
- Develop a sustainability management plan
- Community and stakeholder engagement
- Prepare community and stakeholder engagement plan
- Obtain planning approvals
- Obtain environmental, Aboriginal heritage and other approvals
- Review and refine the Ultimate Concept Design
- Assess design options for the Project Case
- Prepare 15% Concept Design for the preferred Project Case.

The design and construction phases incorporate the detailed design of the scope of the project from 15% through to Issued for Construction (IFC) and delivery of the physical work. This includes:

- Highway incorporating grade separated interchanges and upgrades
- Other roads and bridge over Helena River connecting local government road network to Highway
- PSP and Paths
- Urban and Landscape Design and Public Art
- Design Verification
- Design Process
- Traffic Engineering & Management
- Testing, monitoring, independent quality certifier and Measure of Pavement condition performance
- Community and Stakeholder Engagement
- Road Maintenance
- Handover
- Defect correction

Due to the size and scale of the proposed development, the site has been divided into seven Work Packages (WP):

- WP1 – GEHB
- WP2 – Lloyd Street Bridge
- WP3A – Abernethy Road and Adelaide Street
- WP3B – Abernethy Road
- WP4 – Roe Highway
- WP5 – Stirling Crescent Upgrade
- WP6 – Kalamunda Road bridge over Rail widening
- WP7 – Kalamunda Road / GEHB interchange (planning study).

3. Objectives

The objectives of the ASSDMP are to:

- Identify the presence of actual and potential ASS (AASS/PASS) within WP4 where disturbance via excavation and/or exposure due to the active lowering of the water table (dewatering) is anticipated to occur.
- Identify the dewatering requirements within WP4 where groundwater disturbance via excavation and/or dewatering is anticipated.
- Develop an ASSDMP in line with current best management practices and Department of Water and Environmental Regulation (DWER) acid sulfate soil and dewatering guidelines (DER 2015b).
- Develop a strategy to effectively manage the potential extent and severity of impacts of ASS disturbance via excavation and dewatering in relation to WP4 scope of work.
- Provide practicable ASS and dewatering management measures to be implemented during the construction of WP4, while reducing environmental impacts both on-site and within proximity to the site.
- Minimise off-site disposal of ASS impacted material, through treating and re-using on-site.
- Minimise groundwater extraction volumes.

4. Scope of Work

The following ASS and groundwater investigation scope of works was undertaken between August and October 2021, in accordance with GEHBI Sampling Plan – Acid Sulfate Soil and Contamination Investigation (GCA 2021). The ASS and groundwater investigation was undertaken to inform the development of this ASSDMP. The ASS and groundwater investigation scope of work included:

- Desktop review of available site data prior to undertaking intrusive site works including:
  - Review of historical reports including the Preliminary Site Investigation (PSI) report (Jacobs 2020).
  - Review available geological data to identify local and regional geology.
  - Review dial before you dig (DBYD) plans prior to attending site.
  - Review of publicly available information and databases to identify potential sensitive receptors within a 1 km radius of the site boundary. The search included but was not limited to the following DWER online databases: contaminated site database, water information reporting, ASS risk maps and Perth groundwater atlas.
- Review of current available100% design plans (– Construction DrawingsAppendix H) to identify dewatering requirements and develop a hierarchy of dewatering effluent disposal options.
- Location of underground services through an accredited subcontractor on drilling locations.
- Supervision of the mechanical drilling of 46 ASS soil bore holes across WP4 by a Geoprobe Model 6620DT drilling rig utilising direct push probe drilling methods, to a depth of between approximately 4.0 to 9.0 meters below ground level (mbgl).
- Collection and submission of approximately 1,160 primary soil samples (plus 51 QC samples) to ALS Environmental Laboratory Group (ALS), a National Association of Testing Authorities (NATA) accredited laboratory for analysis of ASS pH field (pH_F) and ASS pH peroxide test (pH_{FOX}) screening.
- Collection and submission of approximately 615 soil samples (plus 37 QC samples) to ALS for chromium reducible sulfur (Scr) suite analysis.
- Installation of four groundwater monitoring wells (GW03, GW04, GW06 and GW15) to a maximum depth of between 5.0 mbgl and 10.0 mbgl.
- Development of groundwater monitoring wells (GW03, GW04, GW06 and GW15) until field parameters stabilised in accordance with the sampling plan (GCA 2021). Field parameters included: pH, redox potential (E_h), dissolved oxygen (DO), electrical conductivity (EC), temperature and standing water level.
- Undertake a groundwater monitoring event (GME) sampling of the four new wells and one existing well (MW03) and take two surface water samples (SW07 and SW08) for field and laboratory analysis.

The ASSDMP scope of work includes the development of a plan detailing the ASS and dewatering effluent management measures to be implemented in general accordance with DWER guidelines, including post dewatering reporting requirements.

5. Site Identification

The WP4 site description details are presented below in Table 5.1.

WP4 site location is shown in Figure 2 and a site layout plan is provided in Figure 3.

Table 5.1 - Identification and Description Details

Description	Details
Site name/address	WP4 – Roe Highway Hazelmere, 6055, Perth, Western Australia, Australia
Local government	City of Swan Shire of Mundaring
Land-use zoning	Regional reserve, commercial/industrial, residential, and rural residential
WP4 area	753,663 m^2
Historical site use (Jacobs 2020)	Details of the site history are presented in the PSI (Jacobs 2020). • 1953: The southern and central portion of WP4 is predominantly covered in sparse natural vegetation. The GEHB is not visible. Sections of Roe Highway have been constructed. WP4 and surrounding land in the northern portion is predominantly occupied by commercial/industrial units with evidence of Midland Rail Yard in the north-west. Areas of residential housing are also evident in the north. • 1965: Further development of the Midland Rail Yard is evident to the north-west. The northern portion of the Study Area remains predominantly unchanged with areas of commercial/industrial, residential, and cleared land for agriculture. The southern portion of the Study Area consists of cleared land for agricultural purposes and sparse vegetation. • 1974: The northern portion of the Study Area appears to be predominantly unchanged with land use occupied by commercial/ industrial and residential properties. Further development of the Midland Rail Yard has taken place. The southern portion of the Study Area predominantly consists of cleared land for agricultural purposes and sparse vegetation. There appears to be dwellings and storage sheds developed over the southern portion of the Study Area. There appears to be a large residential area to the south-west, now the suburb of High Wycombe. • 1983: Construction of Roe Highway is evident in both northern and southern portions of the Study Area. High Wycombe suburb expansion is evident to the south-west. Maida Vale suburb to the south-east of the Study Area is present, with Hill View public golf course is present in the south-east. • 1995: The development of Roe Highway is complete, with further evidence of the continued development of the surrounding suburbs. • 2004: Further expansion of residential suburbs in the south portion of the Study Area is evident • 2008: Further residential development is evident in the northern and southern portions of the Study Area. Commercial/industrial development is evident at the intersection of Roe highway and the GEHB. • 2014: Extensions to Roe Highway with the on and off ramps connecting Roe Highway and Great Eastern Highway evident. • 2014: A portion of land to the east of the Study Area has been cleared. Further infrastructure development to commercial/industrial sites located to the south-west of the Study Area has taken place, specifically the three warehouses located off Talbot Road. The Helena River portion of the site has remained largely unchanged.
Aboriginal Heritage	There are 16 Aboriginal heritage sites listed within 500 m of the site boundary (Figure 4). Five of those are registered as 'lodged' (DPLH 2022). There are four registered sites located within the site boundary, which include: • Great Eastern Highway / Stirling Crescent Scatter (16110). • Helena River (3758). • Holding Paddock 1-4 (3966). • Helena River A-C (3967).

Description	Details
	The remaining registered and lodged sites are outside WP4 boundary (Figure 4).
Non-Indigenous Heritage	There are no non-Indigenous heritage sites listed within the site boundary. However there are 11 non-indigenous heritage site listed within 500 m of the boundary, as shown in Figure 5 (HCWA 2022): • Darling Range Tavern (1686). • Church of the Good Shepherd (2458). • Bellevue Primary School (3512). • Belle View Farm (3836). • Terrace Houses (9711). • House (9712). • Bellevue RSL War Memorial, RSL Club (14153). • Melita House (14549). • Bellevue Mechanics' Institute (14560). • House (23616). • House (24430).
Proposed site use	• Road reserve.
Site layout	Figure 3 shows the proposed development layout.

6. Site Conditions

A summary of the site physical setting and condition are detailed below in Table 6.1.

Table 6.1 - WP4 Physical Setting and Condition

Item	Details
Topography	The site slopes down in a north-easterly direction from Relative Level (RL) 39.0 meters Australian Height Datum (mAHD) to RL 18.0 mAHD, with a depression at Helena River (10 mAHD).
ASS risk	Jacobs (2020) identifies the northern portion of the site as having extremely low probability of ASS, with the central portion considered to have an extremely low to low probability of ASS occurring, and the southern portion to be considered as having a low probability of ASS. DWER online ASS Risk Map (DWER 2022a) shows areas of the southern portion is considered to have a moderate to low risk of ASS occurring within 3.0 metres of the natural ground surface' (Figure 6).
Contaminated sites	An overview of the DWER contaminated sites within the area of WP4 is shown in Figure 7. A search on DWER (2022b) contaminated sites database identified 17 contaminated sites within 500 m of the site. All 17 sites were recorded as remediated for restricted use (Figure 7). Section 3.5 and 4.2 of the Contamination Investigation Report (GCA 2022) explains in detail the contaminants of potential concern these sites may pose. Based on a review of DWER's online contaminated site database (DWER, 2022b) and existing knowledge of WP4, the following sites have been identified as a potential sources of contamination during the development of WP4: • An inert landfill is located hydraulically upgradient (south-east) of the Roe Highway/GEHB interchange. Immediately adjacent to the proposed WP4 development area. • Immediately north-west of the Roe Highway bridge (DWER no. 12228 and 12203), comprises of approximately 12 contaminated lots, ranging from 'contaminated – remediated for restricted use' to 'contaminated – restricted use', and 'contamination – remediation required' (Figure 7). Although a contaminated site (DWER No.23510) exists within the WP4 site boundary, immediately north of the Midland Toodyay Railway overpass, aerial photographs indicate the existing road is comprised of a large volume of fill. In addition, the reference drawings indicate the principal shared path (PSP) will be constructed on the existing fill. As such, the underlying contaminated site is not anticipated to be disturbed. No sampling has been proposed for this area. A historical landfill is located to the south-west of Roe Highway. The Site is listed as 'contaminated – remediation required' due to the presence of asbestos, metals and polychlorinated biphenyls in the fill and soil beneath the Site. The groundwater underlying the Site is also impacted with heavy metals, nutrients, sulphides. The groundwater was found to have a low pH value. However, as detailed design plans do not include excavation or large structures that may require dewatering, the overall risk posed by this contaminated site is deemed to be low. In the event the proposed development design changes, the need for further investigation should be reassessed.
Groundwater bores	There is one known groundwater abstraction license within the site boundary (168139), however the licence is for abstraction from the deeper Leederville aquifer. There are 32 groundwater abstraction licenses within a 1.0 km radius of the site as shown in Figure 8 and listed in Appendix A. There are no known groundwater extraction bores within the site boundary. There are several groundwater extraction bores within a 1.0 km radius of the site as shown in Figure 9 and listed in Appendix A.
Preferential pathways	Groundwater is predicted to flow in a north-west direction towards water bodies on Hazelmere Crescent and Helena River (Figure 10).

7. Geology and Hydrogeology

A summary of the site's regional geology is presented in Figure 11 and summarised below in Table 7.1. Soils encountered during the ASS investigation are summarised in Section 11.3.1, Table 11.3.

Table 7.1 - Summary of Regional and Local Geology

Item	Description
Regional geology	The northern portion of WP4 is dominated by soils classified as Kurosol, which are described as sandy acidic yellow mottled, some of which contain ironstone gravel. Chromosol soils are also present in the northern portion and are broadly described as hard acidic yellow soils containing ironstone gravels, brown sands containing ironstone gravels at depth (Jacobs 2020). The soils underlying the central portion of WP4 are classified as Kandosol as described above. The soils underlying the southern portion of WP4 are classified as Podosol and are broadly described as sandy dunes with intervening sandy clayey swamp flats. (Jacobs 2020) Site geological details are shown in Figure 11.
Local geology/soil stratigraphy	The PSI describes the geology of the site as (Jacobs 2020): • SAND, White to pale grey at surface, yellow at depth. Fine to medium grained, moderately sorted, subangular to sub-rounded, minor heavy minerals, of aeolian origin (Bassendean Sand); over. • Sandy clay to clayey sand of the Guildford Formation, of aeolian origin.

A summary of the site's hydrogeological details is presented in Table 7.2.

Table 7.2 - Summary of Regional and Local Geology

Item	Description
Aquifer	Jandakot Mound Superficial Aquifer, underlain by the Leederville aquifer.
Top of Aquifer	Between RL 7.00 to 16.00 mAHD.
Base of Aquifer	Between RL 0.00 to -15.00 mAHD.
Depth of Aquifer	Between 6.00 meters (m) to 22.00 m.
Depth to groundwater	Depth to groundwater on the DWER (2022b) Perth Groundwater Atlas is reported as between 1.00 to 22.00 mbgl. Groundwater monitoring was undertaken as part of the GCA (2022) groundwater investigation, across the five GWs within WP4 on 28 October 2021 (Figure 14), encountered standing water levels at: • GW03 – 1.18 mbgl - 7.60 mAHD. • GW04 – 2.01 mbgl - 6.89 mAHD. • GW06 – 4.95 mbgl - 18.54 mAHD. • GW15 – 7.13 mbgl - 23.48 mAHD. • MW03 – 3.69 mbgl - 16.65 mAHD.
Groundwater quality/salinity	250-500 mg/L, Suitable for garden bore use.
Regional groundwater flow direction	North-west towards Helena River (Figure 10).
Drinking water	The site is not located within 1.0 km of a Public Drinking Water Source Area (Jacobs 2020).
Iron staining risk	Low.
Surface/groundwater interaction	The following hydrological features are located within or in the vicinity of area: • Helena River runs through WP4 from east to west. • Small surface water bodies (tributaries to the Helena River) are present to both the western and eastern site boundaries near the proposed bridge duplication over Helena River, ranging in distance from approximately 50 m to 100 m.

Item	Description
	• Small surface water bodies and creeks are evident to the east of the northern portion of WP4 and appear to connect to the Helena River system via overland flow. • Two unnamed surface water bodies are located approximately 1.2 km and 1.4 km to the north. • Four dams/ponds are located approximately 350 m to the west of the western most portion of WP4. This property is identified as Talloman (meat processor).
Beneficial uses of groundwater	The site is located in a light to moderate industrial/commercial area, which is known to contain activities commonly associated with contamination i.e. sandblasting/spray painting, heavy diesel machinery rebuilding facility and a rendering facility (Talloman). In addition, a landfill is located hydraulically upgradient of the two fill areas. Based on the industrial/commercial land uses surrounding WP4, potential beneficial uses are most likely restricted to the use of groundwater from the superficial aquifer for non-potable purposes.

8. Sensitive Receptors

Sensitive receptors within a 1.0 km radius of the site that may be impacted during ASS disturbance activities are summarised in Table 8.1.

Table 8.1 - Sensitive Receptors

Sensitive Receptor	Potential Risk
Groundwater aquifer	Oxidation of ASS can occur through the exposure of impacted soils to the atmosphere via excavation or dewatering (active or passive drawdown of groundwater). Oxidation can result in an increase in acidity, and the mobilisation of contaminants such as heavy metals and/or nutrients into the groundwater. This in turn may impact off-site local surface water bodies and, in the northern portion of the site, Helena River, due to the surface water – groundwater interactions.
Off-site surface water bodies	The Helena River runs directly through the northern portion of WP4. During construction, it is likely soil disturbance, land clearing and dewatering activities will occur, which have the potential to impact the Helena River (northern portion of WP4 only) and surrounding water bodies.
Groundwater users	Acidic or ASS impacted groundwater may impact off-site groundwater users through reduced groundwater quality.
Threatened ecological communities (TEC) and priority ecological communities (PEC)	TEC and PEC, in the form of a Banksia woodlands comprised of *Banksia attenuata* and *Banksia menziesii* exist within WP4, immediately south-east of the Stirling Crescent GEHB intersection (Figure 12). The Banksia woodlands are deep-rooted and based on the seasonal variability in groundwater levels of between 1.0 – 3.0 m. A groundwater fluctuation of less than 3.0 m variability should not cause significant impact on Banksia TEC health. Additionally, large-scale drawdown activities occurring in the winter period are likely to be buffered by seasonal rainfall re-charge events. Lowering of the groundwater table greater than 3.0 m and for extended periods of time may impact the TEC. Deterioration of groundwater or surface water quality due to ASS impacts may poses a risk to TEC/PECs.
Groundwater dependent ecosystems (GDE)	Six GDE were identified within a 1.0 km radius of WP4 (Jacobs, 2020), two of which intersect WP4: • One is associated with DBCA Helena River floodplain area surrounding the Roe Highway bridge (1899) duplication and Basin 18. • One is the seasonally waterlogged areas immediately hydraulically upgradient of bridge 1899 and south-west of the Roe – GHEB intersection. Lowering of the groundwater table below seasonal groundwater variability levels for extended periods of time and/or deterioration of water quality associated with ASS may pose a risk to these GDE (Figure 13).

9. WP4 Development Details

WP4 development will include the following modifications to the existing road alignment (Figure 3):

- Upgrade of the Roe Highway - GEHB intersection to include:
  - Reconfiguration of the existing intersection to include a bridge over Roe Highway (No. 1898), loop road, semi-direct ramps and direct ramps.
  - PSP underpass (No. 9494).
- Construction of a new Bridge (No. 1899) over Helena River (Roe Highway) to include up to three lanes each way.
- Construction of PSP overpass (No. 9495), at the northern end of the WP4 alignment.
- Widening of the existing Bushmead – Helena Valley Road overpass (No. 1188).
- Installation of a PSP along the length of the alignment, including a footbridge (No. 9495) on the southern side of Clayton Street.
- Construction of 12 new drainage basins (Basin 4,10 to 18, 20 and 21) (Figure 20).
- Construction of new drainage baselines along the alignment to capture and manage stormwater runoff.
- Construction of retaining walls around the trumpet and to the north and south of Helena River Bridge duplication (Bridge 1899).
- Installation of two new gantry signs (VMS001 and VMS002).

ASS management and dewatering is anticipated to be required for the construction of several drainage lines, the duplication the bridge (1899), construction of drainage basin 18 and two retaining walls south of bridge 1899.

ASS depth, anticipated ASS excavation and dewatering volumes and associated management procedures are presented in Sections 13 through to Section 19 of this ASSDMP.

Key structural drawings are presented in Appendix H.

10. Groundwater Investigation

10.1 Methodology

The rationale and groundwater monitoring wells installation methodology for WP4 is detailed in the GEHBI Sampling Plan (GCA 2021). A high-level summary is presented in Table 10.1. Groundwater (GW) monitoring well locations are presented in Figure 14.

The Sampling Plan included the installation of five GW wells (GW03, GW04, GW05, GW06 and GW15) within the original (2020) footprint of WP4.

A total of four GW wells (GW03, GW04, GW06 and GW15) were installed across WP4 as part of the ASS and contamination investigation undertaken between September and October 2021. GW05 was not installed as the historical monitoring well (MW03) was located and deemed to be appropriate for the investigation.

Table 10.1 - GW Installation Methodology Summary

Task	Detail
GW well details	• GW03 installed to 6.0 mbgl. • GW04 installed to 5.0 mbgl. • GW06 installed to 7.5 mbgl. • GW15 installed to 10.0 mbgl.
Services location	Dial before you dig services location plans were reviewed prior to undertaking the intrusive works. Proposed sampling locations cleared of underground services by a certified service clearer prior to breaking ground. Sample locations were hand cleared by Direct Push Probing (DPP) using a hand auger to 1.5 mbgl or refusal.
Method	GW wells were installed in accordance with the sampling plan (CGA 2021). Where shallow groundwater was encountered a minimum 0.5 m plug was installed. GW wells were purged until field parameters (pH, EC, DO, temperature, and Redox) stabilised for at least three consecutive readings. Groundwater well construction logs and development logs are included in Appendix B.

10.2 Groundwater Assessment Criteria

To identify baseline groundwater quality conditions across WP4 and to inform treatment and management requirements during dewatering operations, a GME was conducted in October 2021.

Groundwater quality results (field and laboratory) have been compared against the assessment criteria presented below in Table 10.2. Groundwater laboratory results presented in Table C-1 and field results presented in Table C-2, Appendix C).

Exceedances of the adopted criteria may not result in adverse environmental impacts; however, it does indicate that consideration may need to be given to additional treatment, management, or investigation prior to dewatering.

Table 10.2 - Groundwater Investigation Assessment Criteria

Criteria	Application
ANZG (2018) Freshwater 95% toxicant default guideline values (FW)	95% FW guidelines have been applied to provide an indication of the general quality across WP4. Where the ANZG (2018) guidelines do not specify criteria, criteria have been retained from the Australian and New Zealand Environment and Conservation Council (ANZECC 2000) guidelines. The 95% FW guidelines also provide an indication of dewatering effluent treatment requirements.
DER (2015b) ASS disturbance indicators, acidic water, discharge to water bodies and Contaminated Site Branch (CSB) notification	Used to identify if groundwater has been or likely to be impacted by ASS disturbance and to assess the buffering capacity of the groundwater. DER (2015b) ASS disturbance and acidic water indicators also provide dewatering effluent treatment trigger levels, buffering capacity indicators, definitions of acidic water.

Criteria	Application
	DER (2015b) discharge to water bodies criteria informs disposal options and treatment requirements. CSB notification trigger values are the trigger values which if breached the CSB must be notified as soon as practicable.
Department of Health (DoH) (2014) and DWER (2021) non-potable use groundwater (NPUG)	As presented in DWER (2021) assessment and management of contaminated site guidelines and DoH (2014) guidelines. Used to assess the suitability of groundwater quality in terms of aesthetic quality as a domestic non-potable water source and inform treatment requirements. The criteria are also used to identify potential risk to public health and workers on-site who may come into contact with the dewatering effluent.
NEMP (2020) PFAS Freshwater 95% species protection	The 99% PFAS species protection limit has not been applied to WP4 as no discharge is proposed to Helena River. Furthermore, the dewatering effluent is proposed to be infiltrated onsite. As such the 95% species protection threshold is deemed appropriate. The 95% species protection threshold is applied to assess potential dewatering effluent pre-treatment requirements, current groundwater conditions at the site. Recreational water quality default values are applied to provide an indication of treatment requirements, current groundwater quality conditions and assess the potential risk to human health as presented in NHMRC (2008) and NEMP (2020).
Short Term Irrigation guidelines (STI)	As presented in DWER (2021) Assessment and Management of Contaminated Site Guidelines. STI guidelines have been applied to inform potential treatment requirement for the reuse of dewatering effluent on-site and off-site i.e., dust suppression and infiltration. STI is also used to understand current groundwater conditions on-site and potential accumulation of contaminants in the soil from dewatering effluent.

10.3 Groundwater Results

10.3.1 Groundwater Levels

Groundwater levels varied across the site, ranging between RL 6.89 mAHD at GW04 to RL 23.48 mAHD at GW15. Table 10.3 provides a summary of the groundwater levels taken during the October 2021 GME. Note these levels are indicative of seasonal groundwater high which occur generally between September to October.

Table 10.3 - GME Groundwater Levels

Site Location	Ground Surface Elevation (RL mAHD)	Top of Casing (TOC) (RL mAHD)	Depth to Water (mTOC)	Standing Water Level (mAHD)	Depth to Water (mbgl)
GW03	8.78	9.50	1.90	7.60	1.18
GW04	8.90	9.63	2.74	6.89	2.01
GW06	23.49	24.00	5.46	18.54	4.95
GW15	30.61	31.33	7.85	23.48	7.13
MW03	20.34	20.40	3.75	16.65	3.69

10.4 Field Results

Groundwater field results are presented in Table C-2 (Appendix C).

Field results indicate:

- pH levels in the four wells did not meet the adopted 95% FW assessment criteria range of pH 6.5 to 8.5, with the pH ranging between pH 4.76 (GW15) to 5.91 (GW03).
- pH levels in GW15 did not meet the DER ASS / acidic water indicator (< pH 5.0).
- Electrical conductivity (EC) results indicate that the groundwater is fresh ranging between 155 µS/cm (GW15) and 1,435 µS/cm (GW04).
- Field acidity and alkalinity were not taken during the GME; however, laboratory results are summarised below in Section 10.5.

10.5 Laboratory Results

The following sections summarise the laboratory analysis results from the GME and interpretation of the results from a dewatering management perspective. For an interpretation of the results from a contamination perspective refer to the GEHBI WP4 Contamination Investigation Report (GCA 2022).

Tabulated laboratory results are compared against the adopted assessment criteria in Table C-1 (Appendix C). Groundwater laboratory certificates are included in Appendix D.

10.5.1 Physical Parameters

Laboratory pH levels were higher than the field readings, which is due to the delayed sampling time. For this reason it is industry best practice to apply the field pH readings. Laboratory pH results for GW03 and MW03 met the 95% FW criteria (pH 6.5 – 8.5). GW06 (pH 5.93) and GW15 (pH 5.54) recorded below the STI criteria and DER effluent treatment trigger value (< pH 6).

EC results across the site were within the applied STI criteria (6400 uS/cm).

Laboratory results indicate total alkalinity (TALK) at GW06, GW15 and MW03 were failed to meet the DER CSB immediate notification trigger (< 30 mg/L) for dewatering effluent discharge. Total titratable acidity (TTA) across the five wells were within the DER trigger value (40 mg/L). Acidity: Alkalinity ratios exceeded the DER ASS/acidic water indicator ratio (> 1) at GW06 and GW15.

Alkalinity: Sulfate ratios were within the adopted criteria of < 5.0 across the five wells.

Chloride levels in GW04 (439 mg/L) exceeded the NPUG trigger value of 250 mg/L.

10.5.2 Dissolved Metals

Dissolved iron (Fe) at GW04, GW06 and GW15 exceeded the NPUG criteria (300 µg/L) and the DER discharge to water bodies assessment criteria (1,000 µg/L).

10.5.3 Total Metals

The following exceedances were recorded for total metals:

- Aluminium (Al): 95% FW criteria (55 µg/L), NPUG (200 µg/L), DBCA (150 µg/L) and DER (150 µg/L) assessment criteria for discharge to water bodies was exceeded across the five wells.
- Cadmium (Cd): GW15 exceeded the 95% FW criteria (0.2 µg/L) at 0.24 µg/L.
- Copper (Cu): GW04, GW06 and GW15 exceeded the 95% FW criteria (1.4 µg/L) with GW06 measuring the highest Cu concentration of 52.3 µg/L.
- Fe: GW03, GW04, GW06 and GW15 exceeded the NPUG criteria (300 µg/L), DER ASS disturbance indicator criteria (1,000 µg/L) and DBCA criteria (1,000 µg/L). Fe concentrations at GW06 (18,500 µg/L) also exceeded the STI criteria (10,000 µg/L).
- Lead (Pb): GW04 and GW06 exceeded the 95% FW criteria (3.4 µg/L) with GW06 recording 14.4 µg/L.
- Zn: GW04, GW06 exceeded the 95% FW criteria (8 µg/L) with GW04 recording a concentration of 31 µg/L.

10.5.4 Nutrients and Inorganics

The following exceedances were recorded:

- Phosphorous: GW06 (0.26 mg/L) exceeded the DBCA guidelines criteria of 0.065 mg/L.
- Chloride: GW04 (439 mg/L) exceeded the NPUG criteria of 250 mg/L.

- Total nitrogen: GW15 (3.7 mg/L) and MW03 (4.4 mg/L) exceeded the DBCA criteria (1.2 mg/L) listed in table 3.3.6 of the ANZECC (2000) guidelines – lowland rivers and streams criteria.
- Ammonia as N: GW04 and MW03 exceeded the DBCA criteria (0.08 mg/L) with MW03 also exceeding the 95% FW criteria and NPUG criteria.

10.5.5 Per – and poly – Fluoroalkyl Substances (PFAS)

There were no PFAS exceedances above the adopted 95% protection levels however sum of PFOS and PFHxS were recorded above the LOR in all wells except GW15.

10.6 Discussion

The GME quality results generally indicate groundwater underlying WP4 is being affected by or has already been affected by the oxidation of sulfides associated with ASS. This is supported by results from GW04, GW16 and MW03 recording high concentrations (>1,000 µg/L) of total Al and Fe and dissolved Fe, which are an indicator of ASS (DER 2015a), as well as exceedances of DWER dewatering effluent treatment trigger values.

Low alkalinity (10-30 mg/L) at MW03 indicates that the groundwater beneath is inadequate to maintain stable, acceptable pH levels. GW06 and GW15 has very low alkalinity (<10 mg/L) which is considered an unacceptable pH level under all circumstances according to DWER (2015b).

Total chromium (Cr) VI at GW04 and GW06 have a LOR value of 10 µg/L and 5 µg/L respectively, which is above the STI and 95% FW guideline value of 1 µg/L. Therefore Cr VI has been recorded as an exceedance across the five wells due to the elevated LOR. Total silver has also been recorded as an exceedance across the five wells, where the 95% FW criteria trigger value of 0.05 µg/L is below the LOR of 0.1 µg/L.

Elevated total metal concentrations are most likely due to elevated sediment levels, as dissolved concentrations were generally below the adopted criteria except for dissolved iron.

Based on the GME results, treatment is required for total and dissolved metals and pH amendment prior to discharge to water bodies i.e. via the stormwater system.

Due to exceedances of the STI and NPUG criteria, treatment of dewatering is anticipated to be required for total Al and Fe prior to infiltration onsite.

A pH adjustment unit will also be required to increase pH and alkalinity while decreasing total acidity.

11. ASS Investigations

11.1 Methodology

The sampling methodology, density and location rationale for WP4 is detailed in the GEHBI Sampling Plan (CGA 2021). Table 11.1 summarise the ASS investigation.

WP4 ASS sampling locations are presented in Figure 15.

Table 11.1 - ASS Investigation Summary

Task	Detail
Investigation Dates	Between 9 August and 19 October 2021.
Number of locations	A total of 46 ASS soil bores were extracted and sampled. Four bore holes BH104 (GW03), BH105 (GW04), BH138 (GW06) and BH112 (GW15) were converted to groundwater monitoring wells.
Soil bore drilling	Forty six soil bore holes (BH) were drilled across the site to a maximum depth of between approximately 2.0 mbgl and 9.0 mbgl for the ASS investigation and up to 7.5 mbgl for groundwater wells. Drilling was completed using a direct push drilling technique by Direct Push Probing Pty Ltd (DPP).
Soil logging	Soil profiles were logged for each location and are included in 0. Groundwater construction logs are included in Appendix B. Depth to water was measured at each location and recorded on the bore log.
Soil sampling	In accordance with the Sampling Plan (GCA 2021), ASS samples were collected directly into new laboratory (ALS) supplied ASS bags and air was removed from the bags as far as practicable. ASS field screening samples, pH^F and pH^{Fox} were collected at 0.25 m intervals along the BH including surface and base. ASS samples were collected and submitted for Scr analysis at 0.5 m intervals including surface and base of each BH. Intra – laboratory samples (duplicates) were collected at a rate of 1:20 in accordance with DER (2015a) guidelines.
Chain of Custody (CoC) and sample transportation.	CoCs were completed using ALS compass, a digital platform used to track samples. Each sample bag or container has a unique bar code which is scanned and a digital CoC is generated. A simplified paper CoC accompanied the samples to the laboratory. WP4 CoCs are included in Appendix F. Samples were placed in an esky on ice and couriered to ALS on the day of sampling.

11.2 ASS Assessment Criteria

The ASS action criteria for >1,000 tonnes have been applied in accordance with DER (2015b) ASS guidelines, as greater than 1,000 tonnes of material is anticipated to be disturbed during WP4 (Table 11.2).

In the event Bassendean sands are encountered in WP4, where a sample has a net acidity value of <0.03 %S and a pH_{Fox} value of less than pH 3.0, the soil will be treated as ASS, in accordance with DER (2015a) ASS guidelines.

Table 11.2 - >1000 Tonnes Disturbance ASS Action Criteria (DER, 2015a)

Type of Material		Action Criteria (>1000 tonnes of material disturbed)	
Texture Range	Approximate Clay Content (%)	Equivalent Sulfur (%S), excluding Acid Neutralising Capacity (ANC) (oven-dry basis)	Equivalent Acidity (H+mol/tonne), excluding ANC (oven-dry basis)
Coarse – sands to loamy sands	<5%	0.03	18

Type of Material		Action Criteria (>1000 tonnes of material disturbed)	
Medium – sandy loams to light clays	5 – 40%	0.03	18
Fine – medium to heavy clays and silty clays	>40%	0.03	18

11.3 ASS Results

11.3.1 Geology

The soil profiles encountered during the intrusive works were logged by an experienced Environmental Scientist. Due to the size of the alignment the soil profile varied notably with depth and across the site. The main soil types encountered are summarised below in Table 11.3. For location specific soil logs refer to the specific BH log included in Appendix E.

Table 11.3 - Generalised Soil Profile

Depth (mbgl)	Material Type	Material Description
0.0 0.25	Fill - SAND	Dark brown, fine to coarse sand, organic matter
Varying depths up to 6 mbgl	NATURAL – SAND	Dark brown and dark grey, fine to coarse grained, with organic material
	NATURAL – Clayey SAND	Light grey with traces of red/orange mottling, fine to medium grained with low plasticity
	NATURAL – Sandy CLAY	Brown, medium to coarse sand
BH112 and BH22 only	NATURAL – Coffee Rock	Brown/red, fine to coarse sand, sub-rounded, sub-angular gravel

11.3.2 ASS Results

Tabulated ASS results for each BH are presented in full in Table C-3 (Appendix C).

BH samples with positive ASS results (pHF, pHFox or Scr) are summarised in Table C-4 (Appendix C). Positive ASS locations are shown in Figure 16.

Net acidity (excluding ANC) and pH_F and pH_{Fox} results were reviewed in conjunction with soil bore logs to identify links between positive ASS results and specific soil horizons where possible.

Copies of the laboratory certificates are included in Appendix F.

Field screening results identified PASS at 22 locations with coffee rock encountered at two locations (Table 11.4). PASS indicators include a pH_F >4 and pH_{FOX} <4, a strong reaction with peroxide and a large difference between pH_F and pH_{FOX}.

Table 11.4 - ASS Field Screening Results

ASS type	Location
AASS	NA
PASS	BH06, BH08, BH09, BH10, BH11, BH12, BH14, BH15, BH16, BH20, BH29, BH30, BH92, BH94, BH96, BH97, BH98, BH100, BH104, BH105, BH112 and BH139.
Coffee Rock	BH22, BH112

Net acidity ranged between 0.03 %S to 0.25 %S (BH25), however net acidity levels were generally between 0.03 %S and 0.05 %S (Table C-4, Appendix C). Net acidity values above the adopted DER (2015a) action criteria (0.03 %S) were recorded at the following locations and depths.

- BH06:
  - RL 10.63 to 9.38 mAHD
  - RL 7.13 to 6.38 mAHD
- BH08: RL 6.52 mAHD to the maximum depth of investigation (MDI) (RL 5.02 mAHD)
- BH09 :
  - RL 7.31 to 5.56 mAHD
  - RL 4.56 to 4.06 mAHD
- BH10: RL 6.60 to 6.10 mAHD
- BH11: RL 7.60 mAHD to the MDI (RL 2.10 mAHD)
- BH12: RL 8.38 to 4.13 mAHD
- BH14: RL 15.60 to 13.10 mAHD
- BH15: RL 13.68 to 13.18 mAHD.
- BH16: RL 13.46 mAHD to the MDI (RL 12.21 mAHD)
- BH20 :
  - RL 11.58 to 10.83 mAHD
  - RL 9.83 to 8.83 mAHD
- BH22: RL 16.75 to 16.25 mAHD
- BH29: RL 20.99 mAHD to the MDI (RL 18.24 mAHD)
- BH30: RL 22.88 to 22.38 mAHD
- BH92: RL 18.65 to 15.40 mAHD
- BH94: RL 19.83 to 17.33 mAHD
- BH96:
  - RL 9.63 to 8.13 mAHD
  - RL 5.13 mAHD to the MDI (RL 4.63 mAHD)
- BH97:
  - RL 7.97 to 6.47 mAHD
  - RL 5.97 mAHD to the MDI (RL 3.22 mAHD)
- BH98:
  - RL 7.79 to 6.79 mAHD
  - RL 4.54 to RL 3.54 mAHD
- BH100: RL 10.84 mAHD to the MDI (RL 5.84 mAHD)
- BH104 :
  - RL 8.03 to RL 6.53 mAHD
  - RL 4.03 mAHD to the MDI (RL 2.78 mAHD)
- BH105: RL 5.15 to RL 3.90 mAHD
- BH112: RL 30.08 mAHD to the MDI (RL 27.33 mAHD)
- BH139: RL 15.27 to RL 12.77 mAHD

Note: The upper and lower limit of each ASS band has been extended to the nearest results which did not exceed the adopted assessment criteria.

Figure 17a to Figure 17d show the eight areas where ASS was encountered across WP4 based on the 100% design. All works undertaken within these areas will need to be assessed to determine if they intersect ASS.

11.4 ASS Results Discussion

ASS was identified at eight key areas across WP4, with the majority of the ASS encountered north of the trumpet. Figure 17a to Figure 17d provide a high level overview of the eight ASS areas. Figure 16a to Figure 16d show specific bore holes where ASS was encountered.

Positive ASS results generally occurred where sandy CLAY to clayey SAND with Silt to silty Clay encountered near the Helena River Bridge (1899).

ASS varied in depth across the site with some boreholes encountering ASS across the full profile (BH100), while others were confined bands i.e. a 0.5 m thick coffee rock layer at BH22.

Appropriate management of ASS within these areas is required to limit as much as practically possible the oxidation of ASS when exposed to oxygen either via excavation or dewatering.

Note: an additional 250 mm has been included in all the stormwater invert levels to allow for blue metal compaction.

11.5 Further Investigation

Since undertaking the ASS investigation (August to October 2021) the alignment boundary has changed. Subsequently a gantry sign (VSM002) is proposed to be installed outside the investigation boundary (Figure 3). It is recommended this material is stockpiled separately and tested by GCA's Environmental Scientist(s) to verify if ASS management is required.

The piling process can result in the mixing and neutralisation of ASS, ASS investigation depths where piling is proposed did not extend to the full pile depth i.e. Bridge 1899 and the retaining walls (RW-U3 and RW-U10) immediately south-east of Bridge 1899. Where piling is proposed, it is recommended the material is stockpiled separately and tested by GCA's Environmental Scientist(s) to verify if ASS management is required.

This ASSDMP is based on the 100% design. Any changes will need to be captured either in an addendum to this ASSDMP or monitoring report(s).

Liming rates will be calculated based on the laboratory results. The results of the testing and additional management will be presented as a separate memo, if deemed appropriate, or monitoring report.

11.6 QA/QC Review

The data quality objectives (DQO) and review of field and laboratory quality control/ quality assurance (QA/QC) procedures is presented in Appendix F and Appendix G respectively.

12. Surface Water Investigation

12.1 GCA Contaminated Site Investigation (2022) and Monthly ISC Surface Water

As part of the Contaminated Site Investigation (GCA 2022b) for WP4 and as the proposed development includes the duplication of a bridge over Helena River, surface water sampling up and downstream (SW07 and SW08) of the Bridge 1899 was undertaken by GCA on 13 October 2021 (Figure 18). Section 8.6 of the WP4 Contamination Investigation Report (CGA 2022) discusses in detail the assessment criteria, field results and laboratory results from a contamination perspective.

In addition, as part of the GCA's Infrastructure Sustainability Council of Australia and New Zealand (ISC) commitment, GCA undertakes monthly surface water quality sampling at SW07 and SW08 for heavy metals and nutrients. Sampling has been undertaken since August 2021. No samples were collected between January 2022 and May 2022 due to the river being dry.

For this ASSDMP, the surface water quality results have been compared against the ANZG (2018) Freshwater 95% toxicant default guideline values and the NEMP (2020) PFAS freshwater 95% species protection, as the sampling locations are within a slightly to moderately modified environment, to provide an indication of existing river water quality.

Field parameters indicated the surface water of Helena River to be fresh with neutral to slightly alkaline conditions at both SW07 and SW08 (pH 6.07 – pH 7.84). EC levels fluctuated between fresh to brackish as flow rates decreased (November, December).

Elevated heavy metal concentrations were recorded above the 95% freshwater criteria for dissolved Cu, and Zn during one sampling event. Total and dissolved hexavalent chromium exceeded the 95% freshwater criteria at both SW07 and SW08 in October 2021. Total Cu, Pb and Zn have consistently exceeded the 95% freshwater criteria at SW08, while downstream concentrations were below the adopted criteria. Total Al concentrations continuously exceeded the adopted criteria across both sampling locations between August 2021 and December 2022. Elevated concentrations were recorded for calcium, potassium and magnesium across the two locations.

PFAS sampling was undertaken as part of the October 13, 2021, sampling event. PFOA and PFOS concentrations were below the adopted assessment criteria but above the LOR, ranging in concentration 0.0125 to 0.0644 µg/L.

Tabulated results are presented in Table C-5, Appendix C.

Discharge of dewatering effluent to Helena River is not proposed. All Dewatering effluent is to be infiltrated on site.

13. Dewatering Management Procedures

13.1 Dewatering Requirements

Based on advice from GCA's Hydrogeologist, groundwater levels used to determine dewatering requirements are based on 40 year flood high minus 0.95 m, which equates to the seasonal winter high. These levels have been compared against the 100% design to identify areas most likely to require dewatering based on a conservative, worst case scenario.

Dewatering is anticipated to be required to draw down the water table to a maximum depth of 1.0 m below the base of each excavation. Dewatering drawdown depths are anticipated to range between 0.2 and 3.33 m across WP4, with majority of dewatering required in the north around Helena River.

Dewatering is anticipated to be required for the following structures and services:

- Bridge 1899 pier 1 and pier 2.
    - Dewatering is anticipated to be required to a maximum depth of approximately 2.0 mbgl, RL 4.98 mAHD for Pier 1 pile caps and approximately 1.3 mbgl, RL 5.69 mAHD for Pier 2 pile caps.
- Basin 18 main subsoil drainage line (SS-20).
    - Dewatering is anticipated to be required to a maximum depth of approximately 1.5 mbgl, RL 7.64 mAHD.
- Approximately 2,498 m of drainage pipeline across WP4.
    - Dewatering is anticipated to a maximum depth of between 0.2 m to 5.65 m across 104 lines, predominantly in the northern portion of WP4 (Figure 21a).
- Construction of two retaining walls (RW) – RW-U3 and RW-U10.
    - Dewatering is proposed to be completed in four sections up to 70 m in length, with the worst case being that the water table will need to be lowered between 0.2 m to 3.33 m, based on the seasonal groundwater high.

The indicative dewatering requirements provided in Table 13.1 summarises the locations anticipated to require dewatering including excavation depths, dimensions, dewatering volumes, rates, radius of influence, and durations.

It is anticipated that dewatering spears will be installed to provide a dry working environment and to allow for compaction (where required) with drawdown to maximum depth of approximately 1.0 m below invert levels or excavation depth. Where compaction is not required drawdown will be kept to a minimum (100 mm to 500 mm) to avoid exposure to ASS. Sump pumps may also be used for smaller excavation.

13.2 Indicative Dewatering Program

Dewatering calculations are based on worst case groundwater levels i.e. groundwater seasonal high. Dewatering for the pile caps for Bridge 1899 is proposed to start in October 2023 for pier 2 and take approximately 60 days (8 weeks) with pier 2 commencing in December 2023 with dewatering expected to be complete by March 2024. The total dewatering timeframe for the two pier pile caps is approximately 17.5 weeks, including initial drawdown.

Construction of the two retaining walls RW-U3 and RW-U10 is proposed to commence in March 2023. Dewatering is proposed to be completed in two 70 m to 75 m sections, commencing at the southern end of RW-U3. Each section is anticipated to require dewatering for 6 weeks, with an additional day allowed to achieve the required drawdown prior to excavation occurring.

Dewatering for RW-10 is proposed to commence in May 2023 RW-U3 and be completed in two 70 m and 50 m sections. Dewatering is anticipated to be required for 4 weeks per section, with an additional two to three days required to achieve the required drawdown prior to the commencement of dewatering.

Dewatering for the two retaining walls (RW-U3 and U10) anticipated to be required for a combined total of approximately 16 weeks.

Dewatering for main subsoil drainage line in Basin 18 (SS-20) is anticipated to take approximately ten days in September 2023.

Dewatering for the 2,498 m of stormwater drainage is proposed to commence in March 2023 and be required for approximately 9 weeks, until July 2023.

Dewatering is not proposed during piling.

100% design drawings for Bridge 1899 pile caps and associated piles, RW-U3 and RW-U10, Basin 18 and the VMS gantry sign piles are included in Appendix H.

13.3 Dewatering Method

It is anticipated dewatering will be undertaken primarily using dewatering spears or a combination of dewatering spears and sump pumps. The final dewatering method will be determined by the dewatering contractor and take into consideration conditions encountered on-site. If the proposed dewatering method is anticipated to notably increase dewatering rates or volumes an addendum to this ASSDMP may be required. Alternatively, modification will be recorded via the monthly internal reports and incorporated in the closure report.

Typically, dewatering spears are installed along either side of an excavation to a minimum depth of 1.0 m below the base of the excavation i.e. the depth of dewatering drawdown.

For the drainage lines, dewatering is anticipated to be undertaken at a rate of 20 m per day plus. It is anticipated that the initial drawdown will only take between 1 to 3 hours, however dewatering will commence the day prior to excavation/installation to allow for the groundwater table drawdown to stabilise.

Drawdown for the larger structures i.e. retaining walls, pile caps etc. will take up to three days to achieve the required drawdown and will be achieved using dewatering spears.

13.4 Dewatering Rate and Volume

Dewatering rates and volumes have been calculated based on the conservative assumption that groundwater will be at its seasonal maximum level i.e. worst case.

Initial drawdown rates are anticipated to range between 1.14 L/sec at Basin 18 Subsoil to 5.59 L/sec at RW-U10.

Total volume of dewatering effluent anticipated to be extracted is 111,251 kL.

Dewatering calculation tables and cumulative flow rates are included in Appendix I.

13.4.1 Licence Applications

A groundwater abstraction licence is required when:

- Groundwater is removed from the underlying water table to facilitate construction and is extracted at a rate of 10 L/sec or more, or
- Continuous dewatering is required over a period of more than 30 days or
- Extraction volume exceeds 25,000 kL.

Based on the estimated dewatering volumes a 5C licence to take water under the *Rights in Water and Irrigation Act 1914* (RIWI Act) is required. A copy of this ASSDMP is anticipated to be required by DWER to support the 5C licence application.

13.5 Radius of Influence

Dewatering radius of influence for the pier 1 and 2 pile caps are 29 m and 18 m respectively. Radius of influence for RW-U3 and RW-10 is anticipated to range between 30 m and 48 m.

Figure 19a to Figure 19c shows the anticipated maximum (worst case) radius of influence likely to occur during dewatering for the pile caps, retaining walls and drainage lines. Drainage lines with a radius of influence of less than 20 m are shown on the figure however the radius as these works is not shown as they are deemed to be minor. The radius of influence for the stormwater pipes range between 5 m to 82 m.

Dewatering calculations were undertaken using Sichardt's equation, with well points (spears) simulated at several locations along the length of the excavation(s) to predict the required abstraction rate(s). These values were compared against the DWER (2021b) online Cone of Depression Calculator to check for consistency.

The lateral extent of the drawdown cone of depression (radius of influence) was also estimated based on the Sichardt's equation and the simulated well points. The outer most extent of the cone of depression was identified by a 0.1 m drawdown of the water table.

Conservative estimates were used to determine dewatering volumes and radius of influence, to allow flexibility when planning dewatering activities. This applies to hydraulic conductivity values, groundwater levels, depth of excavation, timeframe for dewatering and length/width of excavation zones. The hydraulic conductivity values were based on the results of on-site slug testing, with the maximum value from the nearby slug tests used.

Estimated groundwater levels were based on a 40 year high flood minus 0.95 m which is indicative of a winter high groundwater level.

The following assumptions were made for the Sichardt's equation:

- Hydraulic conductivity 2 m/day for the pile caps, retaining walls and 1 m/day for the stormwater pipes.
- Saturated thickness of the aquifer = 20 m.
- Specific yield = 0.1.
- Dewatering is required to approximately 1.0 m below excavation except for the stormwater pipework and subsoil drainage line (SS-20) at Basin 18, for which a drawdown depth of 0.5 m below excavation depth has been applied.
- One day open excavation per 20 m of storm water pipe (i.e. 50 m pipe = 3 day open excavation plus one day draw down).

Table 13.1 - Dewatering Rates, Radius of Influence and Extraction Volumes Excluding Storm Water Pipework

Location	Width (m)	Length (m)	Aquifer Thickness (m)	Max Depth of Excavation (RL mAHD)	Max Drawdown Depth (m)	Duration of Dewatering (days)	Radius of Influence (m)	Initial Flow Rate (L/sec)	Continuous Flow Rate (L/sec)	Initial Extraction Volume (kL) (24hrs)	Continual Extraction Volume (kL)	Total Combined Volume (kL)
Pier 1 pile caps	6.4	28.35	20	5.98	1.97	60	28.47	4.33	1.73	374	8979	9352.80
Pier 2 pile caps	6.4	28.35	20	6.96	1.27	60	18.35	4.34	1.74	375	8999.4	9374.4
Basin 18 SS-20	0.5	36.00	20	8.14	1.52	10	15.50	1.14	0.46	98	394	492.48
RW-U3 (04015)	5.1	70.00	20	7.69	2.10	42	30.34	5.55	2.22	540	8056	8595.40
RW-U3 (04016)	5.1	40.00	20	6.29	2.67	42	38.58	4.60	1.86	768	6735	7503.44
RW-U10 (04030)	3.3	70.00	20	8.62	3.33	28	48.12	5.59	2.20	1489	5409	6898.51
RW-U10 (04031)	3.3	51.87	20	8.62	2.63	28	38.00	4.76	1.90	74	4606	5360.14
Total												***47,577.17***

13.6 Potential Dewatering Impacts

Based on the above dewatering information including radius of influence, a list of potential impacts associated with the drawdown of the water table has been developed and is presented below in Table 13.2.

The monitoring schedule and contingency measures presented in Section 18 and Section 19 respectively, have been developed to manage these potential impacts as much as practicable.

Table 13.2 - Potential Dewatering Impacts

Potential impact	Details
Oxidation of ASS	Oxidation of ASS occurs when ASS is exposed to oxygen via excavation or lowering of the groundwater table. This can result in the mobilisation of contaminants such as heavy metals and an increase in acidity. Open excavations and the lowering of the water table will be limited as much as practicable to restrict excessive drawdown. As per Section 16, the base and walls of the excavation will be dusted with lime. Dewatering effluent is proposed to be tested and if deemed necessary, treated prior to discharge.
Groundwater quality	October/September 2021 GME groundwater quality results identified several exceedances of the adopted assessment criteria for heavy metals and nutrients. These results combined with alkalinity: sulfate ratios, which do not meet the adopted assessment criteria, indicate the groundwater is or has already been affected by the oxidation of sulfides. There is the potential therefore that the groundwater underlying the site may be further impacted by dewatering and the potential oxidation of ASS. Appropriate management is therefore required to limit on and off-site impacts. A monitoring program has been developed to manage changes in groundwater quality (Section 0. Contingencies are outlined in Section 19 to address adverse changes in groundwater quality caused by dewatering activities.
Surface water quality and level	Radius of influence calculations indicate drawdown for the pile caps, RW-U3 and RW-U10 will extend between 30.34 m to 48.12 m from the dewatering point (Figure 19a), which may impact surrounding surface water bodies and wetlands if not managed appropriately. Section 17 details the monitoring program that will be implemented throughout and post dewatering. Section 19.5 presents the contingency measures that have been develop in the event surface water quality deteriorates. Section 19.3.2 presents the contingency measure developed for in the event groundwater levels decrease below the anticipated dewatering depth.
Groundwater users	Acidic or ASS impacted groundwater may impact off-site groundwater users through reduced groundwater quality and supply. There are currently 34 groundwater abstraction licences and several groundwater abstraction bores within 1.0 km of WP4 however, there are no known groundwater abstraction bores that are located within the radius of influence. Based on the calculated radius of influence the potential impact of reduced groundwater supply (lowering of the groundwater table) is not deemed to be of concern as the maximum radius of influence is less than 50 m. The risk posed to groundwater users is therefore a deterioration in groundwater quality.
Lowering of water table impacting TEC/PEC's – Banksia woodland	Banksia woodland TECs comprised of *Banksia attenuata* and *Banksia menziesii* are present around the proposed Trumpet construction area. It is not anticipated that the radius of influence from the drawdown from dewatering of the drainage lines in this area will result in a change of water levels for the Banksia woodlands. The maximum total draw down is anticipated to be less than 2.7 m below the maximum winter high groundwater level. A research study on the resilience of Banksia woodland to groundwater drawdown on the Gnangara Mound was conducted by Broun (2004). The study indicated that if given suitable recovery time, Banksia woodland communities are resilient to large-scale drawdown events. Broun (2004) also noted that *Banksia attenuata* and *Banksia menziesii* are known to occur in a greater range of conditions on the Swan Coastal Plain and are more tolerable to changes in groundwater levels. Both species were recorded during the biological survey undertaken by Biota (2020) for GEHBI. Given the seasonal variability of groundwater is approximately 1 m to 3 m within the GEHBI development envelope, a drawdown of less than 2.7 m variability should not cause notable impact on Banksia woodland health. As such the overall risk is deemed to be low.
Groundwater dependent ecosystems (GDE)	Most of the site is classified as Conservation Category Geomorphic Wetlands of the Swan Coastal Plain. Four GDE were identified within the site boundary of WP2 (Jacobs 2020). The four GDE identified are listed as terrestrial and aquatic (Jacobs 2020), such as Helena River and the surrounding water bodies. Lowering of the groundwater table and/or deterioration of water quality associated with ASS may pose a risk to these four GDE.

14. Dewatering Effluent Treatment

14.1 Dewatering Effluent Treatment Requirements

All dewatering effluent will be discharged onsite via infiltration basins.

Based on groundwater quality results, all dewatering effluent across the site will need to be treated for total metals via either a lined settlement trench or baffled settling trap prior to infiltration on site. The size of the lined basin or settling trap will vary between locations based on proposed flow rates.

Due to low pH and buffering capacity of the dewatering effluent, all dewatering effluent will need to be amended prior to infiltration.

In the event dewatering effluent quality or groundwater quality deteriorates additional treatment may be required. In the event dissolved metals, or nutrient concentrations increase to exceed the adopted assessment criteria (Table 14.1) additional treatment will be required. The treatment module will require the system to be backwashed and the associated waste will need to be discharged to a storage tank and disposed off-site to a licenced disposal facility.

14.2 Discharge Location

Dewatering effluent from RW-U3 and RW-U10, which is proposed to commence in March 2023 with all dewatering effluent will be discharged into the northern infiltration basin (Figure 20). The highest flow rate anticipated to be encountered during this period is in early May 2023, when dewatering for both RW-U3 and RW-U10 is undertaken simultaneously. Flow rates of up to 8.0 L/sec are anticipated to be encountered.

Dewatering effluent for the Bridge 1899 pier 1 and 2 pile caps is proposed to be discharged to Basin 18. Basin 18 is proposed to be excavated to its proposed invert (finished) level (RL 9.60 mAHD) prior to the commencement of dewatering. Upon completion of dewatering, Basin 18 will be excavated to approximately RL 8.8 mAHD and the associated subsoil drainage including filter medium will be installed and the basin backfill to its finished invert level. Testing of the accumulated sediment from dewatering will be required prior to construction works commencing.

Due to the presence of coffee rock overlaid by alluvial material, the infiltration capacity of Basin 18 is anticipated to be minimal. Once Basin 18 reaches capacity, at approximately 20 days of dewatering, the excess dewatering effluent from the pile caps will be discharged to a second infiltration basin constructed on the north-eastern side of Helena River, adjacent to abutment 2 (Figure 20).

Based on permeability rates from Basin 20 (conservatively 2.0 m/day) and a worst cumulative maximum flow rate of 8.0 L/sec, the northern infiltration trench (Figure 20) will need to be 26 m by 13 m (346 m^2) and a minimum of 1.0 m deep, with the base of the infiltration trench at least 500 mm above the underlying groundwater table. A settlement trench with the capacity of 173 m^2 or 19 m x 9 m and 1 m deep or equivalent capacity baffled settling trap will be required for a maximum flow rate of 8.0 L/sec.

Dewatering effluent from the installation of Basin 18 main subsoil drainage line will be discharge to a temporary infiltration trench constructed immediately north of Basin 18 (Figure 20). Based on a maximum flow rate of 1.1 L/sec, the infiltration basin will need to be approximately 10 m x 5 m up to 1.0 m deep. Due to low flow rates, it is recommended that all dewatering effluent passes through a baffled settling trap prior to infiltration. pH amendment will also be required prior to infiltration onsite.

Where practicable dewatering effluent from the drainage lines is proposed to be infiltrated via drainage Basins 16 Figure 20). Where the distance between the dewatering location and drainage basin is too large, a temporary infiltration basin will be constructed adjacent to the works but a sufficient distance to prevent recirculation. The final infiltration basin locations will be determined once staging has been finalised. Either a settlement trench or baffled settling trap and pH amendment unit will be installed upstream of the infiltration basin. Based on the maximum initial dewatering rate of 6.29 L/sec and a K value to 2.0 for the drainage lines an infiltration trench with the capacity of up to 272 m^2 or 23 m x 12 m and up to 1 m deep will be required. A lined settlement basin 16 m x 8 m and up to 1 m deep would be required to contain up to 6.29 L/sec.

The fixed drainage basin for WP4 are shown in Figure 20. Additional infiltration basin locations constructed during dewatering will be captured as part of the monthly reporting (Section 20).

Prior to the commencement of and at the completion of dewatering, all basins, fixed and temporary will need to be tested in accordance with Section 18. For the fixed basins, the sediment which has accumulated during infiltration will need to be removed prior to being commissioned as a drainage basin.

14.3 Discharge Assessment Criteria

The adopted assessment criteria for discharge to infiltration basins is presented in Table 14.1.

Table 14.1 - Discharge Assessment Criteria

Disposal Location	Criteria
Infiltration	95% FW assessment criteria (ANZG 2018 and ANZECC 2000)
	STI (DWER 2021; ANZECC 2000)
	Non-Potable Use Groundwater (DoH 2014; DWER 2021)
	DER ASS disturbance, discharge to water bodies acidic water and CSB notification trigger values (DER, 2015b)

15. Dewatering Monitoring Requirements

15.1 Groundwater Monitoring

For the main dewatering works associated with Bridge 1899 pier 1 and 2, where dewatering is required consecutively for 60 days and for the two retaining walls RW-U3 and RW-10 where dewatering is required for 13.5 weeks and 8.5 weeks respectively, groundwater monitoring will be undertaken in accordance with DWER's Table 6 Dewatering Management Level 2 (2015b).

Groundwater monitoring will be undertaken from a minimum of three groundwater wells, ideally triangulated around the dewatering operations, to monitor groundwater quality and drawdown throughout the various stages of dewatering. For Bridge 1899 piers and RW-U3 and RW-U10 dewatering, six additional groundwater monitoring wells are proposed to be installed: two between the proposed excavations for abutment 1 and abutment 2 and Helena River subject to accessibility and two on the northern side of the proposed bridge duplication. GW03 and GW04 will also be monitored as part of the development.

To monitor dewatering during the construction of the retaining walls two additional groundwater monitoring wells are proposed to be installed south of RW-U10 and one between RW-U3 and RW-U10 on the wetland side of the work area to monitor drawdown and potential ASS impacts. One of the wells proposed to be installed on the northern side of the bridge duplication will be monitored for the duration and post dewatering.

Dewatering Management Level 2 includes:

- Baseline laboratory groundwater quality data collection before the commencement of dewatering operations.
- 2nd daily standing water levels will be recorded using an electronic water level indicator.
- 2nd daily field groundwater monitoring (physical parameters) from dedicated groundwater monitoring wells, using low flow sampling method, and a calibrated water quality meter.
- Fortnightly laboratory analysis for 'Groundwater Suite'. Laboratory results will be compared to the relevant guidelines outlined in Section 13.2.

Post dewatering (field and laboratory analysis) monitoring will be undertaken on a monthly basis for a minimum of six months.

For the smaller dewatering operations i.e. drainage lines that will be completed in approximately 20 m increments and Basin 18 main subsoil drainage line (SS-20), groundwater level monitoring is not proposed unless there is an existing GW well (MW03, MW06s, GW06 and GW15) within close proximity to the proposed works (e.g. MW06 beside Basin 18). This approach has been adopted based on the following:

- Drainage line dewatering will be completed in 20 m sections with dewatering required for between for between two to six days maximum with an average of 3 days per drainage line.
- The radius of influence for these structures are anticipated to be less than 30 m. 23 of the 30 sections of drainage are anticipated to have a maximum radius of influence of less than 20 m.
- Daily monitoring of dewatering effluent pre and post treatment will provide an indication of groundwater quality.
- In the event dewatering effluent indicates a deterioration of water quality, contingency measures as per Section 19 will be implemented.

The monitoring schedule for WP4 is presented in Table 18.1.

15.2 Dewatering Effluent Monitoring

Dewatering effluent monitoring will be undertaken on each discharge outlet. As treatment is required, dewatering effluent sampling will be undertaken pre and post treatment.

Daily field monitoring will be undertaken during the working week (Monday to Friday, excluding public holidays). Field monitoring will include recording of daily discharge readings, field parameters, flow rates and cumulative volumes.

Dewatering flow rates and volumes will be recorded from a calibrated flow meter installed on each discharge line for the duration of works. Start and finish meter readings will be provided by the dewatering contractor. Where flow meters become faulty or stop working, they will be replaced with a calibrated flow meter within one day of the fault being identified. Weekly laboratory samples of the dewatering effluent (pre and post treatment) will be analysed for the duration of dewatering, for the 'infiltration suite' and compared to the adopted assessment criteria (95% FW, STI, NPUG and DWER trigger value) as per Table 6 of DER (2015b) ASS treatment and management guidelines. Table 18.1 summarises the dewatering effluent monitoring requirements for WP4.

16. ASS Management Procedures

Identified ASS will be managed to limit, as much as practicable, adverse impacts on sensitive environmental receptors in the area. The following management practices will be undertaken to minimise the risks associated with the disturbance of the acid generating horizons.

The GCA's preferred management strategy is, where practicable, to treat and reuse ASS material on-site and/or within the other WPs (WP1, WP3 or WP4).

Where excavated material cannot be treated and/or reused on-site or in other WPs (i.e. excess spoil or material type is not suitable for reuse), the material will be disposed off-site to a licenced ASS treatment facility.

The following management procedures have been developed by GCA. Deviations from the management strategy discussed herein will require review and approval by the GCA environmental team. The following terms are referenced:

- Contractor: Civil earthworks contractor as per GCA agreement.
- Contaminated sites lead: GCA environmental team.
- Superintendent: GCA environmental team.

The contractor will be responsible for ensuring management procedures outlined below (or otherwise agreed) are implemented on-site with guidance provided by the GCA environment team.

16.1 ASS Extent

A precautionary approach has been applied, whereby the lateral extent of ASS has been extended to the next BH where ASS (pH or net acidity) met the adopted action criteria. The vertical extent of ASS is applied to the next sample depth (above or below) where ASS (pH or net acidity) was below the adopted action criteria.

Based on the GCA 100% design, ASS management is anticipated to be required during the construction and installation of:

- Basin 14. Proposed excavation depth of 28.8 mAHD.
- Basin 18 and associated subsoil drainage. Proposed excavation depth of approximately RL 8.8 mAHD (Figure 20).
- Retaining wall RW-U10, is proposed to be excavated to 500 mm below the base of the limestone block wall:
    - ASS was encountered in BH100 and BH06 from at depths of RL 10.63 and 10.84 mAHD respectively. All material excavated from RW-U10 is to be treated as ASS.
- Retaining Wall RW-U3, located south-east of Bridge 1899, is approximately 145 m long:
    - Excavation for the retaining wall footing is required to a depth of between RL 6.29 to 8.34 mAHD. This includes 250 mm for the footing and an additional 50 mm for sand bedding.
    - Based on the retaining walls close proximity to a high-risk ASS area and presence of ASS at BH100 from the surface to MDI, it is recommended that all material excavated from the retaining wall is treated as ASS.
- For the following Bridge 1899 structures:
    - Pile caps at pier 1 and 2, excavation to approximately RL 4.98 mAHD and RL 5.69 mAHD respectively.
    - Confirmation ASS sampling is anticipated to be required for the following piles which extend below the MDI, and which may be neutralised during piling.
        - Piles for pier 1 and 2, drilling to approximately RL -8.97 mAHD and RL -11.76 mAHD respectively.
        - Piles for abutment 1 and 2, proposed piling depth of approximately RL -9.50 mAHD and RL -11.91 mAHD respectively.
- Piles for gantry sign VSM001, proposed piling depth of approximately RL 0.71 mAHD.
    - ASS was encountered from a depth of RL 7.97 to MDI (RL 3.22 mAHD). It is recommended that piling spoil be stockpiled tested to for ASS, prior to treatment as piling methods can neutralise ASS material.
- Thirty-four new drainage pipelines ranging in (maximum) depth from approximately 0.8 mbgl to 3.5 mbgl.

Locations requiring ASS management are shown in Figure 21a and Figure 21b.

ASS management may also be required for gantry sign VSM002, which is located outside the ASS investigation area. Spoil from VSM002 is stockpile and tested for ASS to identify if ASS management is required.

In addition, spoil from streetlights and similar shallow structures that are anticipated to be installed within the ASS areas (Figure 17a to Figure 17d) will require ASS sampling once stockpiled to determine if ASS treatment is required.

In keeping with GCA's ISC commitment (Section 16.8) ASS material is proposed, where practicable, to be treated and re-used onsite, including coffee rock.

16.2 ASS Volumes

ASS volumes have been calculated for each proposed excavation. Estimated ASS volumes are summarised in Section 16.7, Table 16.2. ASS calculations, including ASS volumes per excavation are included in Appendix I.

Approximately 4,129 m3 (6,139 m3 bulked by a factor of 1.5) of ASS is proposed to be excavated with an additional 1194.3m^3 (1,777.8 m^3 bulked) of material requiring ASS verification i.e. pile spoil.

Pile spoil volumes that are to be stockpiled pending ASS verification testing are presented in Table 16.1.

Figure 17a to Figure 17d shows the areas where ASS is anticipated to be encountered. Figure 21a and Figure 21b show the proposed excavations which will encounter ASS. These locations are based on the GCA 100% detailed design plans.

ASS calculation tables are included in Appendix I.

Table 16.1 - ASS Verification Volume (Pile Spoil)

Location	Volume In situ Per Pile (m^3)	Number of Piles	Total Volume (m^3)
Abutment 1 - Piles	31.81	8	254.47
Abutment 2 - Piles	37.11	8	296.88
Pier 1 Piles	26.51	8	212.06
Pier 2 piles	32.69	8	261.54
Wingwall 1 Piles	10.18	6	61.07
Wingwall 2 Piles	14.00	6	83.97
VMS001 Gantry Sign - Piles	17.53	1	17.53
VMS002 Gantry Sign - Piles	6.79	1	6.79
Total spoil volume:			**1194.3**

16.3 Excavation Procedures

The following ASS excavation procedures will be implemented on-site:

- Excavated soil not considered to be ASS will be segregated from ASS material and material requiring ASS verification testing i.e. drill spoil. The material not considered ASS will be clearly labelled as non-ASS.
- Excavations within ASS impacted areas will be programmed to minimise the period of open excavation.
- Exposed walls and surfaces of ASS excavation will be dusted immediately with fine agricultural lime.
- Lime will be reapplied as need be while the excavation remains open.
- Excavated untreated ASS will be placed immediately on a dedicated bunded limestone pad (outlined in Section 16.4.1).
- Untreated ASS material cannot be stockpiled on-site for longer than 18 hours for SAND, and 70 hours for CLAY material.
- Individual stockpiles should be easily identifiable to enable successive validation sampling (for on-site treatment) and tracking of material e.g. numbered signage system.

- Stockpile pads are to be located upgradient of the proposed development to prevent ingress of surface water runoff into the stockpiles and/or erosion of the stockpiles.

Note: ASS treated on-site requires validation sampling including laboratory analysis prior to being reused (Section 16.6). Laboratory analysis has a standard turnaround time of five to seven working days. Additional treatment and validation testing will be required if the adopted validation criteria is not achieved. Stockpiling may be required for an extended period and must be taken into consideration to provide sufficient area for stockpiling.

Figure 21a and Figure 21b shows the areas on-site proposed to be used for the stockpiling and treatment of ASS material.

Stockpiles will be clearly marked to distinguish between untreated, treated, validated and unvalidated, and those stockpiles that have been cleared by the GCA Environmental team as suitable for reuse on-site. To achieve this a flag system or similar will be implemented, especially if there are multiple stockpiles present on-site at any one time e.g., red flag for untreated, yellow flag for treated but validation pending, and green flag for treated, validated and ok for reuse on-site.

16.4 Untreated ASS Stockpiling and Limestone Pad Construction

16.4.1 Untreated ASS Stockpiling

Untreated ASS is not to be stockpiled (short term) on a limestone pad for greater than 70 hours for CLAY and 18 hours for SAND without prior approval from the GCA Environment Manager.

Where excavated ASS cannot be treated within 18 hours (SAND) or 70 hours (CLAY), material is to be placed on a bunded limestone pad as detailed in Section 16.4.2.

In addition, the following stockpile management measures are to be followed:

- The total volume of any given short-term stockpile will not exceed more than 20% of a day's total extraction.
- Source of the stockpile is to be tracked.
- Stockpiles will be treated in accordance with Section 16.6.
- Avoid stockpiling in low lying areas close to the site boundaries.
- Where stockpiled soils are wet, or works are undertaken between May and October, the need for a leachate collection and treatment system will be required.
- The surface area of the stockpiles will be minimised to reduce its oxidation potential. This may involve shaping the stockpile, capping, or lining it to avoid the effects of sun, wind, and meteoric inputs.
- The surface of the stockpiles will be monitored for signs of oxidation by GCA Environmental Team. Where signs of oxidation are observed, the treatment or disposal schedules will be reviewed and may be brought forward as deemed appropriate by the GCA Senior Environmental Advisor in discussion with the construction team.
- Stockpiles will be kept moist using iron-free water or a neutralising solution sprayed over the surface at a rate that does not generate leachate or surface runoff from the stockpile. Where practicable, on-site bore water will be used or if dewatering effluent results meet criteria, then dewatering effluent will be used.

Treated and untreated stockpiles should be clearly marked to distinguish between untreated, treated but not validated and treated, validated and suitable for reuse on-site. To achieve this a flag system or similar may need to be implemented if there are multiple stockpiles present on-site at any one time e.g., red flag for untreated, yellow flag for treated but validation pending, and green flag for treated, validated and ok for reuse on-site, blue for stockpiles requiring ASS verification testing.

16.4.2 Limestone Pad Construction

Where excavated ASS cannot be treated within 18 hours (SAND) or 70 hours (CLAY), the following ASS stockpiling practices will be implemented:

- ASS will be stockpiled on a compacted pad comprised of acid neutralising materials (e.g., crushed, and compacted lime sand-$CaCO_3$) with a minimum thickness of 300 mm.
- ASS stockpile pads are to be bunded with a minimum of 150 mm of compacted limestone.
    - Where required, diversion banks will be installed up-gradient to prevent the ingress of surface runoff into and/or erosion of the stockpiles.

- Runoff or leachate from the ASS stockpiles should be collected in a lined holding pond or tank, tested, and treated accordingly prior to disposal or reinfiltrated on-site.
- ASS pads will be located, where possible, up-gradient of the proposed development to limit the potential for leachate and run off into undisturbed areas or sensitive receptors.
- ASS pads will be constructed as far away from surface water drains as practicable to minimise the potential mobilisation of the soils or runoff into the waterways.

16.5 Limestone Pad Commissioning and Decommissioning

Prior to the construction of limestone pad(s), four baseline samples will be collected from proposed footprint of each treatment pad and screened for WA waste classification metals, major cations, total metals, and Scr Suite (Table 18.1).

Following the removal of the limestone pad, four validation samples will be collected and submitted to CGA's primary laboratory for the above-mentioned suite. In the event elevated concentrations are recorded, additional material may need to be excavated and potentially disposed off-site.

16.6 On-site ASS Treatment (Neutralisation) and Handling

Where practicable, ASS is proposed to be treated and reused on-site. Due to the size of WP4 and to limit excessive truck movements, ASS pads are proposed to be established near the main excavation areas. Indicative ASS stockpiling and on-site ASS treatment are shown in Figure 21a and Figure 21b. Final ASS treatment locations will be determined by the GCA's Site Manager based on staging of works and accessibility.

ASS treatment and handling will be undertaken in accordance with the following procedure.

- Excavated acid generating types will be lime treated on-site. The lime treatment will mitigate long term oxidation issues associated with the materials. High grade agricultural lime will be used as a neutralising agent. The amount of lime to be used for neutralisation will be calculated using the following equation:

  Lime (kg /m3 soil) = Soil bulk density x (Net acidity (%S x 30.59) x 1.02 x Safety Factor) / ENV

Whereby:

- %S is the maximum net acidity detected in the samples.
- ENV is the effective neutralising value (ENV) of the lime (expressed as a decimal percent) as quoted by the supplier. The ENV as quoted by the supplier must be considerate of the grainsize distribution of the neutralising agent.
- Net acidity = potential acidity + existing acidity –ANC.

The GCA Senior Environmental Advisor and Site Manager will be responsible for tracking of soils by logging ASS stockpiles according to excavation source mentioned in Section 16.4.1.

Treated and untreated stockpiles as well as stockpiled requiring ASS verification sampling will be clearly marked to distinguish between untreated, treated but not validated, and treated, validated and suitable for reuse on-site. To achieve this, a flag system or similar may need to be implemented if there are multiple stockpiles present on-site at any one time e.g., red flag for untreated, yellow flag for treated but validation pending, and green flag for treated, validated and ok for reuse on-site, blue for stockpiles requiring ASS verification testing.

16.7 Liming Rate

Approximately 4,129 m3 (6,139 m3 bulked by a factor of 1.5) of ASS is proposed to be excavated with an additional 1194.3 m^3 (1,777.8 m^3 bulked) of material requiring ASS verification i.e. pile spoil. ASS treatment and management guidelines (DER, 2015b) state that where volume of soil to be disturbed is greater than 1000 tonne, the mean net acidity plus one standard deviation will be used to calculate the appropriate liming rate. Liming rates for WP4 range between 3.74 kg $CaCO_3$ / m^3 and 8.20 kg $CaCO_3$ / m^3, which equates to a combined total of approximately 24,963 kg $CaCO_3$ / m^3 of lime. Calculations have been based on a soil bulk density of 1.5, ENV of 75% and a safety factor of 1.5. Liming rates and volume of lime required will need to be recalculated by the GCA Senior Environmental Advisor based on the ENV provided by the reputable supplier at the time of sourcing. Specific liming rates have been calculated according to the areas of excavation and are summarised in Table 16.2. Piling spoil and material excavated from VSM001 and VSM002 will be stockpiled and sampled on-site to determine appropriate liming rates.

Table 16.2 - Excavation Specific Liming Rates

Location	Related Bore Holes	Mean Net Acidity %S + 1 St Dev	Estimated ASS Volume (m^3)	Liming Rate (kg $CaCO_3$ / $m^{3)}$	Estimated Volume of Lime Required (kg $CaCO_3$ / $m^{3)}$
Basin 14	BH112	0.09	371.2*	8.20	3,043.8
Basin 18 including subsoil	BH100	0.05	1260.0	4.68	5,896.8
Bridge 1899 Pier 1 Footings (Pile Caps)	BH09	0.04	109.61	3.74	409.9
Bridge 1899 Pier 2 Footings (Pile caps)	BH10	0.04	24.46	3.74	91.5
Abutment 1 - Piles	BH99	N/A	254.47	N/A	N/A
Abutment 2 - Piles	BH98	0.08	296.88	7.47	2,217.7
Pier 1 Piles	BH09	0.04	212.06	3.74	793.1
Pier 2 Piles	BH10	0.04	261.54	3.74	978.2
Wingwall 1 Piles	BH99	N/A	61.07	N/A	N/A
Wingwall 2 Piles	BH98	0.08	83.97	7.47	627.3
VMS001 Gantry Sign Piles	BH97	0.04	17.53	3.74	91.5
VMS002 Gantry Sign Piles	N/A	N/A	6.79	N/A	N/A
RW- U3 (04015)	BH100	0.05	305.43	4.68	1429.40
RW- U3 (04016)	BH100	0.05	799.42	4.68	3741.29
RW-U10 (04030)	BH06	0.04	232.16	3.74	868.266
RW-U10 (04031)	BH100	0.05	252.66	4.68	1182.47
Drainage North	BH22, BH139, BH100 and BH06	0.04 to 0.05	715.3	4.67	3,303
Drainage South	BH22 and BH112	0.05 – 0.06	49.6	4.67 to 5.60	274
Total:			***5,322.91***		***24,963.69***

Note: * indicates coffee rock

16.8 Performance Criteria

Performance criteria for ASS validation testing will be consistent with DWER guidelines (DER 2015b):

- Treated soil pH will be in the range of pH 6.0 – pH 8.5.
- The ANC will be greater than potential acidity + existing acidity (pH_{FOX} must be >5).
- Neutralising material has been thoroughly mixed through the soil.
- Net acidity assessment criteria (0.03% S) will be adopted in accordance with DWER ASS guidelines (DER, 2015b).

16.9 Neutralising Material

Neutralising material will be sourced from a reputable supplier in accordance with DWER guidelines (DER, 2015b):

- Fine agricultural lime that can pass through a <1 mm sieve.
- Contain a high neutralising value of 85% to 95%.
- pH in the range of pH 8.5 to 9.0.
- Low solubility in water to provide acid buffering capacity over a sustained period.

16.10 Validation

Validation of treated ASS will be undertaken to verify the material has been effectively treated prior to being reused on-site. If soils fail validation where pH_{FOX} <5, pH is not with the range of 6.0 to 8.5 and/or net acidity including ANC >0.03% S, additional treatment (neutralising material) will be mixed through, and the soils will be retested.

Soils must not be removed from the limestone treatment pad until they pass validation and clearance to reuse on- site is given by the GCA Environmental Scientist.

Validation sampling intensity will be in accordance with the DWER waste classification guidelines (DWER 2019) (Table 16.3). To validate the field pH assessment for treated soils 25% of the samples will be submitted to a NATA accredited laboratory for the analysis of the Scr suite plus TPA.

Table 16.3 - ASS Stockpile Validation Sampling Requirements

Volume (m^3)	Number of Samples
100 to 200	4
200 to 500	6
500 to 1,000	8
1,000 to 2,000	11
2,000 to 3,000	15
3,000 to 4,000	18
4,000 to 5,000	20
5,000 to 10,000	24
>10,0000	24 plus 4 for each additional 10,000 m^3

16.11 Infrastructure Sustainability Council of Australia and New Zealand

To address the risk of ASS on the project, GCA has adopted diversion from landfill targets in alignment with version 2.0 of the Infrastructure Sustainability Council's Technical Manual (ISC, 2018). GCA has committed to achieving the Level 2 target (>85% diversion from landfill), with a stretch target of Level 3 for WP4. The sustainability targets are presented below in Table 16.4.

Table 16.4 - Project Default Targets for Resource Efficiency Performance Criteria: Treated ASS

Rating/Phase	Level 2 Target	Level 3 Target	Justification
As built	>84% diverted from landfill (including >50% onsite re-use)	>95% re-use diverted from landfill (including >75% onsite re-use	To be developed by the designer
Operations	>85% diverted from landfill	>95% re-use diverted from landfill	To be developed by the designer

17. Surface Water Monitoring Requirements

Although no dewatering effluent will be discharged to Helena River, surface water monitoring will be undertaken as part dewatering monitoring schedule. The following section summarises the monitoring which is proposed to be undertaken.

17.1 Surface Water Monitoring ISC

Infrastructure Sustainability Council (ISC) surface water sampling is being completed on a monthly basis as part of a wider surface water monitoring program across the GEHBI project. The monthly sampling is undertaken at two surface water locations (SW07 to SW08) within WP4. SW07 is located downgradient of the site and SW08 is located upstream of the site. The ISC surface water monthly monitoring program includes:

- Field parameters (pH, temperature, DO, EC, Redox and turbidity)
- Laboratory analysis for: total suspended solids, nutrients (total nitrogen, phosphorus) and heavy metals (Al, As, Cd, Cr VI, Cu, Fe, Pb, Mn, Hg, Ni, Se and Zn).

The ISC monitoring program will continue on a monthly basis throughout and post construction works.

17.2 Surface Water Monitoring – Dewatering

To supplement the ISC surface water monitoring program, during dewatering operations the following additional monitoring will be undertaken at the downstream (SW07) and upstream (SW08) surface water monitoring locations:

- 2nd daily visual inspection (Monday to Friday) of the Helena River to verify if dewatering is causing any aesthetic changes in the water comparing upstream to downstream.
- 2nd daily (Mon-Fri) field readings (pH, EC, DO, Redox, Temp, TTA, TALK)
- Fortnightly laboratory analysis for heavy metals (total and dissolved Al, As, Cd, Cr, Fe, Mn, Ni, Se, Zn, Cr (VI)) and nutrients (NH3, NO3, NO2, TKN, TN, TP, FRP)

Surface water monitoring will continue for one week post dewatering works to monitor recovery. In the event quality does not improve the surface water quality contingency measures detailed in Section 19.5 may be implemented.

Results will be reviewed in conjunction with the dewatering works and if results show signs of deterioration associated with dewatering activities, DBCA will be notified within 48 hours of GCA becoming aware of the deterioration and surface water monitoring will be modified accordingly. Contingency measures are presented in Section 19.5.

The results of surface water monitoring will be compared against the criteria presented in Table 17.1.

Table 17.1 - Surface Water Assessment Criteria

Criteria	Application
ANZG (2018) 95% FW	95% FW have been applied to provide an indication of the general surface water quality. Where the ANZG (2018) guidelines do not specify criteria, criteria have been retained from the Australian and New Zealand Environment and Conservation Council (ANZECC 2000) guidelines.

18. Monitoring Requirements

Prior to the commencement of dewatering, six new groundwater monitoring wells will be installed within the vicinity of Bridge BR1899 pier 1 and 2 and retaining walls RW-U3 and RW-10. The final location of these monitoring wells will be determined based on site access and construction staging. The groundwater monitoring wells need to be accessible for a minimum of six months post dewatering.

Groundwater monitoring is not required during the installation of drainage lines as discussed in Section 15.1.

18.1 Groundwater Monitoring

Groundwater monitoring is required during the construction of:

- Bridge 1899 pile caps pier 1 at: GW04 plus two new wells.
- Bridge 1899 pile caps pier 2 at: GW03 plus two new wells.
- RW-U3 at: MW06s plus two new wells.
- RW-U10 at: MW06s plus two new wells.
- Basin 18 SS-20 at: MW06s.

The location of the existing wells in relation to the proposed dewatering are shown in Figure 19a and Figure 19c.

In accordance with the monitoring schedule (Table 18.2), the following groundwater monitoring will be undertaken:

- Standing water levels will be recorded 2nd daily (Mon, Wed, Fri, excluding public holidays) using an electronic water level indicator.
- Groundwater field sampling will also be undertaken 2nd daily from dedicated groundwater monitoring wells pending the staging of works. Physical parameters will be analysed using low flow sampling method, and a calibrated water quality meter. TTA and TALK will be analysed using an acidity and alkalinity test kit on-site.
- The groundwater laboratory samples will be undertaken on a fortnightly basis for the analysis of the 'Groundwater Suite'.
- Post dewatering monitoring will be required monthly for six months at all GW wells conducting field readings (Temperature, pH, EC, DO, Redox, TTA, TALK) and laboratory analysis of the GW suite.

Field and laboratory results will be compared to the guidelines presented below in Table 18.1.

Table 18.1 - Groundwater Monitoring Criteria

Locations	Criteria
GW04, MW06s, GW06 *plus six new groundwater wells to be installed at least 2 months prior to dewatering*	95% FW assessment criteria (ANZG 2018 and ANZECC 2000).
	DER ASS disturbance, discharge to water bodies acidic water and CSB notification trigger values (DER, 2015b).
	Monitoring well specific background groundwater quality results +/- 10%.
	Monitoring well specific groundwater drawdown trigger values: • Change in water level by 500 mm between successive readings. • Dewatering draw down trigger value (dewatering depth).

18.2 Dewatering Effluent and Discharge Monitoring

Field monitoring will be undertaken daily during the working week (Monday to Friday, excluding public holidays) and include recording of daily discharge readings (Temperature, pH, EC, DO, Redox, TTA, TALK), flow rates and cumulative volumes.

Weekly laboratory samples of the dewatering effluent will be analysed for the duration of dewatering to inform if dewatering effluent is meeting the adopted assessment criteria or if additional treatment or modification to the current treatment system is required.

Dewatering effluent is proposed to be infiltrated on site at the following locations:

- Bridge pier 1 and 2: initial discharge to Basin 18, excess to temporary infiltration trench system north-east of pier 2 (Figure 20).
- RW-U3 and RW-U10: all discharge to infiltration trench system north-east of pier 2.
- Basin 18 SS-20: all dewatering effluent to be discharged to the temporary infiltration trench system immediately south of basin 18 (Figure 20).

Weekly laboratory sampling will be comprised of the 'infiltration' suite in Table 18.2.

As treatment is required laboratory and field analysis is to be undertaken on each pre and post treatment line.

18.3 Settlement and Infiltration Basin Sediments

18.3.1 Commissioning

Prior to infiltration of dewatering effluent, baseline soil samples will be collected from each settlement and infiltration basin and/or drainage basin. The proposed infiltration basins are presented in Figure 20. A total of three samples are proposed to be collected:

- One from the surface of the infiltration basin.
- One from approximately 300 mm below the base of the infiltration basin.
- One from below the base of the settlement basin, prior to the liner being installed.

The samples will be submitted for analysis in accordance with Table 18.2.

18.3.2 Decommissioning

At the completion of infiltration, prior to the removal of the settlement and infiltration basin/drainage basins, soil sampling will be completed to determine the decommissioning requirements.

As the total volume of accumulated sediment in each basin is anticipated to be less than 200 m^3, in accordance with DWER (2019) waste classification guidelines, a total of four samples will be collected:

- Two from the settlement basin: one from on top of the HDPE liner and one from underneath.
- Two from the infiltration basin: one from the surface of the basin sediments and one from approximately 300 mm below the base of the infiltration basin.

The samples will be submitted for analysis in accordance with Table 18.2.

As the basins are not anticipated to be excavated more than 500 mm below ground level, ASS (Scr) analysis is not deemed necessary.

18.3.2.1 Drainage basins

Post dewatering for drainage basins 16, 17 and 18, sediment in the bottom of the basins is to be tested in accordance with Section 18.3.2 and DWER (2019) waste guidelines to classify the material prior to the base of the basins be scraped of material in accordance with GCA Drainage Engineers requirements. For the larger basins a minimum four samples are to be collected from the base of each drainage basin. The results will determine if the material can be re-used within WP4 or if the material is to be disposed offsite.

18.4 Surface Water

Surface water monitoring will be undertaken in accordance with Section 17. Surface water monitoring requirements are presented below in Table 18.2.

18.5 Treatment Pad

Soil sampling will be required pre and post commissioning the treatment pad in line with Table 18.1. Sampling analysis will be done in accordance with the waste classification guidelines – metals suite.

18.6 Quality Assurance/Quality Control

18.6.1 Inter and Intra-laboratory samples

Intra-laboratory and inter-laboratory samples will be collected at a rate of at least 1:20 and analysed for the same analytical suite as the primary sample. Discharge and groundwater samples are to be treated as separate sample matrix.

Where PFAS sampling is being conducted the ratio will be increased to 1:10.

18.6.2 Rinsate

Where groundwater monitoring is conducted with non-disposable equipment daily rinsate sample will be collected using laboratory-supplied DI water to validate appropriate equipment decontamination is occurring.

Each rinsate sample will be analysed for the associated groundwater parameters analysed that day.

Groundwater samples will be collected from single use HDPE tubing (PFAS sampling) or low density polyethylene (LDPE) (non-PFAS sampling) directly into laboratory supplied sample jars, using single use nitrile gloves. Using a peristaltic pump to pump the wells, rinsate samples will be collected on the interface probe of the dipper used to dip the groundwater wells.

18.6.3 Decontamination

Reusable sampling equipment will be decontaminated in a triple-wash process, as follows:

- Wash 1: Mixture of PFAS free detergent (e.g., Liquinox®) and tap water.
- Wash 2: Tap water; and
- Wash 3: Deionised water.

18.7 Monitoring Schedule

Table 18.2 below summarises the monitoring schedule for WP4.

Table 18.2 - Monitoring Schedule

Frequency	Location	Sampling	Laboratory Analysis Suite	Analytes
Prior to commencement	ASS pad	Laboratory Analysis (Soil)	ASS Pad Suite	Metals suite for waste classification, As, Be, Mo, Ni, Ag, Al, Cu, Mn, V, Zn, Ba, B, Co, Cd, Pb, Se, Hg and Cr IV
	Settlement and infiltration trench/ drainage basins	Laboratory Analysis (Soil)		pH, EC, TDS, TSS, Acidity, Alkalinity, Turbidity Ca, Mg, Na, K, SO4-2, S-2, Cl- , Ionic Balance Dissolved Al, Fe, Cr (VI)Total Al, As, Cd, Cr, Fe, Mn, Ni, Se, Zn Ferrous Iron Total N, NOx, NH3, TKN, FRP, TP"
	Installation of six new groundwater monitoring wells	N/A	N/A	N/A
	Groundwater monitoring wells MW06s, GW03, GW04, plus six new groundwater monitoring wells. *Sampling to be completed approximately 1 month prior to commencement of dewatering*	Field analysis and groundwater level gauging	N/A	Temperature, pH, EC, DO, Redox, TTA, TALK, Standing water levels
		Laboratory analysis (Water)	Groundwater Suite	pH, EC, TDS, TSS, Acidity, Alkalinity, Turbidity, SO_4^{-2}, S^{-2}, Cl^- Ca, Mg, Na, K Dissolved Al, As, Cd, Cr, Fe, Mn, Ni, Se, Zn, Cr (VI), Fe^{2+} NH_3, NO_3, NO_2, TKN, TN, TP, FRP
Daily	Discharge effluent (each line)	Field Analysis (Water)	N/A	Temperature, pH, EC, DO, Redox, TTA, TALK
	Flow meters (each line)	Meter Readings	N/A	Flow rates and volumes
2nd Daily (Mon, Wed, Fri)	Groundwater monitoring wells MW06s, GW03, GW04, *plus six new groundwater monitoring wells.*	Field analysis and groundwater level gauging	N/A	Temperature, pH, EC, DO, Redox, TTA, TALK, standing water levels
	Surface water (SW07 and SW08)	Visual inspection Field analysis	N/A	Temperature, pH, EC, DO, Redox, TTA, TALK, turbidity
Weekly	Discharge effluent (Infiltration) (Pre and post treatment, each discharge line)	Laboratory analysis (Water)	Infiltration Suite	pH, EC, TDS, TSS, Acidity, Alkalinity, Turbidity Ca, Mg, Na, K, $SO4^{-2}$, S^{-2}, Cl- , Ionic Balance Dissolved Al, Fe, Cr (VI)Total Al, As, Cd, Cr, Fe, Mn, Ni, Se, Zn Ferrous Iron Total N, NOx, NH3, TKN, FRP, TP"
Fortnightly	Groundwater monitoring wells MW06s, GW03, GW04, plus six new groundwater monitoring wells.	Laboratory analysis (Water)	Groundwater Suite	pH, EC, TDS, TSS, Acidity, Alkalinity, Turbidity, SO_4^{-2}, S^{-2}, Cl^- Ca, Mg, Na, K Dissolved Al, As, Cd, Cr, Fe, Mn, Ni, Se, Zn, Cr (VI) NH_3, NO_3, NO_2, TKN, TN, TP, FRP
Fortnightly	Surface Water (SW07 and SW08)	Laboratory analysis (water)	Surface water Suite	pH, EC, TDS, TSS, Acidity, Alkalinity, Turbidity, SO_4^{-2}, S^{-2}, Cl^- Ca, Mg, Na, K Total and Dissolved Al, As, Cd, Cr, Fe, Mn, Ni, Se, Zn, Cr (VI) NH_3, NO_3, NO_2, TKN, TN, TP, FRP
Post Dewatering – 2nd daily for one week	Surface Water (SW07 and SW08)	Field Analysis (Water)	N/A	Temperature, pH, EC, DO, Redox, TTA, TALK, standing water levels
		Visual inspection	N/A	N/A

Frequency	Location	Sampling	Laboratory Analysis Suite	Analytes
Post Dewatering (monthly for six months) *	Groundwater monitoring wells MW06s, GW03, GW04, *plus six new groundwater monitoring wells. Sampling to be completed approximately 1 month prior to commencement of dewatering*	Field analysis and groundwater level gauging	N/A	Temperature, pH, EC, DO, Redox, TTA, TALK, Standing water levels
		Laboratory analysis (Water)	Groundwater Suite	pH, EC, TDS, TSS, Acidity, Alkalinity, Turbidity, SO_4^{-2}, S^{-2}, Cl^- Ca, Mg, Na, K Dissolved Al, As, Cd, Cr, Fe, Mn, Ni, Se, Zn, Cr (VI) NH_3, NO_3, NO_2, TKN, TN, TP, FRP
Decommissioning	Limestone ASS pad	Laboratory analysis (Soil)	ASS Pad Suite	Metals Suite for Waste Classification, As, Be, Mo, Ni, Ag, Al, Cu, Mn, V, Zn, Ba, B, Co, Cd, Pb, Se, Hg and Cr IV
	Infiltration basin systems and drainage basins	Laboratory analysis (Soil)	ASS Pad Suite	Metals Suite for Waste Classification, As, Be, Mo, Ni, Ag, Al, Cu, Mn, V, Zn, Ba, B, Co, Cd, Pb, Se, Hg and Cr IV

19. Contingency Measures

19.1 Dewatering Discharge Disposal

All dewatering effluent is proposed to be infiltrated on site either via temporary infiltration trench systems or drainage basins. Provide water from the infiltration basin's meet the adopted criteria, water from the infiltration basin end of the treatment system can be used on site for dust suppression.

19.1.1 Infiltration

In the event dewatering rates increase or where the designated infiltration basins reach capacity, dewatering will be reduced before overflow occurs. An additional infiltration basin system will be constructed as per Section 19.1.1.1 and excess flow will be diverted to the new trench.

If infiltration capacity decreases, the base of the infiltration trench will be disturbed using an excavator bucket to break up the layer of metals, particularly iron, which will build up over time and can reduce the infiltration capacity and rate of a trench.

The discharge water quality and treatment requirements will be reassessed if the infiltration capacity decreases frequently. The lined settlement basin or baffled settling trap may need to be increased in size to increase the retention time.

In the event infiltration does not improve additional settling traps or and filtration units (metals/nutrient removal unit and or flocculant) will be installed to remove sediment bound metals upfront.

In the event infiltration trenches are constructed the commissioning and decommissioning steps below will be undertaken.

19.1.1.1 Commissioning

Prior to infiltration of dewatering effluent, baseline soil samples will be collected from each settlement and infiltration basin. The proposed infiltration basins are presented in Figure 19. A total of three samples are proposed to be collected:

- One from the surface of the infiltration basin.
- One from approximately 300 mm below the base of the infiltration basin.
- One from below the base of the settlement basin, prior to the liner being installed.

The samples will be submitted for analysis Metals suite for waste classification, As, Be, Mo, Ni, Ag, Al, Cu, Mn, V, Zn, Ba, B, Co, Cd, Pb, Se, Hg and Cr IV and Scr.

19.1.1.2 Decommissioning

At the completion of infiltration, prior to the removal of the settlement and infiltration basin(s), soil sampling will be completed to determine the decommissioning requirements.

As the total volume of accumulated sediment in each basin is anticipated to be less than 200 m^3, in accordance with DWER (2019) waste classification guidelines, a total of four samples will be collected:

- Two from the settlement basin: one from on top of the HDPE liner and one from underneath.
- Two from the infiltration basin: one from the surface of the basin sediments and one from approximately 300 mm below the base of the infiltration basin.

The samples will be submitted for analysis in accordance with Table 18.1.

Pending the location of the infiltration basin ASS (Scr) analysis may be required.

19.2 Dewatering

19.2.1 Dewatering Rates, Volumes and Period

If dewatering volumes or period is anticipated to exceed the originally estimate, the relevant regulatory bodies will be notified immediately (i.e. DWER) and prior to exceedances occurring.

If dewatering volumes are expected to exceed the approved 5C licence volume, then the GCA Senior Environmental Advisor will liaise with the GCA team member who applied for and holds the dewatering 5C licence to seek an amendment to or apply for an additional 5C licence to cover the additional extraction volume.

DWER should be notified at least 4 weeks prior to the licence being exceeded where possible as DWER assessment times are roughly between 4 – 8 weeks.

If flow meter readings indicate dewatering flow rates to exceed the infiltration capacity the following will be taken:

- Assess flow rates against the estimated dewatering rates and make sure over pumping is not occurring. If excessive drawdown is occurring, reduce dewatering spear flow rates, where practicable.
- Assess the construction schedule and reduce the number of excavations requiring dewatering at the same time, where practicable.
- Investigate alternative disposal options such as construction of further infiltration trenches on and/or off-site.
- Recalculate flow rates for the remaining sections based on observed rates.
- Reassess the radius of influence and locations of sensitive receptors.
- Where practicable, as a last option, cease dewatering until flow rates can be managed or alternative constructure schedule developed.

19.2.2 Dewatering Effluent Discharge Quality

If dewatering effluent quality results indicate a deteriorating trend the monitoring intensity will be increased, and actions will be taken according to Table 6 of the DWER guidelines (2015b). Where post treatment results do not indicate an improvement in quality compared to pre-treatment results, or do not meet the adopted assessment criteria, the dewatering contractor and the GCA Senior Environmental Advisor will be notified on the day of, and corrective action will be taken (see below). If DWER CSB notification trigger values are not met the CSB will be verbally notified with written notification via email to follow as soon as practicably possible. Notification should include a summary of corrective actions being undertaken.

Modification to or the introduction of additional pre-treatment will likely be required. This may include:

- Where a pH amendment unit is already in use:
  - Increased dosing if pH is low.
  - Reduction in dosing if pH is too high or undertake acid dosing.
- Upgrading of the treatment system to a larger system.
- Increase retention times before discharging to aid in the removal of precipitated metals and or suspended solids.
- Provide a treatment system to aid in the removal of metals and nutrients i.e. metals removal unit.
- Introduction of an additional treatment step i.e. settlement trap to removal sediment prior to treatment for heavy metals or other contaminants.
- Identify the source of contamination and redirect this dewatering effluent to a different treatment train or storage tank.
- Provide a settlement tank where flocculation is required to aid in the settlement time prior to discharge.

If additional treatment does not improve post-treatment water quality, alternative disposal options such as disposal to storage tanks may be required.

Where post-treatment quality results do not meet the adopted disposal criteria, efforts to reduce dewatering volumes or, if feasible, turning off dewatering until appropriate treatment can be achieved may be required (verified by laboratory results). DWER are to be informed of modifications to the treatment systems.

19.3 Groundwater

19.3.1 Groundwater Quality

To determine if exceedances of the adopted assessment criteria are pre-existing or associated with the dewatering occurring on-site, groundwater results will be compared against the background quality results. An increase on the baseline concentrations of 10% will be used to account for seasonal fluctuations, three consecutive readings of greater than this will trigger the need for further investigation.

If monitoring results indicate a declining trend in groundwater quality the following actions shall be taken:

- Assess whether activities surrounding the area may be impacting site works.
- Assess groundwater levels against the drawdown trigger values, check over pumping is not occurring and reduce pumping rates.
- Inspect open excavations to ensure exposed ASS has been sufficiently dusted with lime.
- Increase sampling frequency according to Table 6 of the DWER (2015b) guidelines.
- Increase treatment of infiltrated dewatering effluent.
- Investigate infiltrating treated dewatering effluent within close proximity to the dewatering area.
- Investigate injection of a lime slurry if low pH is recorded.

19.3.2 Groundwater Level

- Review of groundwater and dewatering effluent to identify if the excessive dewatering is impacting groundwater and or discharge quality.
    - If discharge quality is being impacted, modifications to or additional treatment systems may be required.
- DWER CSB to be advised of excess drawdown.
- Review and revise the dewatering schedule to reduce the total number of sections/stages being dewatered at a given time. Construction timeframes will need to be discussed with the construction team.
- Asses and where possible infiltrate or reinject dewatering effluent near the dewatering area to reduce the cone of depression and raise the groundwater level.
- Increased monitoring of strategic monitoring wells and/or installation of additional monitoring wells to monitor the radius of influence.

If levels continue to exceed the anticipated drawdown depth, and dewatering rates or dewatering spear depths cannot be reduced, a GCA Senior Environmental Advisor, in conjunction with the GCA Hydrogeologist will review the results and undertake a risk assessment in accordance with DWER contaminated site guidelines to identify if the potential environmental impacts of dewatering are manageable.

If water levels continue to exceed the anticipated drawdown level for more than two consecutive days and attempts to correct the excessive drawdown by reducing flow rates has been unsuccessful DWER CSB should be advised in writing. A meeting on site with DWER may be required.

19.3.3 Groundwater Monitoring Wells

In the event that the GW monitoring wells are destroyed or damaged such that it becomes unusable, the GCA Senior Environmental Advisor must be informed and will be responsible for determining whether a new GW will be installed.

19.4 Acid Sulfate Soils

19.4.1 Disposal Off-Site

19.4.1.1 Untreated ASS

Where ASS material is unable to be treated on-site due to stockpiling restrictions, or if the material is deemed to be unsuitable for reuse by a Geotechnical Engineer (suitably qualified/specialist) or due to staging restrictions, untreated and/or treated ASS material will be disposed off-site to a licenced treatment facility.

Untreated ASS will only be taken to facilities that are licensed to accept and treat ASS under the *Environmental Protection Act 1984* and have a DWER approved ASS management plan.

Truck dockets and facility acceptance receipts are required for ASS material disposed off-site. The truck dockets and treatment facility receipts should include details of the total volume of soil accepted, date, time, and receiving treatment facility details will be collected and included in the initial closure report.

Copies of the dockets and receipts are to be included in ASS closure reports.

19.4.1.2 Treated ASS

In the event that treated ASS is unable to be reused on-site, material can be disposed off-site to a licenced facility.

Truck dockets and facility acceptance receipts are required for ASS material disposed off-site. The truck dockets and treatment facility receipts should include details of the total volume of soil accepted, date, time, and receiving treatment facility details will be collected and included in the initial closure report.

Copies of the dockets and receipts are to be included in ASS closure reports.

19.4.1.3 Documentation and Waste Classification

Facilities accepting treated or untreated ASS are to be provided with full details of the materials in accordance with their licence requirements. As such, testing requirements are to be confirmed with the accepting licenced facility prior to testing and disposal off-site.

At a minimum it is anticipated that waste classification testing will be required for soil to be disposed off-site. Testing will be undertaken in accordance with the WA DWER Landfill Waste Classification and Waste Definitions 1996 (as amended 2019) (DWER 2019).

19.5 Surface Water

In the event ISCA surface water results indicate downstream surface water quality results (SW07) deteriorate during dewatering activities compared to background levels and/or upstream results (SW08) and an investigation will be undertaken to identify potential causes. If dewatering is identified to be the likely case of the deterioration, DWER, if appropriate DBCA, will be notified and steps will be undertaken to improve SW quality, this may include reducing pumping rates. If the SW quality does not improve over three consecutive (daily) readings, works are to stop until conditions can be improved.

20. Reporting Requirements

20.1 Internal Reporting Requirements

Results are to be reviewed in accordance with the following schedule, if exceedances are recorded or criteria not met contingency measures will be actioned accordingly and notifications issued as required.

- Daily review of field results.
- Weekly review of dewatering effluent laboratory results.
- Fortnightly review of groundwater laboratory results.

Monthly monitoring reports are recommended to track water quality results and record modifications to the construction/dewatering process, track and record ASS treatment/movement on-site. This information is required to be included in the initial and/or final closure report.

20.2 Initial Closure Report

At the completion of ASS management and dewatering, an initial closure report will be developed in accordance with DER guidelines (2015b) and submitted to DWER for review.

The initial closure report will include:

- Summary of groundwater and effluent quality results, water level monitoring, total extraction, and disposal volumes.
- Summary of management measures implemented on-site along with any modifications or deviations from the ASSDMP.
- Volume of ASS material treated on-site.
- Treated and/or untreated ASS material disposed off-site.
    - Truck dockets and receiving facility receipts to be included in the closure report appendix.
- Liming rates for each stockpile as well as tracking/mapping of where the material has been reused on-site.
- Validation results for treated ASS stockpiles and limestone pad decommissioning validation results.
- Discussion of the effectiveness of management strategies employed at the site and of any potential risks to human health or the environment.

The initial closure report will also detail the need for additional monitoring and/or remediation if deemed necessary.

20.3 Post Dewatering Monitoring Report

At the completion of the post dewatering monitoring program a post dewatering closure report will be developed and submitted to DWER summarising the management measures and results of the post dewatering monitoring programs. The report will discuss the effectiveness of management strategies applied onsite and whether any risk to the environment or human health was encountered during the works and whether remediation or additional monitoring is required.

21. Community Concerns Reporting

Community and stakeholder concerns will be managed in accordance with the GCA Complaints and Enquiries Management Procedure (GEHBI-GCA-PRO-A000-CS-00003). Where concerns are raised by the community or other third parties in relation to the project, these concerns will be immediately directed to the site supervisor.

22. References

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LEGEND

- WP4 Project Boundary
- Extent of Work Packages

Site Location

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 2

Map Document: ARCADIS\EAA Team Site - Restoration\TEMP_Job Folders\GEHBI\GEHP GIS\GEHBI Figures\Sampling Plan Figures (rs82837)

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LEGEND

- WP4 Project Boundary
- Areas of Cut
- Areas of Fill

Site Layout Plan

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

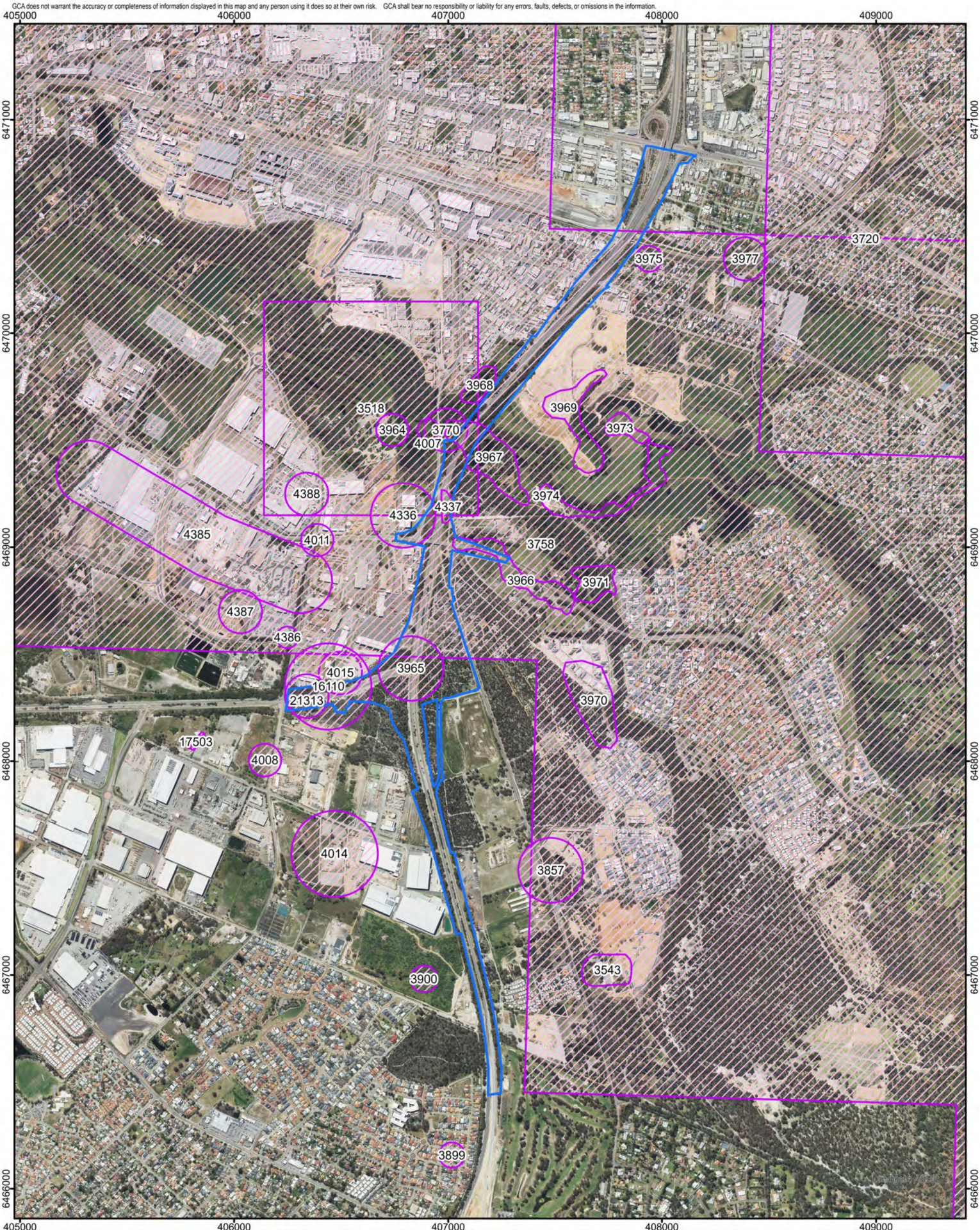
WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 3

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LEGEND

- WP4 Project Boundary
- Aboriginal Heritage Places (DPLH)

Aboriginal Heritage Listed Sites within 500 m

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 4

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- WP4 Project Boundary
- Non-Indigenous Heritage Sites (Local Heritage Survey - DPLH)

Non-Indigenous Heritage Listed Sites within 500 m

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

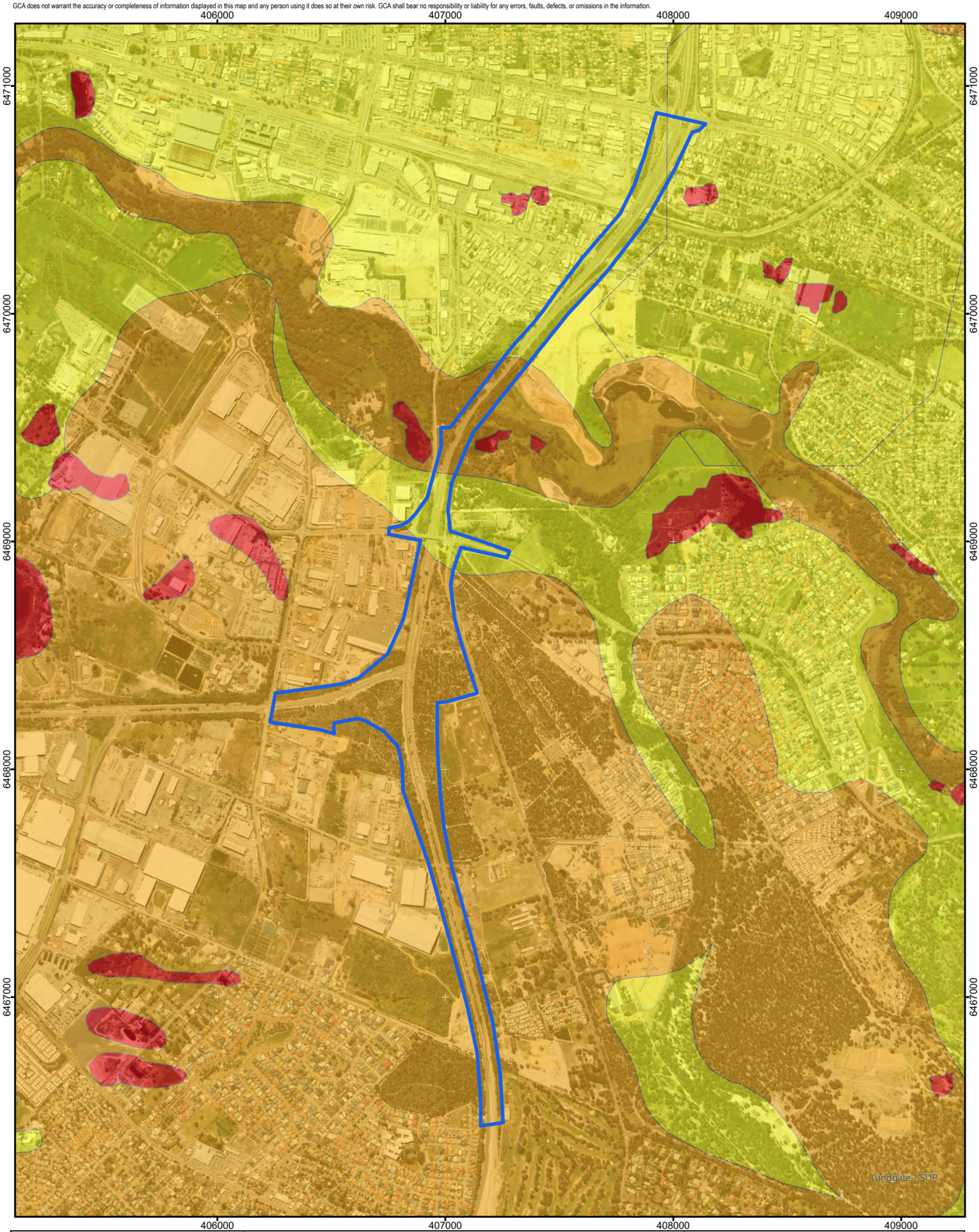
Figure

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- WP4 Project Boundary

Australian Atlas of Acid Sulfate Soils (CSIRO)

- High to moderate ASS disturbance risk (<3 m from the surface)
- Moderate to low ASS disturbance risk (<3 m from the surface)
- No known ASS disturbance risk (<3 m from the surface)

Acid Sulfate Soil Risk

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 6

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LEGEND

- WP4 Project Boundary
- Inert Landfill

Contaminated Sites Database (DWER-059)

- Contaminated - remediation required
- Contaminated - restricted use
- Remediated for restricted use

*Contaminated sites with an area less than 10000m^2 are not labelled

Contaminated Site Map

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

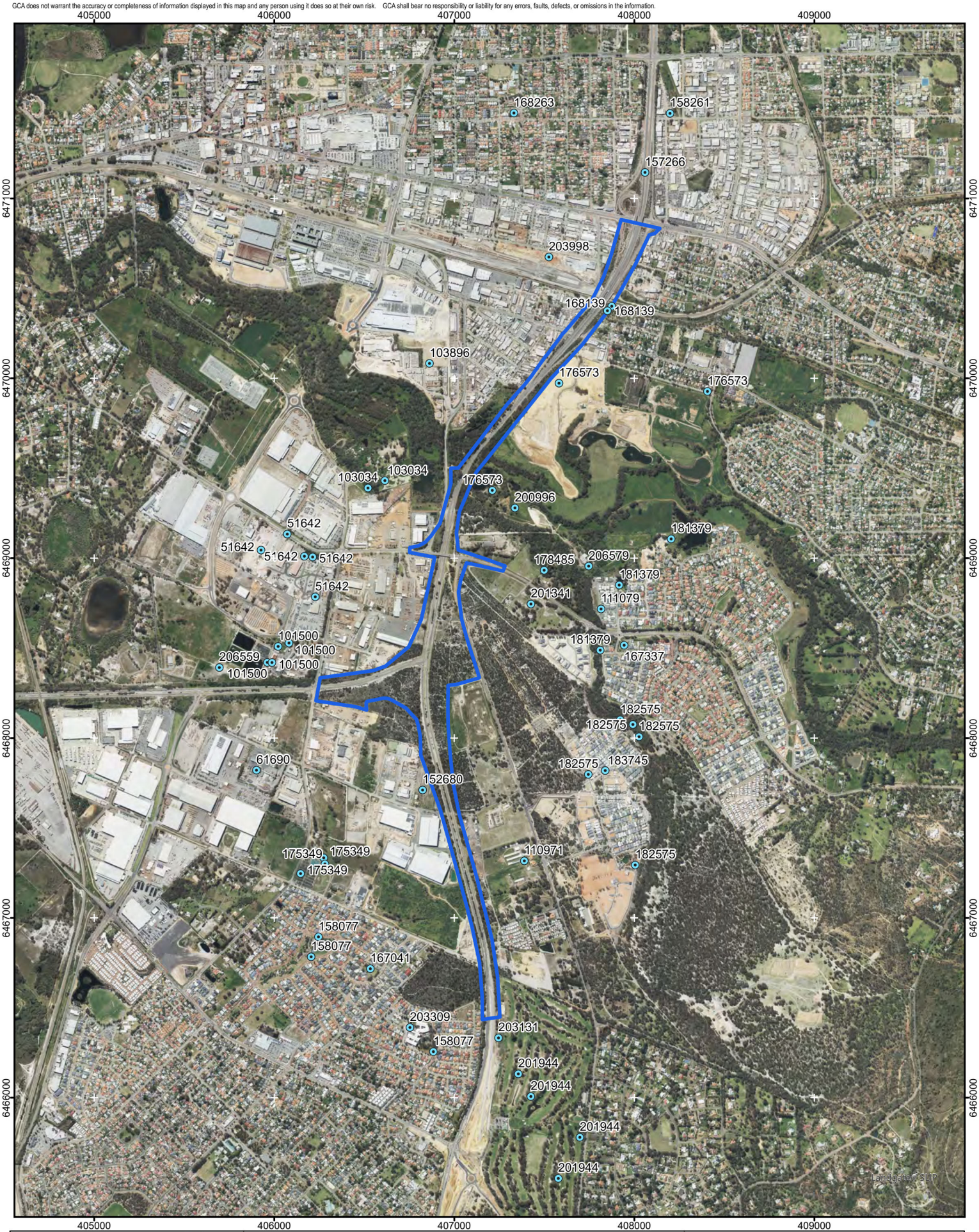
WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 7

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LEGEND

- WP4 Project Boundary
- Groundwater Abstraction Licences

Groundwater Abstraction Licenses within 1 km

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP2 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 8

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LEGEND

- WP4 Site Boundary
- Groundwater Extraction Bores

Registered Groundwater Bores within 1 km

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure

9

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Greater Connect ALLIANCE

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DATUM GDA 1994 MGA Zone 50

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LEGEND

- WP4 Project Boundary
- Groundwater Contours (April 2022)

Local Groundwater Flow Direction

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

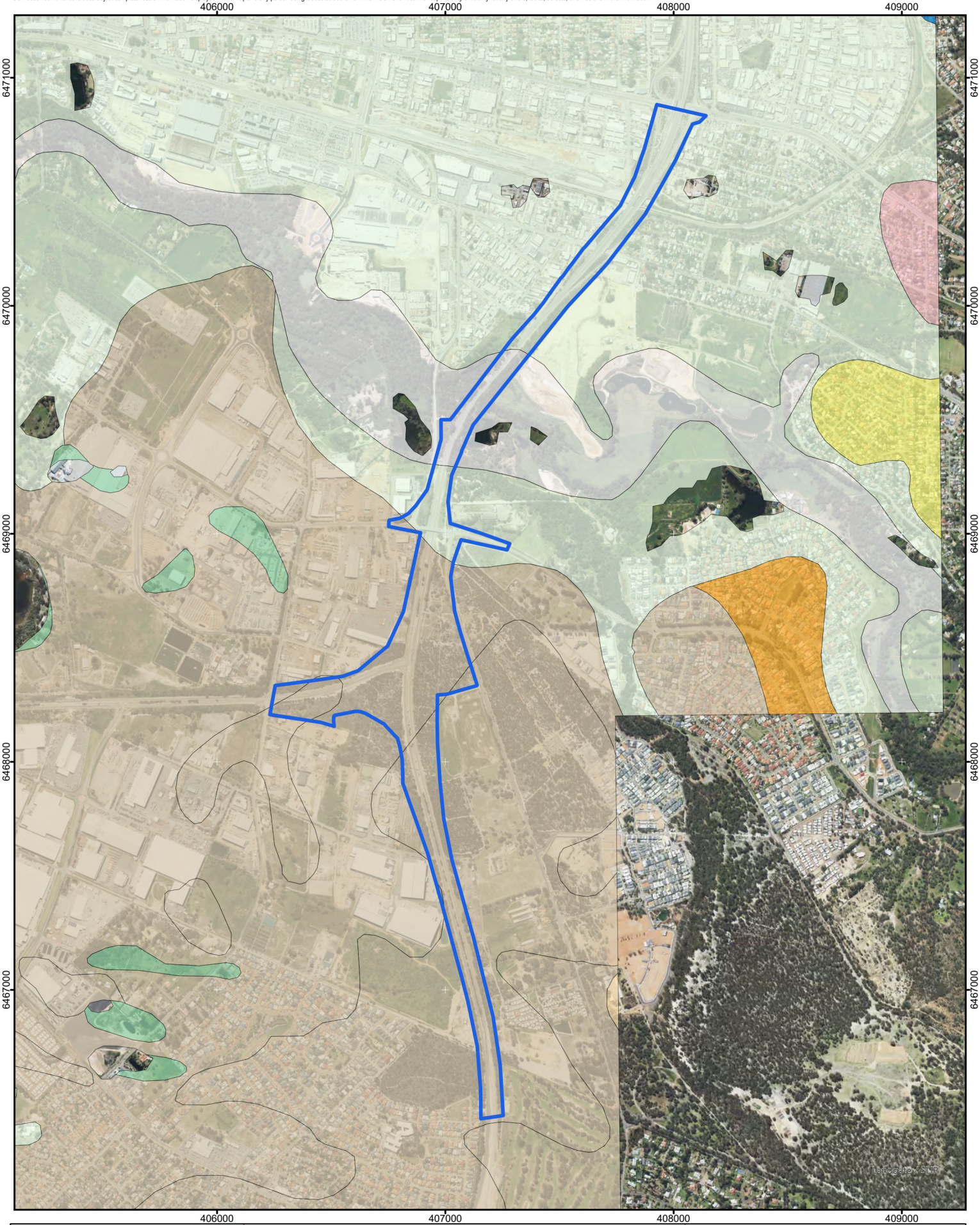
WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 10

Map Document: ARCADIS\EAA Team Site - Restoration\TEMP_Job Folders\GEHBI\GEHP GIS\GEHBI Figures\Sampling Plan Figures (rs82837)

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PROJECT ID	60657311
CREATED BY	RS
APPROVED BY	BV
LAST MODIFIED	15 FEB 2022

Greater Connect ALLIANCE

N

0 50 100
metres

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(when printed at A3)

DATUM GDA 1994 MGA Zone 50

Data sources:

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LEGEND

- WP2 Project Boundary
- Cm2 - CLAY - dark strong brown, hard when dry, soft when moist, variable silt content, no sand, of alluvial origin
- Cps - PEATY CLAY - dark grey and black with variable sand content, of lacustrine origin
- Mc1 - CLAYEY SILT - yellow brown to strong brown, blocky, mottled, soft, with variable clay content, dispersive in part, of alluvial origin
- Mgs1 - PEBBLY SILT - strong brown silt with common, fine to occasionally coarse-grained, sub-rounded laterite quartz, heavily weathered granite pebble, some fine to medium-grained quartz sand, of alluvial origin
- S8 - SAND - very light grey at surface, yellow at depth, fine to medium-grained, sub-rounded quartz, moderately well sorted, of eolian origin

Local Geology

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure

11

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0 150 300
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DATUM GDA 1994 MGA Zone 50

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LEGEND

- WP4 Project Boundary
- Banksia Woodlands of the Swan Coastal Plain

Threatened Ecological Communities within 1 km

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

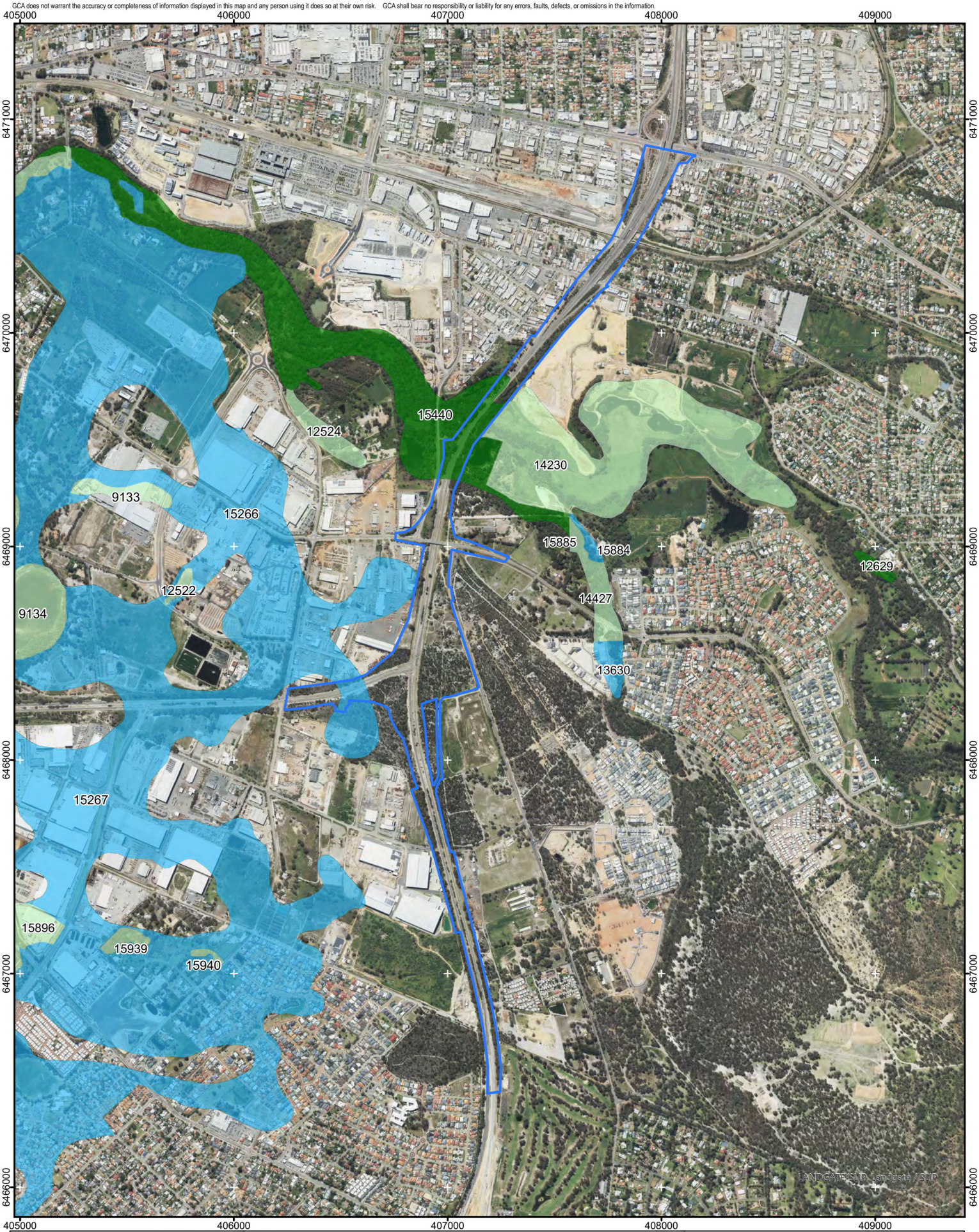
WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 12

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metres

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LEGEND

- WP4 Project Boundary

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Conservation
- Multiple Use
- Resource Enhancement

Geomorphic Wetlands within 1 km

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure

13

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metres

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DATUM GDA 1994 MGA Zone 50

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LEGEND

- WP4 Project Boundary
- GW (Groundwater Sample Locations)

Groundwater Sample Locations

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 14

Map Document: ARCADIS\EAA Team Site - Restoration\TEMP_Job Folders\GEHBI\GEHP GIS\GEHBI Figures\Sampling Plan Figures (rs82837)

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LEGEND

- WP4 Project Boundary
- BH (Soil Bore Hole)

PROJECT ID	60657311
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N

0 150 300 metres

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Soil Sampling Locations

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4- ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 15

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BH16	Stratigraphy	Depth (RL mAHD)
	CLAY	13.46 - 12.21*

BH15	Stratigraphy	Depth (RL mAHD)
	Gravelly SAND	13.68 - 13.43
	Clayey SAND	13.43 - 13.18

BH14	Stratigraphy	Depth (RL mAHD)
	Gravelly SAND	15.60 - 14.60
	Sandy CLAY	14.60 - 13.85
	Clayey SAND	13.60 - 13.10

PROJECT ID	60657311
CREATED BY	RS
APPROVED BY	BV
LAST MODIFIED	27 JUN 2022

Greater Connect ALLIANCE

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0 50 100

metres

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LEGEND

- WP4 Project Boundary
- BH (Soil Bore Hole)
- * *denotes maximum depth of investigation*

Identified Acid Sulfate Locations

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 16a

Map Document: ARCADIS\EAA Team Site - Restoration\TEMP_Job Folders\GEHBI\GEHP GIS\GEHBI Figures\Sampling Plan Figures (rs82837)

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BH11	Stratigraphy	Depth (RL mAHD)
	SILT	7.60 - 2.10 *

BH104	Stratigraphy	Depth (RL mAHD)
	SILT	8.03 - 6.53
	SILT	4.03 - 2.78*

BH10	Stratigraphy	Depth (RL mAHD)
	SAND	6.60 - 6.35
	Silty SAND	6.35 - 6.10

BH09	Stratigraphy	Depth (RL mAHD)
	SAND	7.31 - 5.56
		4.56 - 3.81

BH105	Stratigraphy	Depth (RL mAHD)
	SAND	5.15 - 3.90*

BH08	Stratigraphy	Depth (RL mAHD)
	SAND	6.52 - 6.02
	Clayey SAND	6.02 - 5.02 *

BH100	Stratigraphy	Depth (RL mAHD)
	SAND	10.84 - 5.84*

BH06	Stratigraphy	Depth (RL mAHD)
	SAND	10.63 - 9.38
	Silty CLAY	7.13 - 6.88
	SAND	6.88 - 6.63

BH139	Stratigraphy	Depth (RL mAHD)
	Silty CLAY	15.27 - 13.27
	Sandy CLAY	13.27 - 12.77

BH12	Stratigraphy	Depth (RL mAHD)
	Sandy CLAY	8.38 - 7.88
	Silty CLAY	7.88 - 4.13

BH97	Stratigraphy	Depth (RL mAHD)
	Silty CLAY	7.97 - 6.47
	Silty CLAY	5.97 - 3.22*

BH96	Stratigraphy	Depth (RL mAHD)
	CLAY	9.63 - 7.88
	Sandy CLAY	5.13 - 4.88
	Clayey SAND	4.88 - 4.63*

BH98	Stratigraphy	Depth (RL mAHD)
	CLAY	7.79 - 6.79
	CLAY	4.54 - 3.54

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LAST MODIFIED	05 JUL 2022

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N

0 50 100 metres

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LEGEND

- WP4 Project Boundary
- BH (Soil Bore Hole)

* *denotes maximum depth of investigation*

Identified Acid Sulfate Locations

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

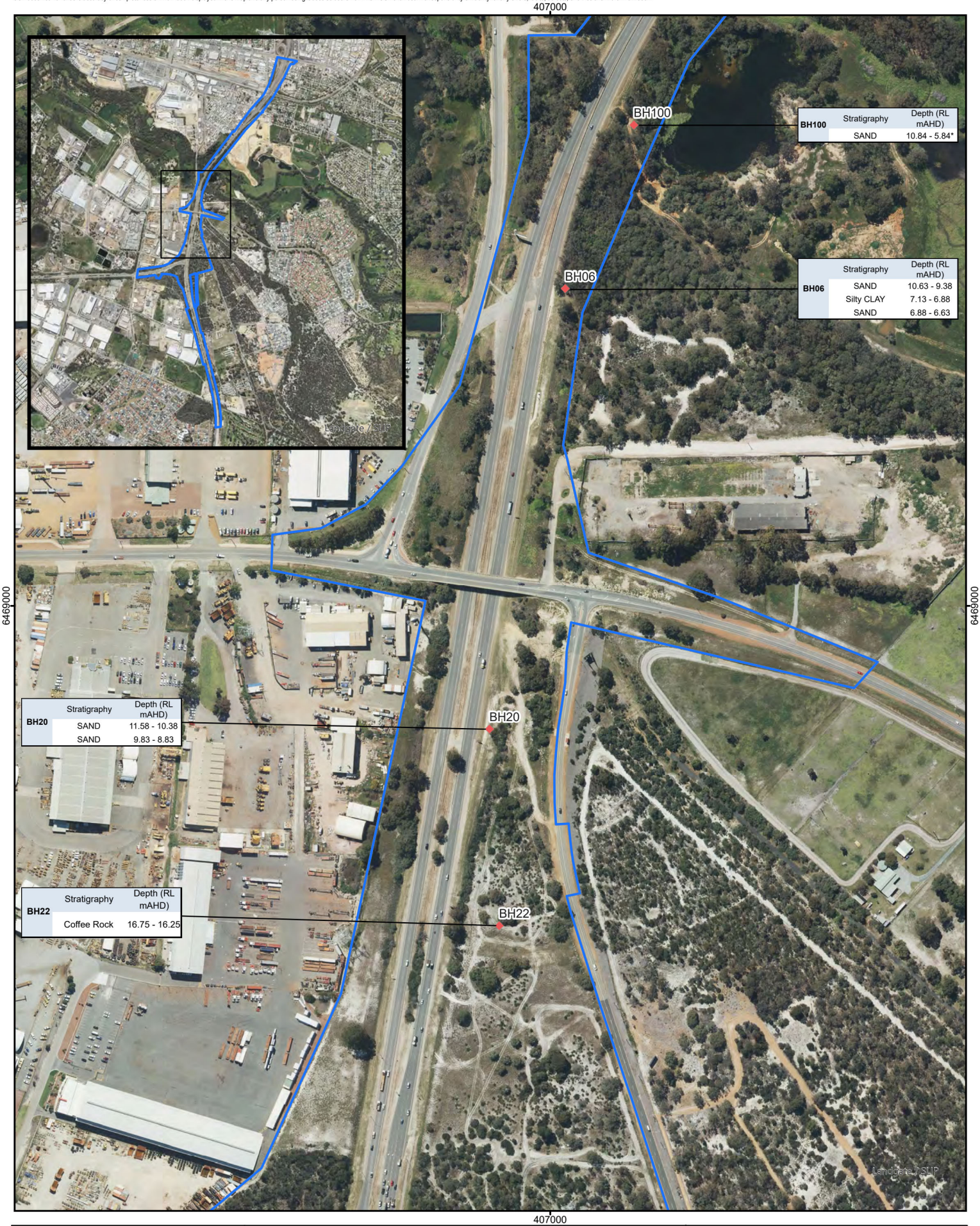
WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 16b

Map Document: ARCADIS\EAA Team Site - Restoration\TEMP_Job Folders\GEHBI\GEHP GIS\GEHBI Figures\Sampling Plan Figures (cq95425)

A3 size

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BH100	Stratigraphy	Depth (RL mAHD)
	SAND	10.84 - 5.84*

BH06	Stratigraphy	Depth (RL mAHD)
	SAND	10.63 - 9.38
	Silty CLAY	7.13 - 6.88
	SAND	6.88 - 6.63

BH20	Stratigraphy	Depth (RL mAHD)
	SAND	11.58 - 10.38
	SAND	9.83 - 8.83

BH22	Stratigraphy	Depth (RL mAHD)
	Coffee Rock	16.75 - 16.25

PROJECT ID	60657311
CREATED BY	RS
APPROVED BY	BV
LAST MODIFIED	29 JUN 2022

Greater Connect ALLIANCE

N

0 50 100

metres

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LEGEND

- WP4 Project Boundary
- BH (Soil Bore Hole)
- * *denotes maximum depth of investigation*

Identified Acid Sulfate Locations

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

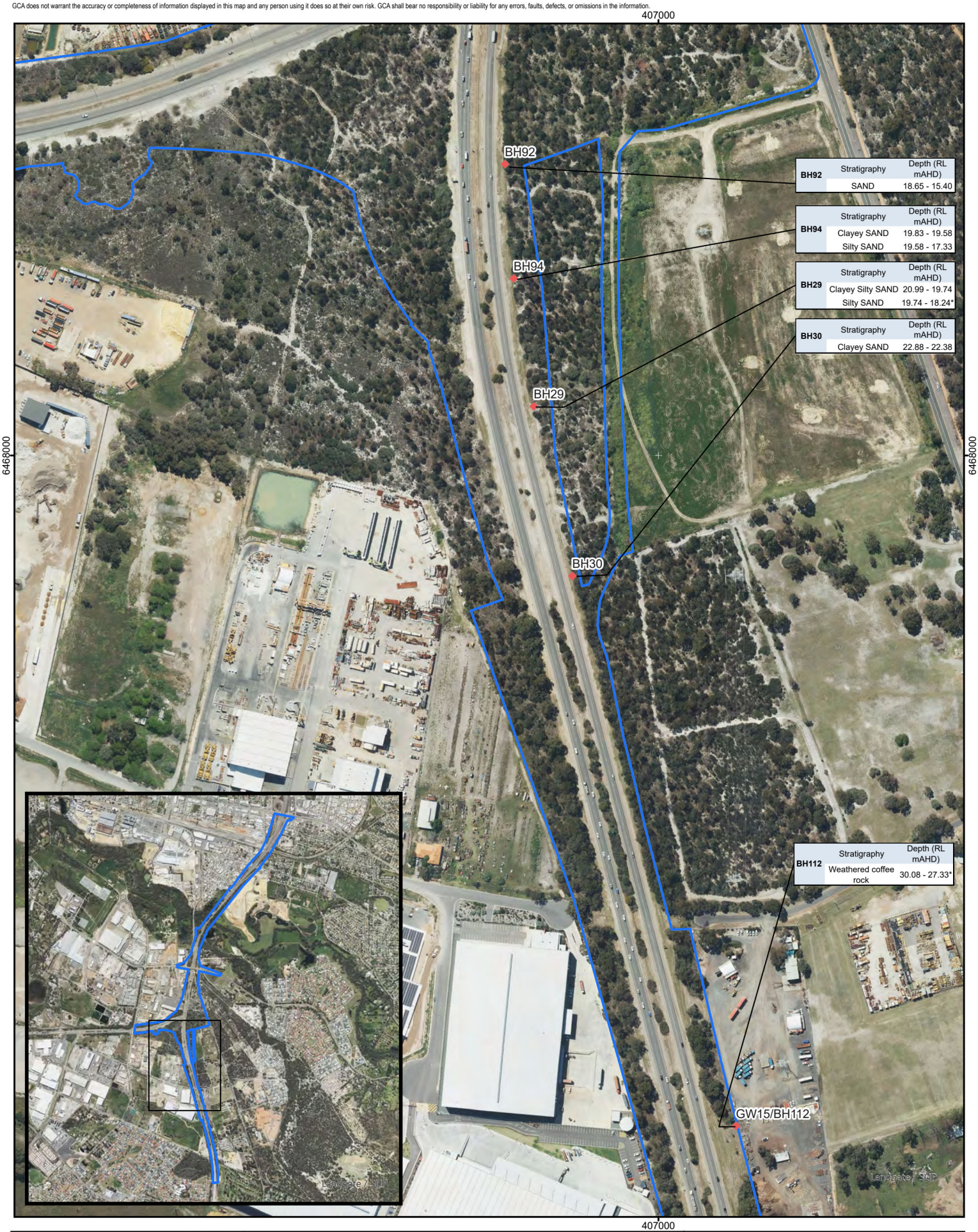
WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 16c

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BH92	Stratigraphy	Depth (RL mAHD)
	SAND	18.65 - 15.40

BH94	Stratigraphy	Depth (RL mAHD)
	Clayey SAND	19.83 - 19.58
	Silty SAND	19.58 - 17.33

BH29	Stratigraphy	Depth (RL mAHD)
	Clayey Silty SAND	20.99 - 19.74
	Silty SAND	19.74 - 18.24*

BH30	Stratigraphy	Depth (RL mAHD)
	Clayey SAND	22.88 - 22.38

BH112	Stratigraphy	Depth (RL mAHD)
	Weathered coffee rock	30.08 - 27.33*

PROJECT ID	60657311
CREATED BY	RS
APPROVED BY	BV
LAST MODIFIED	27 JUN 2022

Greater Connect ALLIANCE

N

0 50 100

metres

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LEGEND

- WP4 Project Boundary
- BH (Soil Bore Hole)
- * *denotes undelineated lower limit*

Identified Acid Sulfate Locations

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 16d

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PROJECT ID	60657311
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LEGEND

- WP4 Project Boundary
- Areas of Acid Sulfate Soil
- BH (ASS Soil Core)

Identified Areas of Acid Sulfate Soil

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure **17a**

Map Document: ARCADIS\EAA Team Site - Restoration\TEMP_Job Folders\GEHBI\GEHP GIS\GEHBI Figures\Sampling Plan Figures (cq95425)

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LEGEND

- WP4 Project Boundary
- Areas of Acid Sulfate Soil
- BH (ASS Soil Core)

WP4 Identified Areas of Acid Sulfate Soil

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 17b

Map Document: ARCADIS\EAA Team Site - Restoration\TEMP_Job Folders\GEHBI\GEHP GIS\GEHBI Figures\Sampling Plan Figures (cq95425)

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metres

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LEGEND

- WP4 Project Boundary
- Areas of Acid Sulfate Soil
- BH (ASS Soil Core)

WP4 Identified Areas of Acid Sulfate Soil

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 17c

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LEGEND

- WP4 Project Boundary
- Areas of Acid Sulfate Soil
- BH (ASS Soil Core)

WP4 Identified Areas of Acid Sulfate Soil

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

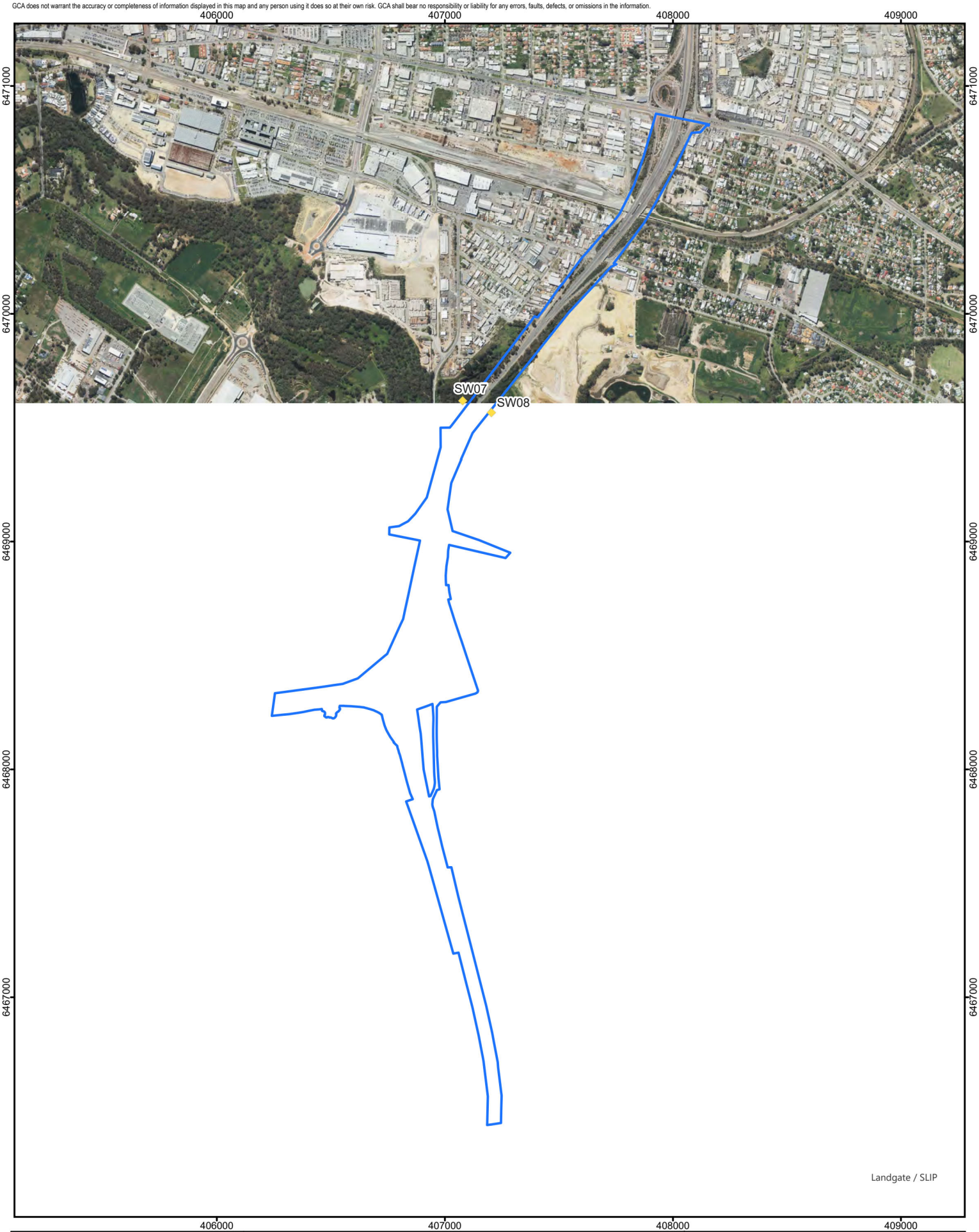
WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure **17d**

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Greater Connect ALLIANCE

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metres

1:15,000
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DATUM GDA 1994 MGA Zone 50

Data sources:

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LEGEND

- WP4 Project Boundary
- SW (Surface Water Sample Location)

Groundwater Sample Locations

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 18

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PROJECT ID	60657311
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LAST MODIFIED	14 APR 2023

Greater Connect ALLIANCE

N

0 50 100

metres

1:4,446 (when printed at A3)

DATUM GDA 1994 Perth Coastal Grid 1994

Data sources:

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LEGEND

- RW U3
- RW U10
- RW-U3 Radius of Influence
- RW-U10 Radius of Influence
- WP4 Pipes
- Groundwater Wells
- Drainage Basins
- WP4 Boundary

Note: Only pipes requiring dewatering are shown. Pipes shown without a radius of influence have a radius of influence less than 20m.

Dewatering Locations and Radius of Influence - North

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 19a

Map Document: ARCADIS\EAA Team Site - Restoration\TEMP_Job Folders\GEHBI\GEHP GIS\GEHBI Figures\Sampling Plan Figures (cq95425)

A3 size



PROJECT ID	60657311
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LAST MODIFIED	14 APR 2023

Greater Connect ALLIANCE

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metres

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(when printed at A3)

DATUM GDA 1994 Perth Coastal Grid 1994

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LEGEND

- WP4 Pipes
- Groundwater Wells
- Drainage Basins
- WP4 Boundary

Note: Only pipes requiring dewatering are shown. Pipes shown without a radius of influence have a radius of influence less than 20m.

Dewatering Locations and Radius of Influence - Central

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 19b

Map Document: ARCADIS\EAA Team Site - Restoration\TEMP_Job Folders\GEHBI\GEHP GIS\GEHBI Figures\Sampling Plan Figures (cq95425)

A3 size



PROJECT ID	60657311
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APPROVED BY	BV
LAST MODIFIED	14 APR 2023

Greater Connect ALLIANCE

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0 50 100

metres

1:3,774 (when printed at A3)

DATUM GDA 1994 Perth Coastal Grid 1994

Data sources:

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LEGEND

- WP4 Pipes
- Groundwater Wells
- Drainage Basins
- WP4 Boundary

Note: Only pipes requiring dewatering are shown. Pipes shown without a radius of influence have a radius of influence less than 20m.

Dewatering Locations and Radius of Influence - South

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 19c

Map Document: ARCADIS\EAA Team Site - Restoration\TEMP_Job Folders\GEHBI\GEHP GIS\GEHBI Figures\Sampling Plan Figures (cq95425)

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LAST MODIFIED	14 JUL 2022

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metres

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DATUM

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LEGEND

- WP4 Project Boundary
- Proposed Drainage Basins
- Proposed Infiltration Basins

Proposed Discharge and Drainage Basin Locations

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure

20

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0 50 100

metres

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DATUM GDA 1994 Perth Coastal Grid 1994

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LEGEND

- Drainage Basin
- RW U3
- RW U10
- WP4 Pipes
- WP4 Project Boundary
- Areas of Acid Sulfate Soil
- ASS Treatment Pads

ASS Excavation and Proposed Treatment Areas

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 21a

Map Document: ARCADIS\EAA Team Site - Restoration\TEMP_Job Folders\GEHBI\GEHP GIS\GEHBI Figures\Sampling Plan Figures (cq95425)

A3 size

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PROJECT ID	60657311
CREATED BY	RS
APPROVED BY	BV
LAST MODIFIED	14 APR 2023

Greater Connect ALLIANCE

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metres

1:3,084 (when printed at A3)

DATUM GDA 1994 Perth Coastal Grid 1994

Data sources:

Base Data: © Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010); Geoscience Australia; Streetpro

LEGEND

- Drainage Basin
- RW U3
- RW U10
- WP4 Pipes
- WP4 Project Boundary
- Areas of Acid Sulfate Soil
- ASS Treatment Pads

ASS Excavation and Proposed Treatment Areas

MAIN ROADS WA

GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

WP4 - ACID SULFATE SOIL AND DEWATERING MANAGEMENT PLAN

Figure 21b

Map Document: ARCADIS\EAA Team Site - Restoration\TEMP_Job Folders\GEHBI\GEHP GIS\GEHBI Figures\Sampling Plan Figures (cq95425)

A3 size

APPENDIX A – GROUNDWATER EXTRACTION LICENCE AND BORE DETAILS

Table A-1 Registered Water Extraction Licences

Table A-2 Registered GW

Licence Number	Licence Type	Issue Date	Expiry Date	Licence Allocation	Parties	Groundwater Area	Groundwater Subarea	Aquifer	Licence Address
51642	Groundwater Licence	15/10/2019	14/10/2029	82250 KL	BGC (Australia) Pty Ltd	Perth	Shire of Swan South	Perth - Superficial Swan	LOT 4 ON DIAGRAM 55932 - Volume/Folio 1978/979 - Lot 4 STIRLING CR HAZELMERE; LOT 800 ON DEPOSITED PLAN 408214 - Volume/Folio 2924/462 - Lot 800 LAKES RD HAZELMERE; LOT 202 ON PLAN 39720 - Volume/Folio 2573/193 - Lot 202 BUSHMEAD RD HAZELMERE; LOT 76 ON PLAN 4539 - Volume/Folio 1674/164 - Lot 76 BUSHMEAD RD HAZELMERE
61690	Groundwater Licence	7/05/2018	6/05/2028	1000 KL	Fulton Hogan Industries Pty Ltd	Perth	Shire of Swan South	Perth - Superficial Swan	LOT 1 ON PLAN 7481 - Volume/Folio 2069/304 - Lot 1 KALAMUNDA RD PERTH AIRPORT
98956	Groundwater Licence	3/04/2020	2/04/2030	15550 KL	Swick, Randal Lloyd	Perth	Shire of Swan South	Perth - Superficial Swan	Lot 12 Stirling Crescent Hazelmere WA 6055 Australia
101500	Groundwater Licence	8/10/2020	7/10/2030	66000 KL	Derby Industries Pty Ltd	Perth	Perth South Confined	Perth - Leederville.	LOT 801 ON PLAN 410111 - Volume/Folio 2939/288 - Lot 801 LAKES RD HAZELMERE; LOT 20 ON PLAN 73040 - Volume/Folio 2814/696 - Lot 20 ; LOT 116 ON PLAN 4553 - Volume/Folio 1243/89 - Lot 116 LAKES RD HAZELMERE
103896	Groundwater Licence	31/05/2021	30/05/2031	8500 KL	Austral Bricks (WA) Pty Ltd	Perth	Shire of Swan South	Perth - Superficial Swan	LOCKED BAG 100 Midland DC WA 6936 Australia
108239	Groundwater Licence	11/12/2013	1/12/2023	4280 KL	Bynon, William John	Perth	Shire of Swan South	Perth - Superficial Swan	Lot 2 On Diagram 58225 Volume/Folio 2130/641 Lot 2 Arum Lily Pl Hazelmere
110971	Groundwater Licence	16/11/2012	16/11/2022	29250 KL	The Trustee For C & S Bucolo Family Trust	Perth	Perth South Confined	Perth - Leederville.	255 Midland Rd Hazelmere WA 6055 Australia
111079	Groundwater Licence	12/03/2015	11/03/2025	5550 KL	Shire of Mundaring	Perth	Shire of Mundaring	Perth - Superficial Swan	7000 Great Eastern Hwy Mundaring WA 6073 Australia
156446	Groundwater Licence	1/05/2017	30/04/2027	9000 KL	Brighton, Anthony	Perth	Shire of Swan South	Perth - Superficial Swan	Lot 7 On Plan 30344 Volume/Folio 2034/646 Lot 7 Hazelmere
168139	Groundwater Licence	8/09/2021	28/08/2029	295775 KL	City of Swan	Perth	Perth South Confined	Perth - Leederville	LOT 503 ON PLAN 75177 - Volume/Folio LR3021/922 - Lot 503 CLAYTON ST KOONGAMIA; Crown Reserve 37172 Lot 10174 Gray Dr Midvale Ron Jose Oval; Lot 13421 On Plan 220279 Volume/Folio Lr3114/605 Lot 13421 Eddie Barron Dr Middle Swan Velodrome; Lot 5 On Diagram 48300 Volume/Folio 1406/686 Lot 5 Great Northern Hwy Middle Swan Lot 56 On Plan ; Lot 144 On Plan 222536 Volume/Folio 1228/232 Lot 144 Helena St Guildford Spring Reserve; Crown Reserve 37172 Lot 10174 Gray Dr Midvale Ron Jose Oval And Gray Drive Lot 18 On Diagram 5876; Lot 70 On Diagram 58407 Volume/Folio 1790/161 Lot 70 Bishop Rd Middle Swan Jack Mann Oval; Crown Reserve 28356 Lot 8156 Minchin Cr Middle Swan Velgrove Park; Lot 98 On Plan 26404 Volume/Folio 2215/629 Lot 98 Harper St Woodbridge Ray Marshall Park; Lot 13517 On Plan 194579 Volume/Folio Lr3033/635 Lot 13517 Middle Swan Jack Williamson Oval; Lot 9808 On Plan 215911 Volume/Folio Lr3011/723 Lot 9808 The Quarry Swan View The Quarry; Lot 234 On Plan 188150 Volume/Folio Lr3041/230 Lot 234 Helena St Guildford Kings Meadow Polo Grou; Lot 216 On Plan 3298 Volume/Folio 2156/710 Lot 216 The Avenue Midland Midland Oval; LOT 1 ON DIAGRAM 69388 - Volume/Folio 1733/885 - Lot 1 ; Crown Reserve 35349 Lot 9803 Blackadder Rd Swan View Swan View Park; Lot 13420 On Plan 220279 Volume/Folio Lr3114/604 Lot 13420 Patterson Dr Middle Swan; Lot 98 Harper Street Woodbridge Ray Marshall Park; Lot 191 On Plan 222550 Volume/Folio 199/195 Lot 191 Meadow St Guildford Stirling Square And Meado
175349	Groundwater Licence	2/11/2012	2/11/2022	57600 KL	Swanview Plant Farm Pty Ltd	Perth	Shire of Swan South	Perth - Superficial Swan	Lot 2 On Diagram 19492 Volume/Folio 1301/113 Lot 2 Adelaide St Hazelmere
176450	Groundwater Licence	24/10/2012	19/10/2022	2000 KL	Hussein, Emine , Egglestone, Kevin Ray	Perth	Shire of Swan South	Perth - Superficial Swan	Lot 508 on Diagram 89700 and being the whole of the land comprised in Certificate of Title Volume 2067 Folio 988 Lot 508 Nirimba Close South Guildford
176573	Groundwater Licence	14/03/2016	31/07/2023	33500 KL	Taliska Securities Pty Ltd	Perth	Shire of Mundaring	Perth - Superficial Swan	Lot 800 On Plan 67650 Volume/Folio 2764/138 Lot 800 Katharine St Bellevue Stage 1 & 2; Lot 239 On Diagram 2029 Volume/Folio 375/101 Lot 239 Wilkins St, Bellevue
181973	Groundwater Licence	28/01/2016	31/01/2026	3600 KL	Marwon Pty Ltd	Perth	Shire of Kalamunda	Perth - Superficial Swan	Part Lot 1499 On Plan 251270 Volume/Folio 1087/357 Lot 1499 Stirling Cr High Wycombe
182575	Groundwater Licence	20/07/2021	19/07/2026	30000 KL	Dunland Property Pty Ltd	Perth	Shire of Swan South	Perth - Superficial Swan	Road Reserve - Pin 12387158; LOT 8004 ON PLAN 415253; LOT 9007 ON PLAN 416337 - Volume/Folio 4004/63 - Lot 9007 ; LOT 8003 ON PLAN 48644 - Volume/Folio LR3169/48 - Lot 8003 BUSHMEAD; Road Reserve - Pin 12387153; Road Reserve - Pin12517462; Road Reserve - Pin12517460; Road Reserve - Pin11841799; Road Reserve - Pin12386389; LOT 8005 ON PLAN 415253; LOT 9006 ON PLAN 418837; Road Reserve - Pin12430712; LOT 9003 ON PLAN 416335; LOT 9504 ON PLAN 416337 - Volume/Folio 4004/64 - Lot 9504 ; Road Reserve - Pin 12310601; Road Reserve - Pin12517461; LOT 8000 ON PLAN 413457; Road Reserve - Pin12386390; Road Reserve - Pin 12386388
158077	Licence Type	24/11/2020	25/01/2024	936725 KL	City of Kalamunda	Perth	Shire of Kalamunda	Perth - Superficial Swan	Lot 11104 On Plan 16087 Lot 11104 Kookaburra Cr High Wycombe Peter Hegney Park; Lot 532 On Plan 4684 Volume/Folio 1219/470 Lot 532 Berkshire Rd Forrestfield Lot 534 On Plan 4684; Lot 15426 On Plan 38202 Volume/Folio Lr3137/878 Lot 15426 Bowden Dr High Wycombe Jacaranda 2; Lot 104 On Plan 17920 Volume/Folio 1906/470 Lot 104 Salix Wy Forrestfield Dawson/ Salix Wy Crow; Lot 570 On Plan 15568 Volume/Folio 1764/820 Lot 570 Newburn Rd High Wycombe Lot 570 Newburn Rd; Lot 8455 On Plan 9177 Volume/Folio Lr3014/588 Lot 8455 Harewood St Forrestfield Connaught Reserve; Lot 13602 On Plan 23588 Volume/Folio Lr3116/599 Lot 13602 Plane Tree Grn Forrestfield Plane Tree ; Crown Reserve 38271 Lot 10427 Saddleback Cir Maida Vale Saddleback Circle; Lot 11891 On Plan 191250 Volume/Folio Lr3101/134 Lot 11891 Wycombe Rd High Wycombe Scott Reserve; Lot 601 On Plan 24621 Volume/Folio Lr3131/506 Lot 601 Hawkevale Rd High Wycombe Hawkevale Rd; Lot 9479 On Plan 10863 Volume/Folio Lr3014/721 Lot 9479 Magnolia Way Forrestfield Magnolia Way Re; Crown Reserve 33741 Lot 9388 Virgilia Wy Forrestfield Virgilla; Lot 13211 On Plan 22311 Volume/Folio Lr3112/823 Lot 13211 Tree Fern Grn Maida Vale Pinker Reserve; Lot 11856 On Plan 14310 Volume/Folio Lr3100/842 Lot 11856 O'Connell Wy High Wycombe Pinetree Rese; Road Reserve - Pin1869713; Crown Reserve 34610 Lot 9611 Akebia Wy Forrestfield Akebia Way Reserve Crown Reserve 34610 Lot 1; Lot 11956 On Diagram 82220 Volume/Folio Lr3103/241 Lot 11956 Worrell Av High Wycombe Ollie Worrel; Lot 14651 On Plan 33710 Volume/Folio Lr3129/567 Lot 14651 Benson Wy High Wycombe Jacaranda 1 Lot; Crown Reserve 29061 Lot 10295 Dawson Av Forrestfield Dawson Park Crown Reserve 35618 Lot 9685 Da; Lot 11072 On Plan 188672 Lot 11072 Newburn Rd High Wycombe Fleming Reserve; Lot 9257 On Diagram 33975 Volume/Folio Lr3014/715 Lot 9257 Gordon St Maida Vale; Lot 15212 On Plan 38506 Volume/Folio Lr3128/735 Lot 15212 Fruit Tree Cr Forrestfield Orchard 2 L; Crown Reserve 46496 Volume/Folio Lr3122/5 Lot 13987 Fruit Tree Cr Forrestfield Fruit Tree Way Lo; Lot 99 On Plan 30216 Volume/Folio 2517/615 Lot 99 Freeduff Dr Wattle Grove Including Adjacent Roa; Crown Reserve 31571 Lot 8927 Bandalong Wy High Wycombe Progress Reserve; Lot 8295 On Plan 8771 Volume/Folio Lr3014/649 Lot 8295 Netherwood Rd High Wycombe Mackenzie Park; Crown Reserve 27815 Lot 7945 Wittenoom Rd High Wycombe Emms Reserve; Lot 28 On Plan 4666 Volume/Folio 1536/595 Lot 28 Swan Rd High Wycombe Rangeview Park Crown Reser; Lot 11887 On Plan 18576 Volume/Folio Lr3101/112 Lot 11887 Wittenoom Rd High Wycombe Viv Robinson ; Lot 33 On Plan 49415 Volume/Folio Lr3155/246 Lot 33 Agraulia Ct High Wycombe High Wycombe; Lot 294 On Plan 72065 Volume/Folio Lr3161/863 Lot 294 Boodjera Bend Forrestfield; Crown Reserve 36299 Lot 9462 Markham Rd High Wycombe High Wycombe Library; Lot 9639 On Plan 11612 Volume/Folio Lr3014/726 Lot 9639 Dawson Av Forrestfield Juniper Reserve; Road Reserve - Pin11816747; Lot 11239 On Plan 217426 Volume/Folio Lr3065/643 Lot 11239 Dawson Av Forrestfield Pioneer Park; Lot 534 On Plan 4684 Volume/Folio 1219/69 Lot 534 Berkshire Rd Forrestfield; Lot 13603 On Plan 23589 Volume/Folio Lr3116/600 Lot 13603 Peach Tree Wy Forrestfield Reserve 3391; Lot 8001 On Plan 69083 Volume/Folio Lr3160/192 Lot 8001 Mandon St Forrestfield Tyler Springs Esta; Crown Reserve 49263; Lot 9464 On Plan 182009 Volume/Folio Lr3014/718 Lot 9464 Swan Rd High Wycombe Rangeview Park; Lot 15430 On Plan 40810 Volume/Folio Lr3134/620 Lot 15430 Fruit Tree Cr Forrestfield Lot 15430 Fr; Crown Reserve 34115 Lot 10448 Magnolia Wy Forrestfield Magnolia Way Reserve Crown Reserve 34115 ; Lot 888 On Plan 49229 Volume/Folio Lr3141/709 Lot 888 Lenihan Cnr Wattle Grove Woodlupine Reserve; Lot 15405 On Plan 38797 Volume/Folio Lr3133/445 Lot 15405 Warda Cr Forrestfield Warda Est; Lot 3894 On Plan 218532 Volum

Licence Number	Licence Type	Issue Date	Expiry Date	Licence Allocation	Parties	Groundwater Area	Groundwater Subarea	Aquifer	Licence Address
158261	Groundwater Licence	6/08/2012	18/04/2022	100500 KL	Shire of Mundaring	Perth	Perth South Confined	Perth - Leederville.	Lot 49 On Plan 1833 Volume/Folio 1818/414 Lot 49 Muros Pl Midvale; Lot 85 On Plan 15125 Volume/Folio 1702/343 Lot 85 Stanhope Gdns Midvale; Lot 51 On Plan 6365 Volume/Folio 1614/974 Lot 51 Horsley St Swan View Collier Park; Lot 12052 On Plan 192029 Volume/Folio Lr3104/283 Lot 12052 Gladstone Av Swan View Swan View High School; Crown Reserve 24730 Lot 9632 Morrison Rd Swan View Swan View Primary School Crown Reserve 24730 Lot 6238 Morrison Rd Swan View Swan View Primary School; Crown Reserve 35349 Lot 9803 Blackadder Rd Swan View Swan View Park; Lot 147 On Plan 1833 Volume/Folio 996/132 Lot 147 Salisbury Rd Swan View Lot 148 On Plan 1833 Volume/Folio 996/132 Lot 148 Salisbury Rd Swan View Lot 145 On Plan 1833 Volume/Folio 1002/537 Lot 145 Salisbury Rd Swan View Lot 144 On Plan 1833 Volume/Folio 1002/537 Lot 144 Salisbury Rd Swan View Lot 143 On Plan 1833 Volume/Folio 1002/537 Lot 143 Salisbury Rd Swan View Lot 142 On Plan 1833 ; Lot 299 On Diagram 70750 Volume/Folio 1743/886 Lot 299 Salisbury Rd Midvale Salisbury Park; Crown Reserve 34717 Lot 9643 Gladstone Av Swan View Markham Pk & Ryan Wy Crown Reserve 34717 Lot 10508 Amherst Rd Swan View Markham Pk & Ryan Wy; Crown Reserve 33375 Volume/Folio Lr3099/453 Lot 11788 Abingdon Rd Swan View Christowe Park Crown Reserve 33375 Volume/Folio Lr3099/453 Lot 9670 Abingdon Rd Swan View Christowe Park Crown Reserve 33375 Volume/Folio Lr3099/453 Lot 9669 Abingdon Rd Swan View Christowe Park Crown Reserve 33375 Volume/Folio Lr3099/453 Lot 9285 Abingdon Rd Swan View Christowe Park
167041	Groundwater Licence	8/01/2019	7/01/2029	3750 KL	City of Kalamunda	Perth	Shire of Kalamunda	Perth - Superficial Swan	Lot 28 On Plan 49522 Volume/Folio Lr3139/210 Lot 28 Nottingham Grn High Wycombe
167337	Groundwater Licence	9/01/2019	8/01/2029	11250 KL	Shire of Mundaring	Perth	Perth South Confined	Perth - Leederville.	Lot 8000 On Plan 63050 Volume/Folio Lr3156/500 Lot 8000 Helena Valley Rd Helena Valley; Lot 12367 On Plan 19377 Volume/Folio Lr3146/813 Lot 12367 Helena Valley Rd Helena Valley; Road Reserve - Pin11840317
168263	Groundwater Licence	8/11/2017	8/11/2027	198675 KL	City of Swan	Perth	Shire of Swan South	Perth - Superficial Swan	CROWN RESERVE 22236; LOT 785 ON PLAN 76009 - Volume/Folio LR3164/383 - Lot 785 ; Lot 12023 On Plan 19280 Volume/Folio Lr3103/948 Lot 12023 Dulverton Cl Stratton Cockman Park; Road Reserve Farrall Rd, Stratton; Lot 12506 On Plan 20009 Volume/Folio Lr3040/44 Lot 12506 Bremer Ct Jane Brook Bremer Park; LOT 256 ON PLAN 1236 - Volume/Folio 1884/782 - Lot 256 NORTH ST MIDLAND; Road Reserves O'Connor Rd, Stratton; Lot 11807 On Plan 191086 Volume/Folio Lr3093/188 Lot 11807 Brilliant Rise Stratton Squires Garden; LOT 503 ON PLAN 43802 - Volume/Folio 2835/28 - Lot 503 ; Road Reserves Terrace Rd, Stratton Sugargum Park; Road Reserve - Pin11823162; Lot 9963 On Plan 4539 Volume/Folio Lr3138/733 Lot 9963 West Pde Hazelmere Bruce Elliott Reserve; LOT 9011 ON PLAN 76009 - Volume/Folio 2842/175 - Lot 9011 ; Lot 267 On Plan 1236 Volume/Folio 1868/23 Lot 267 Charles St Midland Corti Park; LOT 722 ON PLAN 76009 - Volume/Folio LR3164/382 - Lot 722 ; Lot 6868 On Diagram 11287 Volume/Folio Lr3016/512 Lot 6868 Ford St Woodbridge Harper Park; Lot 12820 On Diagram 93424 Volume/Folio Lr3043/293 Lot 12820 Toodyay Rd Jane Brook Jane Brook Foreshore; Lot 12043 on Plan 19164 Volume/Folio Lr3061/743 Lot 12043 Kangaroo Ent, Stratton and Road Reserves Kangaroo Ent, Stratton Kangaroo Park/Joey Park; LOT 206 ON DIAGRAM 91822 - Volume/Folio 2099/148 - Lot 206 WELLATON ST MIDVALE; Road Reserves Talbot Rd, Stratton; Road Reserve Farrall Rd (North), Jane Brook; Lot 44 On Plan 48256 Volume/Folio Lr3138/566 Lot 44 Aquaviva Cir Viveash Elvire Park; Lot 14641 On Plan 35576 Volume/Folio Lr3129/491 Lot 14641 Ferguson St Midland Warnock Park; LOT 0 ON PLAN 5891 - Volume/Folio 1556/716 - Lot 0 NORTH ST MIDLAND; Lot 12224 On Plan 20182 Volume/Folio Lr3120/368 Lot 12224 Waterhall Rd South Guildford Waterhall Park; Lot 9963 West Pde Hazelmere Bruce Elliot Park; LOT 266 ON PLAN 1236 - Volume/Folio 1868/22 - Lot 266 CHARLES ST MIDLAND; Lot 11817 On Plan 18230 Volume/Folio Lr3093/148 Lot 11817 Cockman Crss Stratton Including Adjacent Road Reserves John Stone Park; LOT 723 ON PLAN 69982 - Volume/Folio LR3161/805 - Lot 723 ; LOT 3 ON PLAN 10245 - Volume/Folio 1388/800 - Lot 3 BILDJAR CL SOUTH GUILDFORD; LOT 9012 ON PLAN 401053 - Volume/Folio 2862/753 - Lot 9012 ; LOT 4616 ON DIAGRAM 11287 - Volume/Folio LR3016/511 - Lot 4616 ; LOT 12604 ON DIAGRAM 83348 - Volume/Folio LR3123/713 - Lot 12604 JECKS PL STRATTON; Crown Reserve 45699 Volume/Folio Lr3113/409 13315 Hooley Rd Midvale Snow Bennett Park (Harold); LOT 149 ON PLAN 222536 - Volume/Folio LR3016/500 - Lot 149 JAMES ST GUILDFORD; Lot 15056 On Plan 23951 Volume/Folio Lr3131/431 Lot 15056 De Grey Rtt Jane Brook De Grey Retreat Pos; LOT 34 ON PLAN 222536 - Volume/Folio LR3016/498 - Lot 34 FAUNTLEROY ST GUILDFORD; LOT 255 ON PLAN 1236 - Volume/Folio 1868/21 - Lot 255 NORTH ST MIDLAND; Lot 10627 On Plan 6974 Volume/Folio Lr3146/714 Lot 10627 John St Midland Koolbardi Park; LOT 11812 ON PLAN 18231 - Volume/Folio LR3056/238 - Lot 11812 FARRALL RD STRATTON; LOT 721 ON PLAN 56679 - Volume/Folio LR3151/273 - Lot 721 ; Lot 12358 On Plan 18820 Volume/Folio Lr3105/628 Lot 12358 Cockman Crss Stratton Bombay Entrance Park; LOT 13315 ON DIAGRAM 91822 - Volume/Folio LR3113/408 - Lot 13315 ; LOT 9005 ON PLAN 60247 - Volume/Folio 2703/777 - Lot 9005 ; Road Reserve - Pin1141615; Lot 11806 On Plan 18282 Volume/Folio Lr3096/475 Lot 11806 Brilliant Rise Stratton Brilliant Rise Park; Road Reserve Inquirer Lane, Stratton Inquirer Lane PAW; Lot 12819 On Plan 22125 Volume/Folio Lr3109/519 Lot 12819 Little River Cove Jane Brook Little River Cove Pos; Lot 11748 On Plan 18819 Volume/Folio Lr3093/189 Lot 11748 Cockman Crss Stratton Ferrolana Park; LOT 0 ON PLAN 5891 - Volume/Folio 1556/716 - Lot 0 NORTH ST MIDLAND
178485	Groundwater Licence	6/03/2014	5/03/2024	5225 KL	Salter, Jennifer	Perth	Shire of Mundaring	Perth - Superficial Swan	Lot 1 On Diagram 72674 Volume/Folio 1785/863 Lot 1 Helena Valley Rd Helena Valley
181379	Groundwater Licence	14/01/2016	13/01/2026	23250 KL	Shire of Mundaring	Perth	Shire of Mundaring	Perth - Superficial Swan	Crown Reserve 51186 (Lot 315 on Plan 64809), Helena Valley; Lot 12164 Golden Ash Gdns, Helena Valley (Grundy Park); Lot 12534 Lakeside Dr, Helena Valley (Broz Park); Road verge and median: Helena Valley Rd from Lakeside Dr to Torquata Blvd & Lakeside Dr entrance; Lot 8001 On Plan 50065 Volume/Folio Lr3140/752 Lot 8001 Carabeen Av Helena Valley
183745	Groundwater Licence	1/05/2017	30/04/2027	10000 KL	Dunland Property Pty Ltd	Perth	Shire of Swan South	Perth - Superficial Swan	Lot 911 On Plan 60213 Volume/Folio 2730/721 Lot 911 Midland Rd Hazelmere
201341	Groundwater Licence	23/05/2018	22/05/2028	3519 KL	H and H Developments (WA) No 2 Pty Ltd	Perth	Shire of Mundaring	Perth - Superficial Swan	LOT 252 HELENA VALLEY ROAD HELENA VALLEY 6056
201944	Groundwater Licence	19/09/2018	18/09/2028	196250 KL	Maida Vale Golf Pty Ltd	Perth	Shire of Kalamunda	Perth - Superficial Swan	350 KALAMUNDA ROAD MAIDA VALE 6057
203131	Groundwater Licence	24/07/2019	23/07/2022	65000 KL	Georgiou Group Pty Ltd	Perth	Shire of Kalamunda	Perth - Superficial Swan	LOT 50 ON PLAN 6909; LOT 3 MAIDA VALE ROAD MAIDA VALE 6057
203309	Groundwater Licence	27/03/2020	26/03/2030	6150 KL	Karingal Green Health, Aged and Community Care (WA) Pty Ltd	Perth	Shire of Kalamunda	Perth - Superficial Swan	LOT 500 ON PLAN 411556 - Volume/Folio 2941/307 - Lot 500 HYBANTHUS AV HIGH WYCOMBE
206559	Groundwater Licence	2/11/2021	3/05/2022	4000 KL	Aecom Australia Pty Ltd & Arcadis Australia Pacific Pty Ltd & Laing O'Rourke Australia Construction Pty Ltd	Perth	Shire of Swan South	Perth - Superficial Swan	LOT 800 ON PLAN 404599
206579	Groundwater Licence	5/11/2021	4/11/2031	7233 KL	Cityplaza Pty Ltd	Perth	Shire of Mundaring	Perth - Superficial Swan	LOT 2 ON PLAN 3284; LOT 6 ON PLAN 3259; LOT 3 ON PLAN 3958
200996	Groundwater Licence	1/03/2018	28/02/2023	42000 KL	Taliska Securities Pty Ltd	Perth	Shire of Mundaring	Perth - Superficial Swan	LOT 799 ON PLAN 408219 - Volume/Folio 2912/863 - Lot 799 KATHARINE ST BELLEVUE
203998	Groundwater Licence	26/02/2021	25/02/2022	50000 KL	GMF Contractors Pty Ltd	Perth	Shire of Swan South	Perth - Superficial Swan	LOT 15604 ON DEPOSITED PLAN 41641 - Volume/Folio LR3134/303 - Lot 15604 ELGEE RD BELLEVUE
205535	Groundwater Licence	22/02/2021	21/02/2031	20685 KL	City of Swan	Perth	Shire of Swan South	Perth - Superficial Swan	LOT 8004 ON PLAN 409685; LOT 8005 ON PLAN 412676; LOT 8013 ON PLAN 70100; LOT 8010 ON PLAN 409685; LOT 8003 ON PLAN 412676; LOT 8007 ON PLAN 409683; LOT 8008 ON PLAN 70100

REGISTER EXTRACT INFORMATION

The Department of Water is committed to quality service to its customers and makes every attempt to ensure accuracy, currency and reliability of the data contained in this document. However changes in circumstances after time of publication may impact the quality of this information.

Appendix A - Registered Bores
Table A2 - Registered Groundwater Bores

Site ID	Default Site Reference	Site Type	Site Sub Type	Default Site Number System	Site Name	Site Shortname	All Site References	Eastings	Northings
61608830	61608830	Groundwater	Bore or Well	AWRC	Midland Railway Workshop - Artesian No1	Artesian No1	20040437 [WIN_ID]; 2134-3-SW-0045 [AQWAB]; 61608830 [SITE_REF]	406493	6470307
61608831	61608831	Groundwater	Bore or Well	AWRC	Midland Railway Workshop - Artesian No2	Artesian No2	20040438 [WIN_ID]; 2134-3-SW-0046 [AQWAB]; 61608831 [SITE_REF]	406335	6470209
61608832	61608832	Groundwater	Bore or Well	AWRC	Midland Railway Workshop - No2A	No2A	20040439 [WIN_ID]; 2134-3-SW-0047 [AQWAB]; 61608832 [SITE_REF]	406335	6470209
61608837	61608837	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Midland Rd No1	Midland Rd No1	20040453 [WIN_ID]; 2134-3-SW-0061 [AQWAB]; 61608837 [SITE_REF]	407490	6467213
61608839	61608839	Groundwater	Bore or Well	AWRC	Midland - 18 Abattoirs No2	18 Abattoirs No2	20040455 [WIN_ID]; 2134-3-SW-0063 [AQWAB]; 61608839 [SITE_REF]	406896	6470067
61608956	61608956	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 18	18	20040575 [WIN_ID]; 2134-3-SW-0183 [AQWAB]; 61608956 [SITE_REF]	408064	6469135
61608957	61608957	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 19	19	20040576 [WIN_ID]; 2134-3-SW-0184 [AQWAB]; 61608957 [SITE_REF]	407866	6468961
61608959	61608959	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 21	21	20040578 [WIN_ID]; 2134-3-SW-0186 [AQWAB]; 61608959 [SITE_REF]	406702	6468763
61608960	61608960	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 22	22	20040579 [WIN_ID]; 2134-3-SW-0187 [AQWAB]; 61608960 [SITE_REF]	406072	6468471
61608961	61608961	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 23	23	20040580 [WIN_ID]; 2134-3-SW-0188 [AQWAB]; 61608961 [SITE_REF]	406031	6468432
61608962	61608962	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 28	28	20040581 [WIN_ID]; 2134-3-SW-0189 [AQWAB]; 61608962 [SITE_REF]	407208	6467713
61608963	61608963	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 29	29	20040582 [WIN_ID]; 2134-3-SW-0190 [AQWAB]; 61608963 [SITE_REF]	407255	6466906
61608964	61608964	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 30	30	20040583 [WIN_ID]; 2134-3-SW-0191 [AQWAB]; 61608964 [SITE_REF]	406692	6467558
61608965	61608965	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 31	31	20040584 [WIN_ID]; 2134-3-SW-0192 [AQWAB]; 61608965 [SITE_REF]	406521	6467863
61608966	61608966	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 32	32	20040585 [WIN_ID]; 2134-3-SW-0193 [AQWAB]; 61608966 [SITE_REF]	406758	6466870
61608967	61608967	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 33	33	20040586 [WIN_ID]; 2134-3-SW-0194 [AQWAB]; 61608967 [SITE_REF]	406475	6466938
61608968	61608968	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 34	34	20040587 [WIN_ID]; 2134-3-SW-0195 [AQWAB]; 61608968 [SITE_REF]	406358	6467139
61608969	61608969	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 35	35	20040588 [WIN_ID]; 2134-3-SW-0196 [AQWAB]; 61608969 [SITE_REF]	406242	6467043
61608970	61608970	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 36	36	20040589 [WIN_ID]; 2134-3-SW-0197 [AQWAB]; 61608970 [SITE_REF]	406244	6467262
61608972	61608972	Groundwater	Bore or Well	AWRC	Midvale Helena Valley - Race Course	Race Course	20040591 [WIN_ID]; 2134-3-SW-0199 [AQWAB]; 61608972 [SITE_REF]	408232	6471399
61608973	61608973	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040592 [WIN_ID]; 2134-3-SW-0200 [AQWAB]; 61608973 [SITE_REF]	406423	6467876
61608994	61608994	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Morrison Pk Midvale	Morrison Pk Midvale	20040635 [WIN_ID]; 2134-3-SW-0243 [AQWAB]; 61608994 [SITE_REF]	408420	6471484
61608998	61608998	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040639 [WIN_ID]; 2134-3-SW-0247 [AQWAB]; 61608998 [SITE_REF]	407659	6471533
61609005	61609005	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040646 [WIN_ID]; 2134-3-SW-0254 [AQWAB]; 61609005 [SITE_REF]	407533	6471676
61609006	61609006	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040647 [WIN_ID]; 2134-3-SW-0255 [AQWAB]; 61609006 [SITE_REF]	407665	6471328
61609022	61609022	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040671 [WIN_ID]; 2134-3-SW-0279 [AQWAB]; 61609022 [SITE_REF]	408171	6468505
61609031	61609031	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bellevue Primary	Bellevue Primary	20040681 [WIN_ID]; 2134-3-SW-0289 [AQWAB]; 61609031 [SITE_REF]	407768	6470147
61609037	61609037	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040688 [WIN_ID]; 2134-3-SW-0296 [AQWAB]; 61609037 [SITE_REF]	405909	6467331
61609038	61609038	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040690 [WIN_ID]; 2134-3-SW-0298 [AQWAB]; 61609038 [SITE_REF]	406150	6467223
61609053	61609053	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Newburn 2	Newburn 2	20040708 [WIN_ID]; 2134-3-SW-0316 [AQWAB]; 61609053 [SITE_REF]	407286	6467324
61609078	61609078	Groundwater	Bore or Well	AWRC	Hazelmere - Stewarts Restaurant	Stewarts Restaurant	20040737 [WIN_ID]; 2134-3-SW-0346 [AQWAB]; 61609078 [SITE_REF]	407459	6466913
61609095	61609095	Groundwater	Bore or Well	AWRC	Midvale - Stanhope Gardens 2	Stanhope Gardens 2	20040759 [WIN_ID]; 2134-3-SW-0369 [AQWAB]; 61609095 [SITE_REF]	408209	6471421
61609097	61609097	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040761 [WIN_ID]; 2134-3-SW-0371 [AQWAB]; 61609097 [SITE_REF]	408156	6470175
61609098	61609098	Groundwater	Bore or Well	AWRC	Bellevue - Goodchild Oval No1	Goodchild Oval No1	20040763 [WIN_ID]; 2134-3-SW-0373 [AQWAB]; 61609098 [SITE_REF]	407997	6470012
61609099	61609099	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040764 [WIN_ID]; 2134-3-SW-0374 [AQWAB]; 61609099 [SITE_REF]	406313	6469007
61609100	61609100	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Om1A	Om1A	20040765 [WIN_ID]; 2134-3-SW-0375 [AQWAB]; 61609100 [SITE_REF]	408189	6470209
61609101	61609101	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Om1B	Om1B	20040766 [WIN_ID]; 2134-3-SW-0376 [AQWAB]; 61609101 [SITE_REF]	408189	6470209
61609102	61609102	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Om1C	Om1C	20040767 [WIN_ID]; 2134-3-SW-0377 [AQWAB]; 61609102 [SITE_REF]	408189	6470209
61609103	61609103	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Om2	Om2	20040768 [WIN_ID]; 2134-3-SW-0378 [AQWAB]; 61609103 [SITE_REF]	408224	6470199
61609104	61609104	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Om3A	Om3A	20040769 [WIN_ID]; 2134-3-SW-0379 [AQWAB]; 61609104 [SITE_REF]	408214	6470159
61609105	61609105	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Om3B	Om3B	20040770 [WIN_ID]; 2134-3-SW-0380 [AQWAB]; 61609105 [SITE_REF]	408214	6470159
61609106	61609106	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Om4A	Om4A	20040771 [WIN_ID]; 2134-3-SW-0381 [AQWAB]; 61609106 [SITE_REF]	408249	6470194
61609107	61609107	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Om4B	Om4B	20040772 [WIN_ID]; 2134-3-SW-0382 [AQWAB]; 61609107 [SITE_REF]	408249	6470194
61609108	61609108	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Om5	Om5	20040773 [WIN_ID]; 2134-3-SW-0383 [AQWAB]; 61609108 [SITE_REF]	408229	6470239
61609109	61609109	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Om6A	Om6A	20040774 [WIN_ID]; 2134-3-SW-0384 [AQWAB]; 61609109 [SITE_REF]	408179	6470169
61609110	61609110	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Om6B	Om6B	20040775 [WIN_ID]; 2134-3-SW-0385 [AQWAB]; 61609110 [SITE_REF]	408179	6470169
61609113	61609113	Groundwater	Bore or Well	AWRC	Bellevue - Truck Bay	Truck Bay	20040778 [WIN_ID]; 2134-3-SW-0388 [AQWAB]; 61609113 [SITE_REF]	406980	6470517
61609117	61609117	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040783 [WIN_ID]; 2134-3-SW-0393 [AQWAB]; 61609117 [SITE_REF]	405903	6467812
61609121	61609121	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040787 [WIN_ID]; 2134-3-SW-0397 [AQWAB]; 61609121 [SITE_REF]	408469	6471709
61609123	61609123	Groundwater	Bore or Well	AWRC	Bellevue - OM 7(Deep)	OM 7(Deep)	20040789 [WIN_ID]; 2134-3-SW-0399 [AQWAB]; 61609123 [SITE_REF]	408239	6470184
61609125	61609125	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 110 Clayton Street	110 Clayton Street	20040791 [WIN_ID]; 2134-3-SW-0401 [AQWAB]; 61609125 [SITE_REF]	408242	6470051
61609128	61609128	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 79 Clayton St	79 Clayton St	20040794 [WIN_ID]; 2134-3-SW-0404 [AQWAB]; 61609128 [SITE_REF]	407929	6470211
61609130	61609130	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb1S	Mb1S	20040796 [WIN_ID]; 2134-3-SW-0406 [AQWAB]; 61609130 [SITE_REF]	408280	6470208
61609131	61609131	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb2S	Mb2S	20040797 [WIN_ID]; 2134-3-SW-0407 [AQWAB]; 61609131 [SITE_REF]	408276	6470180
61609132	61609132	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb3S	Mb3S	20040798 [WIN_ID]; 2134-3-SW-0408 [AQWAB]; 61609132 [SITE_REF]	408270	6470237
61609133	61609133	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb4S	Mb4S	20040799 [WIN_ID]; 2134-3-SW-0409 [AQWAB]; 61609133 [SITE_REF]	408253	6470211
61609134	61609134	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb5S	Mb5S	20040800 [WIN_ID]; 2134-3-SW-0410 [AQWAB]; 61609134 [SITE_REF]	408202	6470224
61609135	61609135	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb6S	Mb6S	20040801 [WIN_ID]; 2134-3-SW-0411 [AQWAB]; 61609135 [SITE_REF]	408191	6470182
61609136	61609136	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb7S	Mb7S	20040802 [WIN_ID]; 2134-3-SW-0412 [AQWAB]; 61609136 [SITE_REF]	408249	6470150
61609137	61609137	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb8S	Mb8S	20040803 [WIN_ID]; 2134-3-SW-0413 [AQWAB]; 61609137 [SITE_REF]	408234	6470118
61609138	61609138	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb9S	Mb9S	20040804 [WIN_ID]; 2134-3-SW-0414 [AQWAB]; 61609138 [SITE_REF]	408158	6470235
61609139	61609139	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb10S	Mb10S	20040805 [WIN_ID]; 2134-3-SW-0415 [AQWAB]; 61609139 [SITE_REF]	408129	6470133
61609140	61609140	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb11S	Mb11S	20040806 [WIN_ID]; 2134-3-SW-0416 [AQWAB]; 61609140 [SITE_REF]	408146	6470189
61609141	61609141	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb12S	Mb12S	20040807 [WIN_ID]; 2134-3-SW-0417 [AQWAB]; 61609141 [SITE_REF]	408192	6470227
61609142	61609142	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb1D	Mb1D	20040808 [WIN_ID]; 2134-3-SW-0418 [AQWAB]; 61609142 [SITE_REF]	408254	6470244
61609143	61609143	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb2D	Mb2D	20040809 [WIN_ID]; 2134-3-SW-0419 [AQWAB]; 61609143 [SITE_REF]	408144	6470183
61609144	61609144	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb3D	Mb3D	20040810 [WIN_ID]; 2134-3-SW-0420 [AQWAB]; 61609144 [SITE_REF]	408153	6470234
61609145	61609145	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb1P	Mb1P	20040811 [WIN_ID]; 2134-3-SW-0421 [AQWAB]; 61609145 [SITE_REF]	408254	6470218
61609146	61609146	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Mb2P	Mb2P	20040812 [WIN_ID]; 2134-3-SW-0422 [AQWAB]; 61609146 [SITE_REF]	408197	6470229
61609147	61609147	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 1	1	20040813 [WIN_ID]; 2134-3-SW-0423 [AQWAB]; 61609147 [SITE_REF]	408154	6470234
61609148	61609148	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 2	2	20040814 [WIN_ID]; 2134-3-SW-0424 [AQWAB]; 61609148 [SITE_REF]	408091	6470247
61609149	61609149	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 3	3	20040815 [WIN_ID]; 2134-3-SW-0425 [AQWAB]; 61609149 [SITE_REF]	407933	6470293

Site ID	Default Site Reference	Site Type	Site Sub Type	Default Site Number System	Site Name	Site Shortname	All Site References	Eastings	Northings
61609151	61609151	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 5	5	20040817 [WIN_ID]; 2134-3-SW-0427 [AQWAB]; 61609151 [SITE_REF]	408092	6470078
61609152	61609152	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 7	7	20040818 [WIN_ID]; 2134-3-SW-0428 [AQWAB]; 61609152 [SITE_REF]	408231	6470103
61609153	61609153	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 8	8	20040819 [WIN_ID]; 2134-3-SW-0429 [AQWAB]; 61609153 [SITE_REF]	408177	6470094
61609154	61609154	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 9	9	20040820 [WIN_ID]; 2134-3-SW-0430 [AQWAB]; 61609154 [SITE_REF]	408127	6470140
61609155	61609155	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Cma	Cma	20040821 [WIN_ID]; 2134-3-SW-0431 [AQWAB]; 61609155 [SITE_REF]	408226	6470215
61609156	61609156	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Cmb	Cmb	20040822 [WIN_ID]; 2134-3-SW-0432 [AQWAB]; 61609156 [SITE_REF]	408226	6470185
61609157	61609157	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Wa2	Wa2	20040823 [WIN_ID]; 2134-3-SW-0433 [AQWAB]; 61609157 [SITE_REF]	408250	6470224
61609158	61609158	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Wa4	Wa4	20040824 [WIN_ID]; 2134-3-SW-0434 [AQWAB]; 61609158 [SITE_REF]	408251	6470193
61609159	61609159	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Wa5	Wa5	20040825 [WIN_ID]; 2134-3-SW-0435 [AQWAB]; 61609159 [SITE_REF]	408245	6470164
61609556	61609556	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Wa6	Wa6	20083190 [WIN_ID]; 2134-3-SW-0436 [AQWAB]; 61609556 [SITE_REF]	408208	6470170
61609557	61609557	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Wa7	Wa7	20083191 [WIN_ID]; 2134-3-SW-0437 [AQWAB]; 61609557 [SITE_REF]	408201	6470188
61609558	61609558	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Wa8	Wa8	20083192 [WIN_ID]; 2134-3-SW-0438 [AQWAB]; 61609558 [SITE_REF]	408193	6470211
61609559	61609559	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Wa9	Wa9	20083193 [WIN_ID]; 2134-3-SW-0439 [AQWAB]; 61609559 [SITE_REF]	408197	6470228
61609577	61609577	Groundwater	Bore or Well	AWRC	Bellevue - OM 7(Shallow)	OM 7(Shallow)	20083277 [WIN_ID]; 2134-3-SW-0445 [AQWAB]; 61609577 [SITE_REF]	408239	6470184
61609584	61609584	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bh1	Bh1	20083321 [WIN_ID]; 2134-3-SW-0446 [AQWAB]; 61609584 [SITE_REF]	408298	6470225
61609585	61609585	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bh2	Bh2	20083322 [WIN_ID]; 2134-3-SW-0447 [AQWAB]; 61609585 [SITE_REF]	408298	6470225
61609586	61609586	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bh3	Bh3	20083323 [WIN_ID]; 2134-3-SW-0448 [AQWAB]; 61609586 [SITE_REF]	408285	6470234
61609790	61609790	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb1	Sb1	20084117 [WIN_ID]; 2134-3-SW-0450 [AQWAB]; 61609790 [SITE_REF]	408235	6470121
61609791	61609791	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb2	Sb2	20084119 [WIN_ID]; 2134-3-SW-0451 [AQWAB]; 61609791 [SITE_REF]	408230	6470104
61609792	61609792	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb3	Sb3	20084120 [WIN_ID]; 2134-3-SW-0452 [AQWAB]; 61609792 [SITE_REF]	408227	6470118
61609793	61609793	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb4	Sb4	20084121 [WIN_ID]; 2134-3-SW-0453 [AQWAB]; 61609793 [SITE_REF]	408220	6470126
61609794	61609794	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb5	Sb5	20084122 [WIN_ID]; 2134-3-SW-0454 [AQWAB]; 61609794 [SITE_REF]	408218	6470122
61609795	61609795	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb7	Sb7	20084125 [WIN_ID]; 2134-3-SW-0455 [AQWAB]; 61609795 [SITE_REF]	408200	6470122
61609796	61609796	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb8	Sb8	20084126 [WIN_ID]; 2134-3-SW-0456 [AQWAB]; 61609796 [SITE_REF]	408187	6470141
61609797	61609797	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb9	Sb9	20084128 [WIN_ID]; 2134-3-SW-0457 [AQWAB]; 61609797 [SITE_REF]	408212	6470142
61609798	61609798	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb10	Sb10	20084129 [WIN_ID]; 2134-3-SW-0458 [AQWAB]; 61609798 [SITE_REF]	408186	6470153
61609799	61609799	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb11	Sb11	20084130 [WIN_ID]; 2134-3-SW-0459 [AQWAB]; 61609799 [SITE_REF]	408188	6470158
61609800	61609800	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb12	Sb12	20084131 [WIN_ID]; 2134-3-SW-0460 [AQWAB]; 61609800 [SITE_REF]	408190	6470163
61609801	61609801	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb13	Sb13	20084132 [WIN_ID]; 2134-3-SW-0461 [AQWAB]; 61609801 [SITE_REF]	408240	6470174
61609802	61609802	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb14	Sb14	20084133 [WIN_ID]; 2134-3-SW-0462 [AQWAB]; 61609802 [SITE_REF]	408244	6470165
61609803	61609803	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb15	Sb15	20084135 [WIN_ID]; 2134-3-SW-0463 [AQWAB]; 61609803 [SITE_REF]	408240	6470161
61609804	61609804	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb16	Sb16	20084136 [WIN_ID]; 2134-3-SW-0464 [AQWAB]; 61609804 [SITE_REF]	408252	6470183
61609805	61609805	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb17	Sb17	20084138 [WIN_ID]; 2134-3-SW-0465 [AQWAB]; 61609805 [SITE_REF]	408247	6470174
61609806	61609806	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb18	Sb18	20084139 [WIN_ID]; 2134-3-SW-0466 [AQWAB]; 61609806 [SITE_REF]	408251	6470170
61609807	61609807	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb19	Sb19	20084141 [WIN_ID]; 2134-3-SW-0467 [AQWAB]; 61609807 [SITE_REF]	408226	6470110
61609808	61609808	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb20	Sb20	20084142 [WIN_ID]; 2134-3-SW-0468 [AQWAB]; 61609808 [SITE_REF]	408192	6470112
61609809	61609809	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb22	Sb22	20084144 [WIN_ID]; 2134-3-SW-0469 [AQWAB]; 61609809 [SITE_REF]	408192	6470150
61609810	61609810	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb23	Sb23	20084146 [WIN_ID]; 2134-3-SW-0470 [AQWAB]; 61609810 [SITE_REF]	408205	6470154
61609812	61609812	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb24	Sb24	20084148 [WIN_ID]; 2134-3-SW-0471 [AQWAB]; 61609812 [SITE_REF]	408211	6470150
61609813	61609813	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb25	Sb25	20084149 [WIN_ID]; 2134-3-SW-0472 [AQWAB]; 61609813 [SITE_REF]	408195	6470149
61609815	61609815	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb26	Sb26	20084151 [WIN_ID]; 2134-3-SW-0473 [AQWAB]; 61609815 [SITE_REF]	408183	6470148
61609816	61609816	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb28	Sb28	20084153 [WIN_ID]; 2134-3-SW-0474 [AQWAB]; 61609816 [SITE_REF]	408252	6470191
61609817	61609817	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb29	Sb29	20084155 [WIN_ID]; 2134-3-SW-0475 [AQWAB]; 61609817 [SITE_REF]	408185	6470145
61609818	61609818	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb30	Sb30	20084157 [WIN_ID]; 2134-3-SW-0476 [AQWAB]; 61609818 [SITE_REF]	408228	6470146
61609819	61609819	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb31	Sb31	20084159 [WIN_ID]; 2134-3-SW-0477 [AQWAB]; 61609819 [SITE_REF]	408242	6470142
61609820	61609820	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb32	Sb32	20084161 [WIN_ID]; 2134-3-SW-0478 [AQWAB]; 61609820 [SITE_REF]	408233	6470136
61609821	61609821	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Sb32	Sb32	20084163 [WIN_ID]; 2134-3-SW-0479 [AQWAB]; 61609821 [SITE_REF]	408234	6470150
61609950	61609950	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - D1	D1	20084436 [WIN_ID]; 2134-3-SW-0480 [AQWAB]; 61609950 [SITE_REF]	408239	6470175
61609951	61609951	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - D2	D2	20084437 [WIN_ID]; 2134-3-SW-0481 [AQWAB]; 61609951 [SITE_REF]	408246	6470175
61609952	61609952	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - D3	D3	20084438 [WIN_ID]; 2134-3-SW-0482 [AQWAB]; 61609952 [SITE_REF]	408242	6470186
61609953	61609953	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - D4	D4	20084439 [WIN_ID]; 2134-3-SW-0483 [AQWAB]; 61609953 [SITE_REF]	408247	6470181
61609954	61609954	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - D5	D5	20084440 [WIN_ID]; 2134-3-SW-0484 [AQWAB]; 61609954 [SITE_REF]	408255	6470206
61609955	61609955	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - D6	D6	20084441 [WIN_ID]; 2134-3-SW-0485 [AQWAB]; 61609955 [SITE_REF]	408196	6470222
61609956	61609956	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - D7	D7	20084442 [WIN_ID]; 2134-3-SW-0486 [AQWAB]; 61609956 [SITE_REF]	408199	6470224
61609957	61609957	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - D8	D8	20084443 [WIN_ID]; 2134-3-SW-0487 [AQWAB]; 61609957 [SITE_REF]	408192	6470226
61609958	61609958	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - D9	D9	20084444 [WIN_ID]; 2134-3-SW-0488 [AQWAB]; 61609958 [SITE_REF]	408194	6470232
61609959	61609959	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - D10	D10	20084445 [WIN_ID]; 2134-3-SW-0489 [AQWAB]; 61609959 [SITE_REF]	408201	6470230
61609960	61609960	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - D11	D11	20084446 [WIN_ID]; 2134-3-SW-0490 [AQWAB]; 61609960 [SITE_REF]	407986	6469858
61609961	61609961	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - D12	D12	20084447 [WIN_ID]; 2134-3-SW-0491 [AQWAB]; 61609961 [SITE_REF]	408656	6469835
61611961	61611961	Groundwater	Bore or Well	AWRC	Swan Catchment Council - Scc 02/08	Scc 02/08	23042144 [WIN_ID]; 61611961 [SITE_REF]	407321	6471363
61616989	61616989	Groundwater	Unknown	AWRC	Midvale Helena Valley - Artesian	Artesian	20040436 [WIN_ID]; 2134-3-SW-0044 [AQWAB]; 61616989 [SITE_REF]	408552	6470912
61616996	61616996	Groundwater	Unknown	AWRC	Swan Coastal Catchment 616 - Morrison Rd	Morrison Rd	20040449 [WIN_ID]; 2134-3-SW-0057 [AQWAB]; 61616996 [SITE_REF]	408470	6471747
61617001	61617001	Groundwater	Unknown	AWRC	Swan Coastal Catchment 616 - 17	17	20040574 [WIN_ID]; 2134-3-SW-0182 [AQWAB]; 61617001 [SITE_REF]	407963	6469133
61617024	61617024	Groundwater	Unknown	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040648 [WIN_ID]; 2134-3-SW-0256 [AQWAB]; 61617024 [SITE_REF]	407661	6471550
61617034	61617034	Groundwater	Unknown	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040689 [WIN_ID]; 2134-3-SW-0297 [AQWAB]; 61617034 [SITE_REF]	408889	6470297
61617040	61617040	Groundwater	Unknown	AWRC	Swan Coastal Catchment 616 - Well	Well	20040732 [WIN_ID]; 2134-3-SW-0341 [AQWAB]; 61617040 [SITE_REF]	407445	6468791
61617047	61617047	Groundwater	Unknown	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040762 [WIN_ID]; 2134-3-SW-0372 [AQWAB]; 61617047 [SITE_REF]	408356	6470203
61618714	61618714	Groundwater	Bore or Well	AWRC	Derby Industries - Talloman	Talloman	23012166 [WIN_ID]; 61618714 [SITE_REF]	405334	6468585
61618715	61618715	Groundwater	Bore or Well	AWRC	Derby Industries - Talloman	Talloman	23012167 [WIN_ID]; 61618715 [SITE_REF]	405314	6468383
61618717	61618717	Groundwater	Bore or Well	AWRC	Derby Industries - Talloman	Talloman	23012169 [WIN_ID]; 61618717 [SITE_REF]	406300	6468538
61618718	61618718	Groundwater	Bore or Well	AWRC	Derby Industries - Talloman	Talloman	23012179 [WIN_ID]; 61618718 [SITE_REF]	405520.16	6468615.69
61618726	61618726	Groundwater	Bore or Well	AWRC	Waste Control Bellevue - Military Road	Military Road	23012192 [WIN_ID]; 61618726 [SITE_REF]	406929	6469556

Appendix A - Registered Bores
Table A2 - Registered Groundwater Bores

Site ID	Default Site Reference	Site Type	Site Sub Type	Default Site Number System	Site Name	Site Shortname	All Site References	Eastings	Northings
61618728	61618728	Groundwater	Bore or Well	AWRC	Waste Control Bellevue - Military Road	Military Road	23012193 [WIN_ID]; 61618728 [SITE_REF]	407210	6469913
616233	616233	Stream Gauging	Stream Gauging	AWRC	Helena River - Roe Highway	Roe Highway	616233 [SITE_REF]	407107.02	6469611.7
6162407	6162407	Surface (other)	Sampling location	AWRC	Bellevue Industrial Area Drains - Cowie Close	Cowie Close	23023703 [WIN_ID]; 6162407 [SITE_REF]; BELLEVUE 02 [TEXT_REF]	407101.7	6470636.7
6162408	6162408	Surface (other)	Sampling location	AWRC	Bellevue Industrial Area Drains - Wilkins Street	Wilkins Street	23023705 [WIN_ID]; 6162408 [SITE_REF]; BELLEVUE 03 [TEXT_REF]	407702.6	6470097.4
6162474	6162474	Surface (other)	Sampling location	AWRC	Bellevue - End Of Wilkins St	End Of Wilkins St	23023966 [WIN_ID]; 6162474 [SITE_REF]; HRCSN 03 [TEXT_REF]	407710.87	6470100.66
6163347	6163347	Surface (other)	Sampling location	AWRC	Helena River - Hrsw5	Hrsw5	23003164 [WIN_ID]; 6163347 [SITE_REF]; HRSW5 [TEXT_REF]	407106	6469599
6163348	6163348	Surface (other)	Sampling location	AWRC	Helena River - Hrsw6	Hrsw6	23003165 [WIN_ID]; 6163348 [SITE_REF]; HRSW6 [TEXT_REF]	407021	6469606
6163349	6163349	Surface (other)	Sampling location	AWRC	Helena River - Hrsw7	Hrsw7	23003166 [WIN_ID]; 6163349 [SITE_REF]; HRSW7 [TEXT_REF]	406971	6469605
6163350	6163350	Surface (other)	Sampling location	AWRC	Helena River - Hrswt	Hrswt	23003167 [WIN_ID]; 6163350 [SITE_REF]; HRSWT [TEXT_REF]	407221	6469561
6163351	6163351	Surface (other)	Sampling location	AWRC	Helena River - Hrswb	Hrswb	23003168 [WIN_ID]; 6163351 [SITE_REF]; HRSWB [TEXT_REF]	406881	6469678
6167029	6167029	Surface (other)	Sampling location	AWRC	Helena Valley Floodplain - Deep Pool Lower Rhas	Deep Pool Lower Rhas	23046731 [WIN_ID]; 6167029 [SITE_REF]; HELENA1 [TEXT_REF]	406672	6469864
6167030	6167030	Surface (other)	Sampling location	AWRC	Helena Valley Floodplain - Pool DS Roe Hwy Br	Pool DS Roe Hwy Br	23046732 [WIN_ID]; 6167030 [SITE_REF]; HELENA2 [TEXT_REF]	407030	6469612
6167031	6167031	Surface (other)	Sampling location	AWRC	Helena Valley Floodplain - Taliska-Bellevue	Taliska-Bellevue	23046733 [WIN_ID]; 6167031 [SITE_REF]; HELENA3 [TEXT_REF]	407950	6469590
61670850	61670850	Groundwater	Bore or Well	AWRC	Hazelmere - Company	Company	23052656 [WIN_ID]; 61670850 [SITE_REF]	406139	6467250
61670933	61670933	Groundwater	Bore or Well	AWRC	Highwycombe - Company	Company	23052937 [WIN_ID]; 61670933 [SITE_REF]	406226	6466882
61670970	61670970	Groundwater	Bore or Well	AWRC	Helena Valley - Private	Private	23052747 [WIN_ID]; 61670970 [SITE_REF]	407827	6468475
61671515	61671515	Groundwater	Bore or Well	AWRC	Helena Valley - Private	Private	23086532 [WIN_ID]; 61671515 [SITE_REF]	407496	6468893
61671984	61671984	Groundwater	Bore or Well	AWRC	Bellevue - Private	Private	23087143 [WIN_ID]; 61671984 [SITE_REF]	408515	6470115
61608819	61608819	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Hawkevale Farm	Hawkevale Farm	20040396 [WIN_ID]; 2134-3-SW-0004 [AQWAB]; 61608819 [SITE_REF]	406596	6466355
61608842	61608842	Groundwater	Bore or Well	AWRC	Maida Vale - 181 New Hawkville	181 New Hawkville	20040458 [WIN_ID]; 2134-3-SW-0066 [AQWAB]; 61608842 [SITE_REF]	407325	6466221
61608843	61608843	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 182	182	20040459 [WIN_ID]; 2134-3-SW-0067 [AQWAB]; 61608843 [SITE_REF]	407266	6466350
61608844	61608844	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 183	183	20040460 [WIN_ID]; 2134-3-SW-0068 [AQWAB]; 61608844 [SITE_REF]	407481	6466326
61608854	61608854	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 38	38	20040472 [WIN_ID]; 2134-3-SW-0080 [AQWAB]; 61608854 [SITE_REF]	407783	6465613
61608855	61608855	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 39 No1	39 No1	20040473 [WIN_ID]; 2134-3-SW-0081 [AQWAB]; 61608855 [SITE_REF]	407659	6465638
61608856	61608856	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 40 No2	40 No2	20040474 [WIN_ID]; 2134-3-SW-0082 [AQWAB]; 61608856 [SITE_REF]	407597	6465582
61608857	61608857	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 41	41	20040475 [WIN_ID]; 2134-3-SW-0083 [AQWAB]; 61608857 [SITE_REF]	406402	6466106
61608860	61608860	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 45	45	20040478 [WIN_ID]; 2134-3-SW-0086 [AQWAB]; 61608860 [SITE_REF]	406694	6465841
61608861	61608861	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 46	46	20040479 [WIN_ID]; 2134-3-SW-0087 [AQWAB]; 61608861 [SITE_REF]	406694	6465765
61608862	61608862	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - 47	47	20040480 [WIN_ID]; 2134-3-SW-0088 [AQWAB]; 61608862 [SITE_REF]	406921	6465531
61608986	61608986	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040624 [WIN_ID]; 2134-3-SW-0232 [AQWAB]; 61608986 [SITE_REF]	406465	6466299
61609041	61609041	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040695 [WIN_ID]; 2134-3-SW-0303 [AQWAB]; 61609041 [SITE_REF]	406510	6466287
61609057	61609057	Groundwater	Bore or Well	AWRC	Swan Coastal Catchment 616 - Bore	Bore	20040712 [WIN_ID]; 2134-3-SW-0321 [AQWAB]; 61609057 [SITE_REF]	406476	6466163
61671957	61671957	Groundwater	Bore or Well	AWRC	High Wycombe - Company	Company	23087113 [WIN_ID]; 61671957 [SITE_REF]	406863	6466204

APPENDIX B – GROUNDWATER CONSTRUCTION LOGS AND DEVELOPMENT LOGS

B-1 WP4 Groundwater Construction Logs and Development Logs

Borehole GW03/BH104

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	1.9	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	8.78	Drilling Method:	Hand Auger and Push Tube
Date Started:	18/10/2021	Northings:	268654.854	Logger:	S.B & J.H
Date Completed:	18/10/2021	Eastings:	69048.982	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.5	0.0	BH104_C_0.0 SQC054_C SQC055_C		Clayey SAND: Grey, fine to coarse sand, low plasticity		Riser	
			0.0	BH104_C_0.25		Clayey SAND: Light grey, fine to medium sand, low plasticity			
			0.0	BH104_C_0.5					
		1.0	0.0	BH104_C_0.75		SILT: Black peat material		Bentonite Seal	
			0.0	BH104_C_1.0					
		1.5	0.0	BH104_C_1.25					
			0.0	BH104_C_1.5					
		2.0	0.0	BH104_C_1.75					
			0.0	BH104_C_2.0					
		2.5	0.0	BH104_C_2.25					
			0.0	BH104_C_2.5		Silty SAND: Dark brown, fine sand			
		3.0	0.0	BH104_C_2.75				Gravel Pack	
			0.0	BH104_C_3.0		SILT: Dark brown			
Push Tube		3.5						Slotted Screen	
		4.0							
		4.5							
		5.0							
		5.5							
		6.0						End Cap	

Remarks: Top of Casing: 9.502 mAHD. N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole GW04/BH105

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	2.4	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	8.90	Drilling Method:	Hand Auger and Push Tube
Date Started:	14/09/2021	Northings:	268542.727	Logger:	S.B & J.H
Date Completed:	14/09/2021	Eastings:	68961.087	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0	0.0	BH105_C_0.0		SAND: Dark brown, shades to light brown, organic matter, trace limestone gravels	D	Riser	
			0.0	BH105_C_0.25				Bentonite Seal	
		0.5	0.0	BH105_C_0.5		Shades to dark brown Shades to red/brown			
			0.0	BH105_C_0.75					
		1.0	0.0	BH105_C_1.0					
			0.0	BH105_C_1.25					
		1.5	0.0	BH105_C_1.5					
			0.0	BH105_C_1.75		Grades to fine sand, well sorted	M		
		2.0	0.0	BH105_C_2.0		Shades to light brown/yellow	W	Gravel Pack	
			0.0	BH105_C_2.25					
		2.5	0.0	BH105_C_2.5		Grades to medium to coarse sand, well sorted			
			0.0	BH105_C_2.75				Slotted Screen	
		3.0	0.0	BH105_C_3.0					
Pushtube						Shades to light brown/grey, trace gravels			
		3.5				Shades to grey with dark brown mottling			
		4.0				Shades to brown with orange mottling			
		4.5				Grades to increased clay content			
						Clayey SAND: Brown/grey, low plasticity			
		5.0						End Cap	
						SAND: Grey/dark brown, coarse sand, well sorted			
		5.5				End of hole at target depth 5.5 mbgl			

Remarks: Top of Casing: 9.631 mAHD. N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole GW06/BH138

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	4.5	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	20.35	Drilling Method:	Hand Auger and Push Tube
Date Started:	14/09/2021	Northings:	266148.109	Logger:	S.B & J.H
Date Completed:	14/09/2021	Eastings:	67013.982	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0	0.0	BH138_C_0.0		FILL: Grey fine sand, organic matter	D	Riser	
			0.0	BH138_C_0.25		Shades to light grey/cream			
		0.5	0.0	BH138_C_0.5 SQC38_A SQC39_A				Cement	
			0.0	BH138_C_0.75 SQC40 SQC41_C					
		1.0	0.0	BH138_C_1.0					
			0.0	BH138_C_1.25					
		1.5	0.0	BH138_C_1.5		Shades to dark grey		Bentonite Seal	
			0.0	BH138_C_1.75					
		2.0	0.0	BH138_C_2.0		Shades to light grey/cream			
			0.0	BH138_C_2.25					
		2.5	0.0	BH138_C_2.5					
			0.0	BH138_C_2.75		Shades to yellow			
		3.0	0.0	BH138_C_3.0		Trace sub-angular, sub-rounded gravels (1-3 cm)			
		3.5				Shades to cream	M	Gravel Pack	
		4.0				Trace Coffee Rock cobbles			
Pushtube		4.5		BH138_C_4.5		Grades to coarse, well sorted sand, shades to cream/grey	W		
		5.0						Slotted Screen	
		5.5							
		6.0							
		6.5							
		7.0							
		7.5				End of hole at target depth 7.5 mbgl		End Cap	

Remarks: Top of Casing: 24.004 mAHD. N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole GW15/BH112

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	7.0	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	30.61	Drilling Method:	Hand Auger and Push Tube
Date Started:	13/09/2021	Northings:	266384.345	Logger:	S.B & J.H
Date Completed:	13/09/2021	Eastings:	68941.261	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.5				FILL: Black fine to coarse sand, organic matter	D	Riser	
		1.0				Shades to grey Shades to cream Trace gravels			
Pushtube		1.5				Weathered COFFEE ROCK: Light brown, coarse sand Red mottling		Cement	
		2.0				Shades to red with light brown mottling			
		2.5							
		3.0				Grades to increasing clay content, shades to red with grey/brown mottling		Bentonite Seal	
		3.5							
		4.0				Grades to sand, shades to light brown			
		4.5				COFFEE ROCK: Brown/orange, gravel (1-2 cm), trace sand			
		5.0				Grades to increased quartz (1-5 cm), trace sand		Gravel Pack	
		5.5				SAND: Grey with orange mottling, fine to coarse sand Red mottling			
		6.0				Shades to orange/brown with grey mottling Grades to well sorted sand, shades to grey			
		6.5							
		7.0					W	Slotted Screen	
		7.5							
		8.0							
		8.5							
		9.0							
		9.5							
		10.0				End of hole at target depth 10.0 mbgl		End Cap	

Remarks: Top of Casing: 31.326 mAHD. N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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APPENDIX C – TABULATED RESULTS

Table C-1 Groundwater Investigation Results

Table C-2 Groundwater Field Results

Table C-3 Analytical Results Soil

Table C-4 Positive ASS Results

Table C-5 Surface Water Results

Table C-1:Groundwater Results

	Organics	Inorganics																			Alkalinity				Acidity
	BOD	Ammonia as N	Anions Total	Cations Total	Chloride	Electrical conductivity [4](lab)	Ferrous Iron	Ionic Balance	Kjeldahl Nitrogen Total	Nitrate (as N)	Nitrite (as N)	Nitrite + Nitrate as N	Nitrogen (Total)	pH (Lab)	Reactive Phosphorus as P	Total Phosphorus as P	Sodium (Filtered)	Sulphide	Sulfate as SO4 - Turbidimetric (Filtered)	TDS	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Acidity (as CaCO3)
	mg/L	mg/L	meq/L	meq/L	mg/L	uS/cm	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	pH_Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL	2	0.01	0.01	0.01	1	1	0.05	0.01	0.1	0.01	0.01	0.01	0.1	0.01	0.01	0.01	1	0.1	1	10	1	1	1	1	1
Short Term Irrigation Values (DWER 2021)						6400[4]							25[5]	6-8.5		0.8[6]									
ANZG (2018) Freshwater 95% toxicant DGVs		0.9																							
DWER Trigger Values (DER, 2015)														<4[9] / <5[12] / <6[8/10]										<30[8 / 9 / 10]	40[8] / 100[9]
DBCA Policy # 50 (2017) [2]		0.08			300 [13]								1.2	6.5-8.0	0.04	0.065									
Non-potable Groundwater Use (DWER, 2021)		0.5			250					500	30								1,000						
Water Corporation Criteria [1]		200			15,000				69					6.0-10.0				1,800	1,800	20,000					
PFAS NEMP 2018 Table 1 Health Drinking Water																									
PFAS NEMP 2020 Recreational Water																									
PFAS NEMP 2020 Freshwater 95%																									
Field ID	**Sampled Date**	**Lab Report Number**	**Matrix Type**																						
GW03	28-Oct-21	EP2113015/EP2113677	Water	-	0.03	9.14	7.77	210	814	0.28	8.08	0.1	<0.01	<0.01	<0.01	0.1	6.85	<0.01	0.01	108	<0.1	46	467	113	<1	<1	113	20
GW04	28-Oct-21	EP2113015	Water	-	0.22	13.7	11.3	439	1270	1.57	9.9	1	<0.01	<0.01	<0.01	1	6.29	<0.01	0.05	168	<0.1	18	826	49	<1	<1	49	24
GW06	27-Oct-21	EP2113015/EP2113677	Water	<2	0.04	7.37	6.11	243	659	8.5	9.37	0.7	0.45	<0.01	0.45	1.2	5.93	<0.01	0.26	96	<0.1	20	-	5	<1	<1	5	14
GW15	28-Oct-21	EP2113015	Water	-	0.03	1.04	1.09	28	134	5.15	2.62	0.5	3.15	0.02	3.17	3.7	5.54	<0.01	0.01	19	<0.1	8	90	4	<1	<1	4	25
MW03	28-Oct-21	EP2113015/EP2113677	Water	3	3.79	3.87	3.3	112	397	<0.05	7.97	4	0.41	<0.01	0.41	4.4	6.74	<0.01	0.01	65	<0.1	18	-	17	<1	<1	17	6

NOTES: 1. Metals & nutrients are based on the upper mass alarm limit for a discharge volume of 432kL/day (5L/sec) (Water Corp. 2014)
2. DBCA Corporate Policy 50 (nutrients as listed in ANZECC (2000) guidelines. Table 3.3.6, lowland rivers and streams)
3. Default trigger value for freshwater quality (DWER, 2021)
4. Average EC threshold for pastures in sandy soils (ANZECC, 2000)
5. Lower guideline limit (upper = 125) (ANZECC, 2000)
6. Lower guideline limit (upper = 12) (ANZECC, 2000)
7. Range between which soil and animal health will not generally be affected (DWER, 2021)
8. Effluent Treatment Triggers (DER, 2015b)
9. DER CSB immediate notification triggers (DER, 2015b)
10. Class 4 buffering capacity indicators (DER, 2015b)
11. Discharge to Water Bodies (DER, 2015b)
12. ASS disturbance indicators (DER, 2015b)
13. Default trigger value for lowland rivers in south-west Australia (ANZECC, 2000)

Table C-1:Groundwater Results

| | | | | Metals | | | |

Table C-1:Groundwater Results

	TPH					TRH							BTEX						
	C6-C9	C10-C14	C15-C28	C29-C36	C10-C36 (Sum of total)	C6-C10	>C6-C10 less BTEX (F1)	C10-C16	>C10-C16 less Naphthalene (F2)	C16-C34	C34-C40	>C10 - C40 (Sum of total)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	20	50	100	50	50	20	20	100	100	100	100	100	1	1	1	1	1	1	1
Short Term Irrigation Values (DWER 2021)																			
ANZG (2018) Freshwater 95% toxicant DGVs													950				350		
DWER Trigger Values (DER, 2015)																			
DBCA Policy # 50 (2017) [2]																			
Non-potable Groundwater Use (DWER, 2021)													10	25	3			20	
Water Corporation Criteria [1]																			
PFAS NEMP 2018 Table 1 Health Drinking Water																			
PFAS NEMP 2020 Recreational Water																			
PFAS NEMP 2020 Freshwater 95%																			

Field ID	Sampled Date	Lab Report Number	Matrix Type																		
GW03	28-Oct-21	EP2113015/EP2113677	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	28-Oct-21	EP2113015	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	27-Oct-21	EP2113015/EP2113677	Water	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<1	<1	<1	<1	<1	<1	<1
GW15	28-Oct-21	EP2113015	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	28-Oct-21	EP2113015/EP2113677	Water	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<1	<1	<1	<1	<1	<1	<1

Table C-1:Groundwater Results

				MAH									PAH				PAH																Phenols	PCBs								
				1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo(a) pyrene	Benzo(a)pyrene TEQ calc (Zero)	Benzo(g,h,i)perylene	Benzo(b+j)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total)	Picloram	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				1	1	1	1	1	1	1	1	1	0.02	0.02	0.02	0.02	0.005	0.005	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.005	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Short Term Irrigation Values (DWER 2021)																																								
ANZG (2018) Freshwater 95% toxicant DGVs																											16								0.6		0.03		
DWER Trigger Values (DER, 2015)																																								
DBCA Policy # 50 (2017) [2]																																								
Non-potable Groundwater Use (DWER, 2021)																	0.1															3000								
Water Corporation Criteria [1]																																								
PFAS NEMP 2018 Table 1 Health Drinking Water																																								
PFAS NEMP 2020 Recreational Water																																								
PFAS NEMP 2020 Freshwater 95%																																								
Field ID	**Sampled Date**	**Lab Report Number**	**Matrix Type**																																						
GW03	28-Oct-21	EP2113015/EP2113677	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	28-Oct-21	EP2113015	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	27-Oct-21	EP2113015/EP2113677	Water	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.02	<0.02	<0.02	<0.02	<0.007	<0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.2	<0.02	<0.02	<0.005	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
GW15	28-Oct-21	EP2113015	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	28-Oct-21	EP2113015/EP2113677	Water	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.02	<0.02	<0.02	<0.02	<0.005	<0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.005	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Table C-1:Groundwater Results

| | | | | Chlorinated Hydrocarbons | | | |

Table C-1:Groundwater Results

				Organochlorine Pesticides																								
				a-BHC	Aldrin	Dieldrin	Aldrin + Dieldrin	b-BHC	chlordane	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	4,4-DDE	DDT	DDT+DDE+DDD	Endosulfan	Endrin ketone	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Oxychlordane
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
EQL				0.002	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.000002
Short Term Irrigation Values (DWER 2021)																												
ANZG (2018) Freshwater 95% toxicant DGVs									0.08						0.01		0.2					0.02		0.2	0.09			
DWER Trigger Values (DER, 2015)																												
DBCA Policy # 50 (2017) [2]																												
Non-potable Groundwater Use (DWER, 2021)							3								90		200								3		3000	
Water Corporation Criteria [1]									20																			
PFAS NEMP 2018 Table 1 Health Drinking Water																												
PFAS NEMP 2020 Recreational Water																												
PFAS NEMP 2020 Freshwater 95%																												
Field ID	**Sampled Date**	**Lab Report Number**	**Matrix Type**																									
GW03	28-Oct-21	EP2113015/EP2113677	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	28-Oct-21	EP2113015	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	27-Oct-21	EP2113015/EP2113677	Water	<0.002	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.000002
GW15	28-Oct-21	EP2113015	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	28-Oct-21	EP2113015/EP2113677	Water	<0.002	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.000002

Table C-1:Groundwater Results

| | | | | Organophosphorous Pesticides | | | | | | | | | | Organophosphorous Pesticides | | | | | | | | | |

Table C-1:Groundwater Results

				Pesticides by LCMSMS																							
				Dichlorprop-P	Diflufenican	Aminopyralid	Novaluron	Penconazole	Pyraclostrobin	Rimsulfuron	Siduron	Pyrimethanil	Propamocarb	Bensulide	Boscalid	Atrazine-desethyl	Atrazine-desisopropyl	Cyproconazole	Hexaconazole	Irgarol	Iodosulfuron methyl	Quinclorac	Tetraconazole	Trinexapac Ethyl	Trifloxystrobin	Trifloxysulfuron-sodium
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.1	0.02	0.1	0.1	0.01	0.1	0.1	0.1	0.02	0.1	0.1	0.1	0.1	0.1	0.02	0.02	0.002	0.1	0.1	0.1	1	0.1	0.1
Short Term Irrigation Values (DWER 2021)																										
ANZG (2018) Freshwater 95% toxicant DGVs																										
DWER Trigger Values (DER, 2015)																										
DBCA Policy # 50 (2017) [2]																										
Non-potable Groundwater Use (DWER, 2021)																										
Water Corporation Criteria [3]																										
PFAS NEMP 2018 Table 1 Health Drinking Water																										
PFAS NEMP 2020 Recreational Water																										
PFAS NEMP 2020 Freshwater 95%																										
Field ID	**Sampled Date**	**Lab Report Number**	**Matrix Type**																							
GW03	28-Oct-21	EP2113015/EP2113677	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	28-Oct-21	EP2113015	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	27-Oct-21	EP2113015/EP2113677	Water	<0.1	<0.02	<0.1	<0.1	<0.01	<0.1	<0.1	<0.1	<0.02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.002	<0.1	<0.1	<0.1	<1	<0.1	<0.1
GW15	28-Oct-21	EP2113015	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	28-Oct-21	EP2113015/EP2113677	Water	<0.1	<0.02	<0.1	<0.1	<0.01	<0.1	<0.1	<0.1	<0.02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.002	<0.1	<0.1	<0.1	<1	<0.1	<0.1

Table C-1:Groundwater Results

	Pesticides																																					
	3-Hydroxy Carbofuran	Aldicarb	Amitraz	Avermectin	Azoxystrobin	Bendiocarb	Brodifacoum	Carbaryl	Carbofuran	Carfentrazone-ethyl	Cyromazine	Diflubenzuron	Fenoxycarb	Fipronil	Fluproponate	Formothion	Haloxyfop	Imazapyr	Imidacloprid	Indoxacarb	Londax	Metalaxyl-M	Metaldehyde	Methomyl	Naphthalene (VOC)	Nicarbazin	Oxamyl	Pirimicarb	Pirimiphos-methyl	Profenofos	Promecarb	Propargite	Pyrasulfotole	Pyriproxyfen	Pyroxsulam	Spirotetramat	Sulfotepp	Temephos
	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	ug/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	ug/L	mg/kg	mg/L	µg/L	µg/L	ug/L	µg/L	µg/L	mg/L	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L
EQL	0.02	0.05	0.1	0.1	0.0001	0.1	5E-05	0.01	0.01	0.0001	0.05	0.1	0.0001	1E-05	1E-04	20	0.0001	0.01	1E-05	0.0001	0.1	0.0001	0.01	0.01	5	0.0001	0.01	0.1	0.01	0.01	0.1	0.0001	0.0001	0.1	0.0001	0.0001	0.005	0.02
Short Term Irrigation Values (DWER 2021)																																						
ANZG (2018) Freshwater 95% toxicant DGVs									1.2															3.5															
DWER Trigger Values (DER, 2015)																																						
DBCA Policy # 50 (2017) [2]																																						
Non-potable Groundwater Use (DWER, 2021)		40	0.09					300	100	1		700		0.007	0.09	500	0.01	90					0.2	200		10	70	70	900	3		70			40	2000		4000
Water Corporation Criteria [1]																																						
PFAS NEMP 2018 Table 1 Health Drinking Water																																						
PFAS NEMP 2020 Recreational Water																																						
PFAS NEMP 2020 Freshwater 95%																																						

Field ID	Sampled Date	Lab Report Number	Matrix Type																																					
GW03	28-Oct-21	EP2113015/EP2113677	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	28-Oct-21	EP2113015	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	27-Oct-21	EP2113015/EP2113677	Water	<0.02	<0.05	<0.1	<0.1	<0.0001	<0.1	<0.0000	<0.01	<0.01	<0.0001	<0.05	<0.1	<0.0001	<0.0000	<0.000	<20	<0.0001	<0.01	<0.0000	<0.0001	<0.1	<0.0001	<0.01	<0.01	<5	<0.0001	<0.01	<0.1	<0.01	<0.01	<0.1	<0.0001	<0.0001	<0.1	<0.0001	<0.0001	<0.005	<0.02
GW15	28-Oct-21	EP2113015	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	28-Oct-21	EP2113015/EP2113677	Water	<0.02	<0.05	<0.1	<0.1	<0.0001	<0.1	<0.0000	<0.01	<0.01	<0.0001	<0.05	<0.1	<0.0001	<0.0000	<0.000	<20	<0.0001	<0.01	<0.0000	<0.0001	<0.1	<0.0001	<0.01	<0.01	<5	<0.0001	<0.01	<0.1	<0.01	<0.01	<0.1	<0.0001	<0.0001	<0.1	<0.0001	<0.0001	<0.005	<0.02

Table C-1:Groundwater Results

| | Pesticides | | | | Herbicides | | | |

Table C-1:Groundwater Results

| | | | | Herbicides | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Halogenated Hydrocarbons | | | | | | | | | Halogenated Benzenes | | | | | | | | | | | | | Solvents | | | | | VOCs | |
|---|---|---

Table C-1:Groundwater Results

			Other			Carbamates	Hydrocarbon Gases	Fungicides																				
			Naphthalophos	Chlorantraniliprole	Triadimenol	Methiocarb	Methane	Cyprodinil	Benomyl	Carbendazim	Carboxin	Chlorothalonil	Difenoconazole	Etridiazole	Fenarimol	Fosetyl-al	Iprodione	Metalaxyl	Flusilazole (NuStar)	Paclobutrazol	Prochloraz	Propiconazole	Systhane	Triadimefon	Tebuconazole
			mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/L
EQL			0.001	0.0001	0.0001	0.01	0.01	0.01	0.01	0.1	0.1	2	0.02	0.5	0.02	10	0.05	0.1	0.02	0.05	0.1	0.05	0.1	0.1	0.01
Short Term Irrigation Values (DWER 2021)																										
ANZG (2018) Freshwater 95% toxicant DGVs																										
DWER Trigger Values (DER, 2015)																										
DBCA Policy # 50 (2017) [2]																										
Non-potable Groundwater Use (DWER, 2021)				60	2	70		900		900	3000	500		1000	400		1000					1000		900	1000
Water Corporation Criteria [1]																										
PFAS NEMP 2018 Table 1 Health Drinking Water																										
PFAS NEMP 2020 Recreational Water																										
PFAS NEMP 2020 Freshwater 95%																										
Field ID	**Sampled Date**	**Lab Report Number**	**Matrix Type**																							
GW03	28-Oct-21	EP2113015/EP2113677	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	28-Oct-21	EP2113015	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	27-Oct-21	EP2113015/EP2113677	Water	<0.001	<0.0001	<0.0001	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<2	<0.02	<0.5	<0.02	<10	<0.05	<0.1	<0.02	<0.05	<0.1	<0.05	<0.1	<0.1	<0.01
GW15	28-Oct-21	EP2113015	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	28-Oct-21	EP2113015/EP2113677	Water	<0.001	<0.0001	<0.0001	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<2	<0.02	<0.5	<0.02	<10	<0.05	<0.1	<0.02	<0.05	<0.1	<0.05	<0.1	<0.1	<0.01

Table C-1:Groundwater Results

				PFAS/PFOS																																								
				10:2 Fluorotelomer sulfonic acid (10:2 FTS)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	N-Ethyl perfluorooctane sulfonamide (EtFOSA	N-Ethyl perfluorooctane sulfonamide (NEtFO	N-Ethyl perfluorooctane sulfonamidoacetic ac	N-Ethyl perfluorooctane sulfonamidoethanol	N-ethyl-perfluorooctanesulfonamidoacetic ac	N-ethylperfluorooctanesulfonamidoethanol (	N-Methyl perfluorooctane sulfonamide (MeF	N-Methyl perfluorooctane sulfonamide (NMe	N-Methyl perfluorooctane sulfonamidoacetic	N-Methyl perfluorooctane sulfonamidoethan	N-methylperfluorooctane sulfonamidoacetic	N-Methylperfluorooctanesulfonamidoethano	Perfluorobutane sulfonic acid (PFBS)	Perfluorobutanoic acid (PFBA)	Perfluorodecane sulfonic acid (PFDS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexane sulfonic acid (PFHxS)	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid (PFNA)	Perfluorooctane sulfonamide (FOSA)	Perfluorooctane sulfonamide (PFOSA)	Perfluorooctanesulfonic acid - PFOS	Perfluorooctanesulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	Perfluoropentane sulfonic acid (PFPeS)	Perfluoropentanoic acid (PFPeA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	Sum of PFAS	Sum of PFHxS and PFOS	Sum of WA DWER PFAS (n=10)*
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	UG/L
EQL				0.001	0.001	0.001	0.001	0.05	0.001	0.02	0.05	5E-04	0.001	0.05	0.001	0.02	0.05	0.0005	0.001	0.0005	0.002	0.02	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.02	5E-04	0.01	0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.0002
Short Term Irrigation Values (DWER 2021)																																												
ANZG (2018) Freshwater 95% toxicant DGVs																																												
DWER Trigger Values (DER, 2015)																																												
DBCA Policy # 50 (2017) [2]																																												
Non-potable Groundwater Use (DWER, 2021)																																												
Water Corporation Criteria [1]																																												
PFAS NEMP 2018 Table 1 Health Drinking Water																																				0.56							0.07	
PFAS NEMP 2020 Recreational Water																																				10							2	
PFAS NEMP 2020 Freshwater 95%																																				220								
Field ID	**Sampled Date**	**Lab Report Number**	**Matrix Type**																																									
GW03	28-Oct-21	EP2113015/EP2113677	Water	<0.001	<0.001	<0.001	<0.001	<0.05	<0.001	<0.02	<0.05	<0.0005	<0.001	<0.05	<0.001	<0.02	<0.05	<0.0005	<0.001	0.0064	0.308	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	0.0722	0.0183	0.335	<0.0005	<0.02	<0.0005	<0.01	0.0077	0.007	0.0032	1.28	<0.0005	<0.0005	<0.0005	2.04	0.026	2.03
GW04	28-Oct-21	EP2113015	Water	<0.001	<0.001	<0.001	<0.001	-	<0.001	-	-	<0.0005	<0.001	-	<0.001	-	-	<0.0005	<0.001	0.0042	0.0033	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0056	0.0038	<0.0005	-	<0.0005	-	0.0005	<0.0005	0.0031	0.0042	<0.0005	<0.0005	<0.0005	0.0247	0.0061	0.0216
GW06	27-Oct-21	EP2113015/EP2113677	Water	<0.001	<0.001	<0.001	<0.001	<0.05	<0.001	<0.02	<0.05	<0.0005	<0.001	<0.05	<0.001	<0.02	<0.05	<0.0005	<0.001	0.0015	0.005	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	0.0015	0.001	0.0216	<0.0005	<0.02	<0.0005	<0.01	<0.0002	<0.0005	0.0005	0.0443	<0.0005	<0.0005	<0.0005	0.0754	0.001	0.0749
GW15	28-Oct-21	EP2113015	Water	<0.001	<0.001	<0.001	<0.001	-	<0.001	-	-	<0.0005	<0.001	-	<0.001	-	-	<0.0005	<0.001	<0.0005	<0.002	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	-	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002
MW03	28-Oct-21	EP2113015/EP2113677	Water	<0.001	<0.001	<0.001	<0.001	<0.05	<0.001	<0.02	<0.05	<0.0005	<0.001	<0.05	<0.001	<0.02	<0.05	<0.0005	<0.001	0.0048	<0.002	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0229	<0.0005	<0.0005	<0.02	<0.0005	<0.01	0.0059	0.0005	0.0036	<0.0005	<0.0005	<0.0005	<0.0005	0.0377	0.0288	0.0341

Table C-1:Groundwater Results

				PFAS TOP Assay		
				Sum of PFASs (n=30) TOPA	Sum of TOP C4 - C14 as Fluorine	Sum of TOP C4 - C14 Carboxylates and C4 - C8
				µg/L	µg/L	µg/L
EQL				0.01	0.01	0.01
Short Term Irrigation Values (DWER 2021)						
ANZG (2018) Freshwater 95% toxicant DGVs						
DWER Trigger Values (DER, 2015)						
DBCA Policy # 50 (2017) [2]						
Non-potable Groundwater Use (DWER, 2021)						
Water Corporation Criteria [1]					200	
PFAS NEMP 2018 Table 1 Health Drinking Water						
PFAS NEMP 2020 Recreational Water						
PFAS NEMP 2020 Freshwater 95%						
Field ID	**Sampled Date**	**Lab Report Number**	**Matrix Type**			
GW03	28-Oct-21	EP2113015/EP2113677	Water	1.7	1.1	1.7
GW04	28-Oct-21	EP2113015	Water	-	-	-
GW06	27-Oct-21	EP2113015/EP2113677	Water	0.07	0.05	0.07
GW15	28-Oct-21	EP2113015	Water	-	-	-
MW03	28-Oct-21	EP2113015/EP2113677	Water	0.03	0.02	0.03

Table C-2 - Groundwater Field Results

Sample ID	Date	DO (mg/L O_2)	EC (µS/cm)	pH (pH units)	Redox (mV)	Temperature (oC)	Description
Freshwater Ecosystems			1500	6.5-8.5			
DWER* Buffering Capacity Indicators				<6			
DWER* ASS / Acidic Water Indicators				<5			
DWER* CSB Notification				<4			
GW03	28/10/21	0.19	907	5.91	86.2	18.0	Clear
GW04	28/10/21	1.10	1435	5.46	95.5	19.9	Clear
GW06	28/10/21	0.96	750	5.08	64.4	18.8	Clear
GW15	28/10/21	1.48	155	4.76	121.6	21.5	Clear
MW03	28/10/21	1.47	432	5.88	108.9	21.2	Clear

NOTES:
1. Default trigger value for lakes, reservoirs & wetlands in south-west Australia (DWER, 2021)
2. Range between which soil and animal health will not generally be affected (DWER, 2021)
3. Average EC threshold for pastures in sandy soils (DWER, 2021)
4. ASS disturbance indicators (DER, 2015b)
5. Class 4 buffering capacity indicators (DER, 2015b)
6. Acidic water definition where pH <6 (DER, 2015b)

Table C-3 Soil Analytical Results

			Field Measurements				pH					Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate		Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-		%S	%S	%S
EQL							0.1	0.1	-	-		0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0				0.03	0.03
Bassendean Sand								3.0						<0.03
Field ID	**Sampled Date**	**Lab Report Number**												
BH06_A_0.0	17-Aug-21	EP2109464	SAND: dark brown fine to coarse sand			12.38	6.0	4.1	1.9	Moderate		<0.02	<0.005	<0.02
BH06_A_0.25	17-Aug-21	EP2109464	Shades to grey			12.13	5.8	3.9	1.9	Moderate		-	-	-
BH06_A_0.5	17-Aug-21	EP2109464	Gravelly Clayey SAND: Brown with dark brown mottle, fine to coarse sand, low plasticity clay			11.88	6.4	4.0	2.4	Moderate		<0.02	<0.005	<0.02
BH06_A_0.75	17-Aug-21	EP2109464				11.63	6.3	4.6	1.7	Moderate		-	-	-
BH06_A_1.0	17-Aug-21	EP2109464	SAND: black with organic staining, organic matter (tree roots), fine to coarse sand, poorly sorted			11.38	6.1	4.2	1.9	Moderate		<0.02	<0.005	<0.02
BH06_A_1.25	17-Aug-21	EP2109464				11.13	6.7	5.1	1.6	Moderate		-	-	-
BH06_A_1.5	17-Aug-21	EP2109464	SAND: dark brown/grey fine to coarse sand			10.88	6.8	5.0	1.8	Slight		<0.02	<0.005	<0.02
BH06_A_1.75	17-Aug-21	EP2109464				10.63	7.0	5.1	1.9	Slight		-	-	-
BH06_A_2.0	17-Aug-21	EP2109464	CLAY: grey with some organic materials, low-med pastisity clays			10.38	6.3	5.2	1.1	Slight		0.03	<0.005	0.03
BH06_A_2.25	17-Aug-21	EP2109464				10.13	6.0	3.9	2.1	Slight		-	-	-
BH06_A_2.5	17-Aug-21	EP2109464				9.88	6.3	2.8	3.5	Strong		0.06	0.005	0.06
BH06_A_2.75	17-Aug-21	EP2109464				9.63	6.1	2.6	3.5	Strong		-	-	-
BH06_A_3.0	17-Aug-21	EP2109464		1.52	10.86	9.38	6.1	3.6	2.5	Slight		<0.02	<0.005	<0.02
BH06_A_3.25	17-Aug-21	EP2109464				9.13	5.8	4.3	1.5	Slight		-	-	-
BH06_A_3.5	17-Aug-21	EP2109464				8.88	5.8	4.4	1.4	Slight		<0.02	<0.005	0.02
BH06_A_3.75	17-Aug-21	EP2109464				8.63	5.9	4.3	1.6	Slight		-	-	-
BH06_A_4.0	17-Aug-21	EP2109464	Clayey SAND: grey fine to coarse sand, low plasiticity clay			8.38	5.8	4.4	1.4	Slight		<0.02	<0.005	<0.02
BH06_A_4.25	17-Aug-21	EP2109464				8.13	5.6	4.6	1.0	Slight		-	-	-
BH06_A_4.5	17-Aug-21	EP2109464				7.88	5.7	3.9	1.8	Slight		<0.02	<0.005	<0.02
BH06_A_4.75	17-Aug-21	EP2109464	Silty SAND: grey, fine to coarse sand (more coarse) well sorted			7.63	5.6	4.2	1.4	Slight		-	-	-
BH06_A_5.0	17-Aug-21	EP2109464				7.38	6.1	4.0	2.1	Slight		<0.02	0.005	<0.02
BH06_A_5.25	17-Aug-21	EP2109464	Silty CLAY: black fine to coarse sand, low-med stiff clays-sticky			7.13	6.0	4.2	1.8	Slight		-	-	-
BH06_A_5.5	17-Aug-21	EP2109464				6.88	6.0	3.9	2.1	Slight		0.05	0.009	0.05
BH06_A_5.75	17-Aug-21	EP2109464	SAND: grey fine to coarse sand (more coarse)			6.63	5.6	4.4	1.2	Slight		-	-	-
BH06_A_6.0	17-Aug-21	EP2109464				6.38	5.9	4.0	1.9	Slight		<0.02	<0.005	<0.02
BH08_A_0.0	13-Sep-21	EP2110727	SAND: Dark brown, fine to coarse sand, some trace gravels			10.02	6.8	4.4	2.4	Moderate		<0.02	<0.005	<0.02
BH08_A_0.25	13-Sep-21	EP2110727				9.77	6.9	4.3	2.6	Moderate		-	-	-
BH08_A_0.5	13-Sep-21	EP2110727	Shades to brown/red, fine to coarse, well sorted			9.52	7.2	5.1	2.1	Strong		<0.02	0.005	<0.02
BH08_A_0.75	13-Sep-21	EP2110727				9.27	7.3	5.9	1.4	Strong		-	-	-
BH08_A_1.0	13-Sep-21	EP2110727				9.02	7.0	6.1	0.9	Strong		<0.02	<0.005	<0.02
BH08_A_1.25	13-Sep-21	EP2110727				8.77	7.1	6.2	0.9	Strong		-	-	-
BH08_A_1.5	13-Sep-21	EP2110727				8.52	7.2	6.2	1.0	Strong		<0.02	<0.005	<0.02
BH08_A_1.75	13-Sep-21	EP2110727				8.27	7.1	5.0	2.1	Strong		-	-	-
BH08_A_2.0	13-Sep-21	EP2110727				8.02	7.3	6.1	1.2	Strong		<0.02	<0.005	<0.02
BH08_A_2.25	13-Sep-21	EP2110727				7.77	7.3	6.3	1.0	Strong		-	-	-
BH08_A_2.5	13-Sep-21	EP2110727		3.10	6.92	7.52	7.3	6.0	1.3	Strong		<0.02	<0.005	<0.02
BH08_A_2.75	13-Sep-21	EP2110727				7.27	7.5	6.0	1.5	Strong		-	-	-
BH08_A_3.0	13-Sep-21	EP2110727	SAND: Light brown/yellow, fine to coarse sand, some trace gravels			7.02	7.7	5.8	1.9	Strong		<0.02	<0.005	<0.02
BH08_A_3.25	13-Sep-21	EP2110727				6.77	7.3	5.6	1.7	Strong		-	-	-
BH08_A_3.5	13-Sep-21	EP2110727				6.52	7.0	5.5	1.5	Strong		<0.02	0.005	<0.02
BH08_A_3.75	13-Sep-21	EP2110727/EP2114604				6.27	6.9	5.6	1.3	Strong		0.04	<0.005	0.04
BH08_A_4.0	13-Sep-21	EP2110727	Clayey SAND: Grey with brown mottling, low plasticity			6.02	6.7	5.4	1.3	Strong		0.04	<0.005	0.04
BH08_A_4.25	13-Sep-21	EP2110727				5.77	6.9	5.4	1.5	Strong		-	-	-
BH08_A_4.5	13-Sep-21	EP2110727	Clayey SAND: Grey, low plasticity			5.52	6.6	5.0	1.6	Strong		0.04	<0.005	0.04
BH08_A_4.75	13-Sep-21	EP2110727				5.27	6.5	5.8	0.7	Strong		-	-	-
BH08_A_5.0	13-Sep-21	EP2110727				5.02	6.8	6.2	0.6	Strong		0.04	0.005	0.04
BH09_A_0.0	14-Sep-21	EP2110806	SAND: light brown, fine to coarse, organic matter			8.31	7.7	6.5	1.2	Strong		<0.02	<0.005	<0.02
BH09_A_0.25	14-Sep-21	EP2110806	Shades to dark brown			8.06	7.5	6.0	1.5	Strong		-	-	-
BH09_A_0.5	14-Sep-21	EP2110806	Shades to light brown/orange			7.81	7.5	5.7	1.8	Moderate		<0.02	<0.005	<0.02
BH09_A_0.75	14-Sep-21	EP2110806				7.56	7.6	6.3	1.3	Strong		-	-	-
BH09_A_1.0	14-Sep-21	EP2110806	SAND: dark brown, fine to coarse, organic matter			7.31	6.8	4.8	2.0	Strong		<0.02	0.007	<0.02
BH09_A_1.25	14-Sep-21	EP2110806/EP2112980				7.06	6.4	3.9	2.5	Strong		0.03	0.006	0.04
BH09_A_1.5	14-Sep-21	EP2110806				6.81	6.1	3.8	2.3	Strong		0.03	<0.005	0.03
BH09_A_1.75	14-Sep-21	EP2110806	Shades to light brown, orange mottling			6.56	6.5	4.6	1.9	Slight		-	-	-
BH09_A_2.0	14-Sep-21	EP2110806				6.31	6.1	4.5	1.6	Slight		<0.02	<0.005	<0.02
BH09_A_2.25	14-Sep-21	EP2110806/EP2114604	Grades to coarse sand, grey mottling			6.06	4.8	3.6	1.2	Slight		0.02	<0.005	0.03
BH09_A_2.5	14-Sep-21	EP2110806	Grades to increased clay content	2.19	6.12	5.81	4.4	3.2	1.2	Slight		0.04	0.005	0.04
BH09_A_2.75	14-Sep-21	EP2110806/EP2112980	Grades to decreased clay content			5.56	6.7	3.8	2.9	Strong		<0.02	0.005	<0.02
BH09_A_3.0	14-Sep-21	EP2110806	Grades to large/coarse sands, grey/brown			5.31	6.0	4.3	1.7	Slight		<0.02	<0.005	<0.02
BH09_A_3.25	14-Sep-21	EP2110806	Shades to grey, fine to coarse grains, well sorted			5.06	5.8	4.3	1.5	Slight		-	-	-
BH09_A_3.5	14-Sep-21	EP2110806				4.81	5.8	4.5	1.3	Slight		<0.02	<0.005	<0.02
BH09_A_3.75	14-Sep-21	EP2110806/EP2112980	Shades to grey, fine to coarse grains, well sorted			4.56	5.8	4.5	1.3	Slight		<0.02	0.005	<0.02
BH09_A_4.0	14-Sep-21	EP2110806				4.31	7.1	5.5	1.6	Strong		0.02	0.006	0.03
BH09_A_4.25	14-Sep-21	EP2110806/EP2114604				4.06	6.9	5.6	1.3	Strong		<0.02	<0.005	<0.02
BH09_A_4.5	14-Sep-21	EP2110806				3.81	6.8	5.5	1.3	Slight		<0.02	<0.005	0.02
BH09_A_4.75	14-Sep-21	EP2110806				3.56	6.4	4.9	1.5	Slight		-	-	-
BH09_A_5.0	14-Sep-21	EP2110806	Shades to yellow/orange			3.31	6.1	4.9	1.2	Slight		<0.02	0.007	<0.02
BH10_A_0.0	19-Oct-21	EP2112529	Silty peat, black with some vegetation			7.85	7.4	4.0	3.4	Extreme		<0.02	<0.005	<0.02
BH10_A_0.25	19-Oct-21	EP2112529	SAND: fine to medium grained			7.60	7.3	5.8	1.5	Extreme		-	-	-
BH10_A_0.5	19-Oct-21	EP2112529	Thin layer of black silty clay with some fine sand (0.9-10mm)			7.35	8.5	6.8	1.7	Strong		<0.02	0.005	<0.02
BH10_A_0.75	19-Oct-21	EP2112529				7.10	8.1	6.9	1.2	Strong		-	-	-
BH10_A_1.0	19-Oct-21	EP2112529	Creamy yellow with gravel			6.85	8.0	6.2	1.8	Strong		<0.02	<0.005	<0.02
BH10_A_1.25	19-Oct-21	EP2112529/EP2114604	SAND: fine to medium grained, creamy yellow with gravel			6.60	7.6	5.4	2.2	Extreme		<0.02	<0.005	<0.02
BH10_A_1.5	19-Oct-21	EP2112529	Silty SAND: black, high plasticity			6.35	6.1	4.0	2.1	Extreme		0.04	<0.005	0.04
BH10_A_1.75	19-Oct-21	EP2112529/EP2114604				6.10	6.4	5.4	1.0	Extreme		<0.02	0.005	<0.02
BH10_A_2.0	19-Oct-21	EP2112529				5.85	6.6	5.1	1.5	Extreme		<0.02	0.006	<0.02
BH10_A_2.25	19-Oct-21	EP2112529		Not Recorded	Not Recorded	5.60	6.7	5.9	0.8	Extreme		-	-	-
BH10_A_2.5	19-Oct-21	EP2112529				5.35	6.8	5.2	1.6	Extreme		<0.02	<0.005	<0.02
BH10_A_2.75	19-Oct-21	EP2112529				5.10	6.8	4.8	2.0	Strong		-	-	-
BH10_A_3.0	19-Oct-21	EP2112529	SAND: dark grey, medium grained			4.85	6.9	4.4	2.5	Strong		<0.02	0.006	<0.02
BH10_A_3.25	19-Oct-21	EP2112529				4.60	6.2	4.0	2.2	Extreme		-	-	-
BH10_A_3.5	19-Oct-21	EP2112529	Shades to light brown, coarse grained			4.35	6.4	5.2	1.2	Extreme		<0.02	<0.005	<0.02
BH10_A_3.75	19-Oct-21	EP2112529				4.10	7.0	5.5	1.5	Strong		-	-	-
BH10_A_4.0	19-Oct-21	EP2112529				3.85	7.0	5.5	1.5	Moderate		<0.02	<0.005	<0.02
BH10_A_4.25	19-Oct-21	EP2112529				3.60	7.1	5.5	1.6	Moderate		-	-	-
BH10_A_4.5	19-Oct-21	EP2112529				3.35	7.0	5.4	1.6	Moderate		<0.02	<0.005	<0.02
BH10_A_4.75	19-Oct-21	EP2112529				3.10	6.2	3.8	2.4	Slight		-	-	-

Table C-3 Soil Analytical Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH11_A_0.0	19-Oct-21	EP2112530	SAND: Medium sand, top soil			8.10	6.1	3.8	2.3	Moderate	0.02	0.006	0.02
BH11_A_0.25	19-Oct-21	EP2112530	SILT: Dark brown			7.85	6.4	4.2	2.2	Moderate	-	-	-
BH11_A_0.5	19-Oct-21	EP2112530				7.60	6.6	4.3	2.3	Moderate	0.02	<0.005	0.02
BH11_A_0.75	19-Oct-21	EP2112530/EP2114604				7.35	6.2	3.7	2.5	Moderate	0.04	<0.005	0.04
BH11_A_1.0	19-Oct-21	EP2112530				7.10	5.9	3.1	2.8	Moderate	0.06	0.014	0.08
BH11_A_1.25	19-Oct-21	EP2112530				6.85	6.3	4.2	2.1	Strong	<0.02	<0.005	<0.02
BH11_A_1.5	19-Oct-21	EP2112530				6.60	6.3	5.3	1.0	Strong	0.02	0.005	0.03
BH11_A_1.75	19-Oct-21	EP2112530/EP2114604				6.35	6.3	6.6	-0.3	Strong	<0.02	<0.005	0.02
BH11_A_2.0	19-Oct-21	EP2112530				6.10	6.1	5.9	0.2	Strong	<0.02	0.008	0.02
BH11_A_2.25	19-Oct-21	EP2112530/EP2114604				5.85	6.1	5.2	0.9	Strong	0.02	<0.005	0.02
BH11_A_2.5	19-Oct-21	EP2112530				5.60	6.1	5.6	0.5	Strong	0.02	0.006	0.03
BH11_A_2.75	19-Oct-21	EP2112530				5.35	5.9	5.5	0.4	Strong	-	-	-
BH11_A_3.0	19-Oct-21	EP2112530		0.50	7.60	5.10	5.9	6.0	-0.1	Strong	0.02	<0.005	0.03
BH11_A_3.25	19-Oct-21	EP2112530				4.85	5.7	4.3	1.4	Strong	-	-	-
BH11_A_3.5	19-Oct-21	EP2112530				4.60	6.2	4.1	2.1	Extreme	0.03	0.005	0.04
BH11_A_3.75	19-Oct-21	EP2112530				4.35	6.2	4.1	2.1	Extreme	-	-	-
BH11_A_4.0	19-Oct-21	EP2112530				4.10	6.2	3.5	2.7	Extreme	0.05	0.013	0.06
BH11_A_4.25	19-Oct-21	EP2112530				3.85	6.1	3.9	2.2	Extreme	-	-	-
BH11_A_4.5	19-Oct-21	EP2112530				3.60	6.4	3.9	2.5	Extreme	0.04	<0.005	0.04
BH11_A_4.75	19-Oct-21	EP2112530				3.35	6.3	3.8	2.5	Extreme	-	-	-
BH11_A_5.0	19-Oct-21	EP2112530				3.10	6.4	3.7	2.7	Extreme	0.03	0.006	0.03
BH11_A_5.25	19-Oct-21	EP2112530/EP2114604				2.85	6.5	3.8	2.7	Extreme	0.03	<0.005	0.03
BH11_A_5.5	19-Oct-21	EP2112529				2.60	6.9	2.8	4.1	Strong	<0.02	<0.005	<0.02
BH11_A_5.75	19-Oct-21	EP2112529/EP2114604				2.35	6.9	3.2	3.7	Strong	<0.02	<0.005	<0.02
BH11_A_6.0	19-Oct-21	EP2112529				2.10	6.8	2.3	4.5	Strong	<0.02	0.029	0.04
BH12_A_0.0	18-Oct-21	EP2112538	Sandy CLAY: Light brown, medium sand with somevegetatation, well rounded gravel, medium plasticity			8.38	5.4	3.0	2.4	Strong	0.07	<0.005	0.07
BH12_A_0.25	18-Oct-21	EP2112538				8.13	5.1	3.3	1.8	Strong	-	-	-
BH12_A_0.5	18-Oct-21	EP2112538	Silty CLAY: Dark brown, high plasticity			7.88	5.1	3.4	1.7	Strong	0.23	0.007	0.25
BH12_A_0.75	18-Oct-21	EP2112538				7.63	5.3	3.2	2.1	Strong	-	-	-
BH12_A_1.0	18-Oct-21	EP2112538	Shades to black			7.38	5.9	3.4	2.5	Strong	0.12	<0.005	0.12
BH12_A_1.25	18-Oct-21	EP2112538				7.13	5.7	3.4	2.3	Moderate	-	-	-
BH12_A_1.5	18-Oct-21	EP2112538	Silty CLAY: Dark brown, high plasticity, with red mottling			6.88	6.2	4.1	2.1	Moderate	0.08	<0.005	0.08
BH12_A_1.75	18-Oct-21	EP2112538				6.63	6.0	3.4	2.6	Moderate	-	-	-
BH12_A_2.0	18-Oct-21	EP2112538				6.38	6.2	4.4	1.8	Slight	0.03	<0.005	0.03
BH12_A_2.25	18-Oct-21	EP2112538	Silty CLAY: Grey with red mottling, minor gravels, medium plasticity			6.13	6.3	5.9	0.4	Moderate	-	-	-
BH12_A_2.5	18-Oct-21	EP2112538		Dry	Dry	5.88	6.2	5.3	0.9	Slight	0.02	<0.005	0.03
BH12_A_2.75	18-Oct-21	EP2112538				5.63	6.4	5.4	1.0	Slight	-	-	-
BH12_A_3.0	18-Oct-21	EP2112538				5.38	6.6	5.6	1.0	Slight	0.04	<0.005	0.05
BH12_A_3.25	18-Oct-21	EP2112538				5.13	6.6	5.6	1.0	Slight	-	-	-
BH12_A_3.5	18-Oct-21	EP2112538				4.88	7.0	6.1	0.9	Moderate	0.04	<0.005	0.04
BH12_A_3.75	18-Oct-21	EP2112538				4.63	7.3	6.0	1.3	Slight	-	-	-
BH12_A_4.0	18-Oct-21	EP2112538				4.38	7.6	6.1	1.5	Slight	<0.02	0.132	0.14
BH12_A_4.25	18-Oct-21	EP2112538	SAND: Light grey, medium sand with minor clay			4.13	7.7	6.5	1.2	Slight	<0.02	<0.005	<0.02
BH12_A_4.5	18-Oct-21	EP2112538				3.88	7.3	6.1	1.2	Slight	<0.02	0.006	<0.02
BH12_A_4.75	18-Oct-21	EP2112538	CLAY: Light grey, high plasticity			3.63	7.1	6.0	1.1	Slight	-	-	-
BH12_A_5.0	18-Oct-21	EP2112538				3.38	7.3	5.7	1.6	Slight	<0.02	<0.005	<0.02
BH13_A_0.0	15-Sep-21	EP2110869	FILL: Oragnic mulch			16.22	7.7	5.3	2.4	Moderate	<0.02	<0.005	<0.02
BH13_A_0.25	15-Sep-21	EP2110869	SAND: Dark grey, fine to coarse sand, well sorted			15.97	7.4	4.6	2.8	Moderate	-	-	-
BH13_A_0.5	15-Sep-21	EP2110869	Gravelly SAND: Brown/grey, sub-angualr, sub-rounded,gravels			15.72	7.3	4.6	2.7	Moderate	<0.02	<0.005	<0.02
BH13_A_0.75	15-Sep-21	EP2110869	SAND: Orange/brown, trace gravels			15.47	6.6	4.6	2.0	Slight	-	-	-
BH13_A_1.0	15-Sep-21	EP2110869	Increasing clay content	Dry	Dry	15.22	6.6	4.9	1.7	Slight	<0.02	<0.005	0.02
BH13_A_1.25	15-Sep-21	EP2110869	Shades to yellow/orange with grey mottling			14.97	6.1	4.9	1.2	Slight	-	-	-
BH13_A_1.5	15-Sep-21	EP2110869				14.72	6.2	4.9	1.3	Slight	0.02	<0.005	0.02
BH13_A_1.75	15-Sep-21	EP2110869	Shades to yellow/brown with red mottling			14.47	6.1	4.7	1.4	Slight	-	-	-
BH13_A_2.0	15-Sep-21	EP2110869				14.22	5.9	4.5	1.4	Slight	0.02	<0.005	0.02
BH14_A_0.0	15-Sep-21	EP2110870-AA	FILL: Gravelly sand, dark brown, organic matter			16.60	8.1	5.7	2.4	Moderate	<0.02	0.006	<0.02
BH14_A_0.25	15-Sep-21	EP2110870-AA	Shades to orange/grey			16.35	7.6	5.7	1.9	Moderate	-	-	-
BH14_A_0.5	15-Sep-21	EP2110870-AA	Shades to orange/brown, grades to increasing sand			16.10	7.1	5.5	1.6	Moderate	<0.02	0.006	<0.02
BH14_A_0.75	15-Sep-21	EP2110870-AA	Grades to increasing clay content			15.85	6.9	5.2	1.7	Slight	-	-	-
BH14_A_1.0	15-Sep-21	EP2110870-AA	Clayey SAND: Red mottling, dark grey sand with trace gravels			15.60	6.6	5.0	1.6	Slight	<0.02	<0.005	0.02
BH14_A_1.25	15-Sep-21	EP2110870-AA				15.35	6.8	4.9	1.9	Slight	0.03	<0.005	0.03
BH14_A_1.5	15-Sep-21	EP2110870-AA				15.10	6.0	4.4	1.6	Slight	0.03	<0.005	0.04
BH14_A_1.75	15-Sep-21	EP2110870-AA				14.85	6.2	4.0	2.2	Slight	-	-	-
BH14_A_2.0	15-Sep-21	EP2110870-AA	Sandy CLAY: red/grey mottling, low plasticity			14.60	5.4	4.3	1.1	Slight	0.05	<0.005	0.05
BH14_A_2.25	15-Sep-21	EP2110870-AA				14.35	5.5	4.4	1.1	Slight	-	-	-
BH14_A_2.5	15-Sep-21	EP2110870-AA	Shades to light brown, grades to decreasing clay content			14.10	5.2	4.4	0.8	Slight	0.04	<0.005	0.04
BH14_A_2.75	15-Sep-21	EP2110870-AA	Clayey SAND: light brown/grey with orange mottling			13.85	5.4	4.4	1.0	Slight	-	-	-
BH14_A_3.0	15-Sep-21	EP2110870-AA		5.50	11.10	13.60	5.3	4.7	0.6	Slight	0.04	<0.005	0.04
BH14_A_3.25	15-Sep-21	EP2110870-AA	Shades to light grey, grades to fine, well sorted sand			13.35	5.7	5.0	0.7	Slight	0.03	<0.005	0.03
BH14_A_3.5	15-Sep-21	EP2110870-AA	SAND: light grey/orange, fine to coarse sand			13.10	6.3	5.2	1.1	Slight	0.02	<0.005	0.02
BH14_A_3.75	15-Sep-21	EP2110870-AA				12.85	6.5	5.4	1.1	Moderate	-	-	-
BH14_A_4.0	15-Sep-21	EP2110870-AA				12.60	6.5	5.6	0.9	Slight	0.02	<0.005	0.02
BH14_A_4.25	15-Sep-21	EP2110870-AA				12.35	6.6	5.8	0.8	Slight	-	-	-
BH14_A_4.5	15-Sep-21	EP2110870-AA	Shades to grey/orange			12.10	7.2	5.9	1.3	Slight	<0.02	<0.005	<0.02
BH14_A_4.75	15-Sep-21	EP2110870-AA				11.85	7.3	5.9	1.4	Slight	-	-	-
BH14_A_5.0	15-Sep-21	EP2110870-AA				11.60	7.4	6.1	1.3	Slight	<0.02	<0.005	<0.02
BH14_A_5.25	15-Sep-21	EP2110870-AA				11.35	7.8	6.2	1.6	Slight	-	-	-
BH14_A_5.5	15-Sep-21	EP2110870-AA	Shades to red mottling			11.10	7.4	6.0	1.4	Slight	<0.02	<0.005	<0.02
BH14_A_5.75	15-Sep-21	EP2110870-AA				10.85	7.6	6.0	1.6	Slight	-	-	-
BH14_A_6.0	15-Sep-21	EP2110870-AA				10.60	7.3	5.7	1.6	Slight	<0.02	<0.005	<0.02

Table C-3 Soil Analytical Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH15_A_0.0	15-Sep-21	EP2110869	FILL: Dark brown, fine to coarse sand, organic matter	Dry	Dry	16.93	8.2	6.0	2.2	Moderate	<0.02	0.006	<0.02
BH15_A_0.25	15-Sep-21	EP2110869				16.68	8.6	6.3	2.3	Moderate	-	-	-
BH15_A_0.5	15-Sep-21	EP2110869	Shades to light brown			16.43	8.9	6.5	2.4	Moderate	<0.02	0.006	<0.02
BH15_A_0.75	15-Sep-21	EP2110869	Shades to grey			16.18	8.4	6.5	1.9	Moderate	-	-	-
BH15_A_1.0	15-Sep-21	EP2110869	Shades to orange/brown with trace limestone cobbles			15.93	8.4	6.4	2.0	Moderate	<0.02	<0.005	<0.02
BH15_A_1.25	15-Sep-21	EP2110869	Gravelly SAND: Dark brown/grey			15.68	8.2	6.4	1.8	Moderate	-	-	-
BH15_A_1.5	15-Sep-21	EP2110869	Grades to decreased gravels			15.43	7.4	5.4	2.0	Moderate	<0.02	<0.005	<0.02
BH15_A_1.75	15-Sep-21	EP2110869	Shades to grey, orange mottling			15.18	7.2	5.6	1.6	Slight	-	-	-
BH15_A_2.0	15-Sep-21	EP2110869	Shades to light brown with orange mottling			14.93	6.8	5.2	1.6	Slight	<0.02	<0.005	<0.02
BH15_A_2.25	15-Sep-21	EP2110869				14.68	6.6	5.0	1.6	Slight	-	-	-
BH15_A_2.5	15-Sep-21	EP2110869				14.43	6.1	4.8	1.3	Slight	0.02	<0.005	0.02
BH15_A_2.75	15-Sep-21	EP2110869	Grades to coarse sand, yellow/brown			14.18	5.6	4.4	1.2	Slight	-	-	-
BH15_A_3.0	15-Sep-21	EP2110869	Red mottling			13.93	5.7	4.5	1.2	Slight	<0.02	<0.005	<0.02
BH15_A_3.25	15-Sep-21	EP2110869	FILL: Dark brown, fine to coarse sand, organic matterGrades			13.68	6.3	4.8	1.5	Slight	0.02	<0.005	0.02
BH15_A_3.5	15-Sep-21	EP2110869	Clayey SAND: Grey, low plasticity with organic matter			13.43	6.3	5.2	1.1	Slight	0.02	<0.005	0.03
BH15_A_4.0	15-Sep-21	EP2110869	SAND: Grey/light brown, fine to coarse sand, trace gravels			13.18	7.2	6.5	0.7	Slight	<0.02	<0.005	<0.02
BH15_A_4.5	15-Sep-21	EP2110869	Shades to light brown			12.93	7.6	6.9	0.7	Slight	<0.02	<0.005	<0.02
BH15_A_5.0	15-Sep-21	EP2110869				12.68	7.5	6.5	1.0	Slight	<0.02	<0.005	<0.02
BH16_A_0.0	02-Sep-21	EP2110216	SILTY SAND: fine to medium grained, subangular to	Not recorded	Not recorded	17.21	7.6	5.1	2.5	Moderate	<0.02	0.006	<0.02
BH16_A_0.25	02-Sep-21	EP2110216	GRAVELLY SAND: fine to coarse grained, subangular to			16.96	7.6	5.2	2.4	Moderate	-	-	-
BH16_A_0.5	02-Sep-21	EP2110216	subrounded; gravel, fine grained, subangular to subrounded;			16.71	8.2	5.1	3.1	Slight	<0.02	0.008	<0.02
BH16_A_0.75	02-Sep-21	EP2110216	SAND: fine to medium grained, subangular to subrounded;			16.46	8.0	5.4	2.6	Slight	-	-	-
BH16_A_1.0	02-Sep-21	EP2110216	with silt, non plastic; pale grey brown mottled yellow, trace			16.21	7.9	4.6	3.3	Moderate	<0.02	<0.005	<0.02
BH16_A_1.25	02-Sep-21	EP2110216	CLAYEY GRAVELLY SAND: fine to medium grained, subangular			15.96	7.8	5.1	2.7	Moderate	-	-	-
BH16_A_1.5	02-Sep-21	EP2110216	to subrounded; clay, non plastic; gravel, fine to coarse			15.71	7.6	5.3	2.3	Moderate	<0.02	0.006	<0.02
BH16_A_1.75	02-Sep-21	EP2110216	grained, angular to rounded; dark brown red, with gravel.			15.46	7.6	5.4	2.2	Moderate	-	-	-
BH16_A_2.0	02-Sep-21	EP2110216				15.21	7.5	5.8	1.7	Strong	<0.02	<0.005	<0.02
BH16_A_2.25	02-Sep-21	EP2110216				14.96	7.2	5.7	1.5	Strong	-	-	-
BH16_A_2.5	02-Sep-21	EP2110216				14.71	7.1	5.7	1.4	Strong	<0.02	<0.005	<0.02
BH16_A_2.75	02-Sep-21	EP2110216	CLAY: high plasticity; trace sand, fine grained, subangular to			14.46	6.7	5.1	1.6	Slight	-	-	-
BH16_A_3.0	02-Sep-21	EP2110216	subrounded; pale grey orange mottled brown.			14.21	6.6	5.2	1.4	Slight	0.02	<0.005	0.02
BH16_A_3.25	02-Sep-21	EP2110216				13.96	6.4	4.8	1.6	Slight	-	-	-
BH16_A_3.5	02-Sep-21	EP2110216				13.71	6.2	4.7	1.5	Slight	<0.02	0.005	0.02
BH16_A_3.75	02-Sep-21	EP2110216				13.46	6.2	4.7	1.5	Slight	0.02	<0.005	0.02
BH16_A_4.0	02-Sep-21	EP2110216	CLAY: low plasticity; dark grey mottled brown red, trace clay.			13.21	6.2	5.1	1.1	Slight	0.03	<0.005	0.03
BH16_A_4.25	02-Sep-21	EP2110216				12.96	6.3	5.2	1.1	Slight	-	-	-
BH16_A_4.5	02-Sep-21	EP2110216				12.71	6.9	5.3	1.6	Slight	0.02	0.005	0.03
BH16_A_4.75	02-Sep-21	EP2110216				12.46	7.0	4.8	2.2	Slight	-	-	-
BH16_A_5.0	02-Sep-21	EP2110216				12.21	6.3	4.6	1.7	Slight	0.04	<0.005	0.04
BH17_A_0.0	02-Sep-21	EP2110218	FILL: Dark brown, fine to coarse sand	Dry	Dry	18.50	8.0	5.3	2.7	Moderate	<0.02	0.009	<0.02
BH17_A_0.25	02-Sep-21	EP2110218				18.25	8.2	5.3	2.9	Moderate	-	-	-
BH17_A_0.5	02-Sep-21	EP2110218				18.00	8.1	5.6	2.5	Moderate	<0.02	<0.005	<0.02
BH17_A_0.75	02-Sep-21	EP2110218	Trace weathered rock (1-5 mm)			17.75	8.0	5.7	2.3	Moderate	-	-	-
BH17_A_1.0	02-Sep-21	EP2110218	Sandy CLAY: Dark brown with black mottling, coarse			17.50	7.1	5.4	1.7	Slight	<0.02	<0.005	<0.02
BH17_A_1.25	02-Sep-21	EP2110218	grained,low plasticity, red and orange deposits			17.25	6.9	5.2	1.7	Slight	-	-	-
BH17_A_1.5	02-Sep-21	EP2110218				17.00	7.0	4.9	2.1	Slight	<0.02	<0.005	<0.02
BH17_A_1.75	02-Sep-21	EP2110218				16.75	7.2	5.0	2.2	Slight	-	-	-
BH17_A_2.0	02-Sep-21	EP2110218	Shades to yellow/orange			16.50	6.7	5.0	1.7	Slight	<0.02	<0.005	<0.02
BH17_A_2.25	02-Sep-21	EP2110218				16.25	6.4	4.8	1.6	Slight	-	-	-
BH17_A_2.5	02-Sep-21	EP2110218				16.00	6.2	4.6	1.6	Slight	<0.02	<0.005	<0.02
BH17_A_2.75	02-Sep-21	EP2110218	SAND: Creamy/grey, fine to coarse sand			15.75	6.3	4.6	1.7	Slight	-	-	-
BH17_A_3.0	02-Sep-21	EP2110218				15.50	6.1	4.5	1.6	Slight	<0.02	<0.005	<0.02
BH17_A_3.25	02-Sep-21	EP2110218				15.25	6.3	4.5	1.8	Slight	-	-	-
BH17_A_3.5	02-Sep-21	EP2110218				15.00	6.3	4.8	1.5	Slight	<0.02	<0.005	<0.02
BH17_A_3.75	02-Sep-21	EP2110218				14.75	6.2	4.6	1.6	Slight	-	-	-
BH17_A_4.0	02-Sep-21	EP2110218	Gravelly SAND: Yellow with red mottling, fine to coarse			14.50	6.3	4.7	1.6	Slight	<0.02	<0.005	<0.02
BH17_A_4.25	02-Sep-21	EP2110218	sand,sub-angular, sub-rounded, small to large pebbles (1-5			14.25	6.2	4.6	1.6	Slight	-	-	-
BH17_A_4.5	02-Sep-21	EP2110218	Shades to light grey with orange mottling and trace Coffee			14.00	6.1	4.7	1.4	Slight	<0.02	<0.005	<0.02
BH17_A_4.75	02-Sep-21	EP2110218	Rock			13.75	6.2	4.1	2.1	Slight	-	-	-
BH17_A_5.0	02-Sep-21	EP2110218	Clayey SAND: Grey with light brown/red mottling, fine			13.50	5.2	4.2	1.0	Slight	<0.02	<0.005	<0.02
BH17_A_5.25	02-Sep-21	EP2110218	sand,low plasticity			13.25	5.8	4.2	1.6	Slight	-	-	-
BH17_A_5.5	02-Sep-21	EP2110218	Shades to orange with red mottling			13.00	5.6	4.4	1.2	Slight	<0.02	<0.005	<0.02
BH17_A_5.75	02-Sep-21	EP2110218				12.75	5.5	4.3	1.2	Slight	-	-	-
BH17_A_6.0	02-Sep-21	EP2110218	Shades to grey with red mottling			12.50	5.3	4.2	1.1	Slight	<0.02	<0.005	0.02
BH17_A_6.25	02-Sep-21	EP2110218				12.25	5.5	4.3	1.2	Slight	-	-	-
BH17_A_6.25	02-Sep-21	EP2110223				12.00	6.1	4.3	1.8	Slight	-	-	-
BH17_A_6.5	02-Sep-21	EP2110218	Decreasing clay content			11.75	5.8	4.3	1.5	Slight	<0.02	<0.005	<0.02
BH17_A_6.5	02-Sep-21	EP2110219	SAND: Orange with grey mottling			11.50	5.7	4.1	1.6	Strong	<0.02	<0.005	<0.02
BH17_A_6.75	02-Sep-21	EP2110218				11.25	5.6	4.4	1.2	Slight	-	-	-
BH17_A_7.0	02-Sep-21	EP2110218	Shades to grey with orange mottling			11.00	5.8	4.4	1.4	Slight	<0.02	<0.005	<0.02
BH17_A_7.25	02-Sep-21	EP2110218				10.75	5.8	4.2	1.6	Slight	-	-	-
BH17_A_7.5	02-Sep-21	EP2110218	Shades to light brown			10.50	5.7	4.3	1.4	Slight	<0.02	<0.005	<0.02
BH17_A_7.5	02-Sep-21	EP2110220				10.25	6.1	4.0	2.1	Strong	<0.02	<0.005	<0.02
BH17_A_7.75	02-Sep-21	EP2110218	Shades to grey, grades to increased clay content			10.00	6.0	4.6	1.4	Moderate	-	-	-
BH17_A_8.0	02-Sep-21	EP2110218	CLAY: Grey, low plasticity			9.75	5.8	4.2	1.6	Moderate	<0.02	<0.005	<0.02

Table C-3 Soil Analytical Results

			Field Measurements				pH					Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate		Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-		%S	%S	%S
EQL						-	0.1	0.1	-	-		0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0				0.03	0.03
Bassendean Sand								3.0						<0.03
Field ID	**Sampled Date**	**Lab Report Number**												
BH18_A_0.0	02-Sep-21	EP2110219	FILL: Dark brown, fine to coarse sand, organic matter			15.30	7.3	5.9	1.4	Moderate		<0.02	<0.005	<0.02
BH18_A_0.25	02-Sep-21	EP2110219	Shades to orange/brown			15.05	7.6	6.0	1.6	Slight		-	-	-
BH18_A_0.5	02-Sep-21	EP2110219				14.80	7.6	5.6	2.0	Slight		<0.02	<0.005	<0.02
BH18_A_0.75	02-Sep-21	EP2110219				14.55	7.7	5.8	1.9	Slight		-	-	-
BH18_A_1.0	02-Sep-21	EP2110219				14.30	7.4	5.6	1.8	Slight		<0.02	<0.005	<0.02
BH18_A_1.25	02-Sep-21	EP2110219				14.05	7.6	5.6	2.0	Slight		-	-	-
BH18_A_1.5	02-Sep-21	EP2110219	SAND: Grey, orange/brown, fine to coarse sand			13.80	7.8	6.1	1.7	Slight		<0.02	<0.005	<0.02
BH18_A_1.75	02-Sep-21	EP2110219	-			13.55	7.6	5.8	1.8	Moderate		-	-	-
BH18_A_2.0	02-Sep-21	EP2110219	5 cm layer of silt stone			13.30	8.2	5.9	2.3	Slight		<0.02	<0.005	<0.02
BH18_A_2.25	02-Sep-21	EP2110219				13.05	7.9	5.7	2.2	Slight		-	-	-
BH18_A_2.5	02-Sep-21	EP2110219				12.80	7.7	5.5	2.2	Slight		<0.02	<0.005	<0.02
BH18_A_2.75	02-Sep-21	EP2110219				12.55	7.8	5.4	2.4	Moderate		-	-	-
BH18_A_3.0	02-Sep-21	EP2110219				12.30	7.7	5.5	2.2	Slight		<0.02	<0.005	<0.02
BH18_A_3.25	02-Sep-21	EP2110219				12.05	7.7	5.6	2.1	Slight		-	-	-
BH18_A_3.5	02-Sep-21	EP2110219				11.80	7.6	5.8	1.8	Slight		<0.02	<0.005	<0.02
BH18_A_3.75	02-Sep-21	EP2110219				11.55	7.5	5.6	1.9	Slight		-	-	-
BH18_A_4.0	02-Sep-21	EP2110219		6.37	8.93	11.30	7.4	5.6	1.8	Slight		<0.02	<0.005	<0.02
BH18_A_4.25	02-Sep-21	EP2110219				11.05	7.6	5.6	2.0	Slight		-	-	-
BH18_A_4.5	02-Sep-21	EP2110219				10.80	7.6	5.6	2.0	Slight		<0.02	<0.005	<0.02
BH18_A_4.75	02-Sep-21	EP2110219				10.55	7.7	5.6	2.1	Slight		-	-	-
BH18_A_5.0	02-Sep-21	EP2110219				10.30	7.6	5.7	1.9	Slight		<0.02	<0.005	<0.02
BH18_A_5.25	02-Sep-21	EP2110219				10.05	7.4	5.5	1.9	Slight		-	-	-
BH18_A_5.5	02-Sep-21	EP2110219				9.80	7.0	5.4	1.6	Slight		<0.02	0.009	<0.02
BH18_A_5.75	02-Sep-21	EP2110219				9.55	6.9	5.3	1.6	Slight		-	-	-
BH18_A_6.0	02-Sep-21	EP2110219	COFFEE ROCK			9.30	6.6	4.8	1.8	Slight		<0.02	<0.005	<0.02
BH18_A_6.25	02-Sep-21	EP2110219	SAND: Light brown/red, fine to coarse sand, Grades to increased clay content			9.05 6.0		4.3	1.7	Slight		-	-	-
BH18_A_6.75	02-Sep-21	EP2110219	Clayey SAND: light brown/grey, low plasticity			8.80	6.2	4.6	1.6	Strong		-	-	-
BH18_A_7.0	02-Sep-21	EP2110219	Shades to grey			8.55	6.1	4.9	1.2	Strong		<0.02	<0.005	<0.02
BH18_A_7.25	02-Sep-21	EP2110219				8.30	5.8	4.5	1.3	Strong		-	-	-
BH18_A_7.5	02-Sep-21	EP2110219				8.05	5.8	3.8	2.0	Slight		<0.02	<0.005	<0.02
BH18_A_8.0	02-Sep-21	EP2110219				7.80	6.1	4.5	1.6	Slight		<0.02	<0.005	<0.02
BH18_A_8.5	02-Sep-21	EP2110219				7.55	6.1	4.5	1.6	Slight		<0.02	<0.005	<0.02
BH18_A_9.0	02-Sep-21	EP2110219				7.30	5.9	4.0	1.9	Slight		<0.02	<0.005	<0.02
BH19_A_0.0	02-Sep-21	EP2110220	FILL: Light brown, fine to coarse sand, well sorted trace gravel			17.95	8.4	5.7	2.7	Moderate		<0.02	<0.005	<0.02
BH19_A_0.25	02-Sep-21	EP2110220	(1-2 cm)			17.70	8.2	6.1	2.1	Moderate		-	-	-
BH19_A_0.5	02-Sep-21	EP2110220				17.45	8.6	6.1	2.5	Moderate		<0.02	<0.005	<0.02
BH19_A_0.75	02-Sep-21	EP2110220	Shades to light grey			17.20	8.6	6.2	2.4	Moderate		-	-	-
BH19_A_1.0	02-Sep-21	EP2110220	COFFEE ROCK			16.95	9.0	6.2	2.8	Slight		<0.02	<0.005	<0.02
BH19_A_1.25	02-Sep-21	EP2110220				16.70	8.4	6.2	2.2	Moderate		-	-	-
BH19_A_1.5	02-Sep-21	EP2110220	Clayey SAND: Light orange/yellow, fine to coarse sand, low			16.45	7.6	5.8	1.8	Moderate		<0.02	<0.005	<0.02
BH19_A_1.75	02-Sep-21	EP2110220	plasticity			16.20	7.2	5.1	2.1	Slight		-	-	-
BH19_A_2.0	02-Sep-21	EP2110220				15.95	7.6	5.4	2.2	Slight		<0.02	<0.005	<0.02
BH19_A_2.25	02-Sep-21	EP2110220	Shades to light grey			15.70	7.4	5.5	1.9	Slight		-	-	-
BH19_A_2.5	02-Sep-21	EP2110220				15.45	7.5	5.4	2.1	Slight		<0.02	<0.005	<0.02
BH19_A_2.75	02-Sep-21	EP2110220	COFFEE ROCK: brown/orange, 1cm cobbles			15.20	8.0	5.8	2.2	Slight		-	-	-
BH19_A_3.0	02-Sep-21	EP2110220	Clayey SAND: light grey with orange mottle, fine to coarse, low			14.95	7.4	5.4	2.0	Slight		<0.02	<0.005	<0.02
BH19_A_3.25	02-Sep-21	EP2110220				14.70	6.1	4.2	1.9	Slight		-	-	-
BH19_A_3.5	02-Sep-21	EP2110220				14.45	5.2	3.7	1.5	Slight		<0.02	0.005	<0.02
BH19_A_3.75	02-Sep-21	EP2110220				14.20	5.0	3.6	1.4	Slight		-	-	-
BH19_A_4.0	02-Sep-21	EP2110220				13.95	4.6	3.4	1.2	Slight		<0.02	<0.005	<0.02
BH19_A_4.25	02-Sep-21	EP2110220				13.70	5.1	3.4	1.7	Slight		-	-	-
BH19_A_4.5	02-Sep-21	EP2110220	Shades to grey/blue	3.32	14.63	13.45	5.6	3.8	1.8	Strong		<0.02	<0.005	<0.02
BH19_A_4.75	02-Sep-21	EP2110220				13.20	5.7	3.5	2.2	Strong		-	-	-
BH19_A_5.0	02-Sep-21	EP2110220				12.95	6.0	3.4	2.6	Strong		<0.02	0.005	0.02
BH19_A_5.25	02-Sep-21	EP2110220				12.70	6.2	4.3	1.9	Strong				
BH19_A_5.5	02-Sep-21	EP2110220				12.45	6.0	4.2	1.8	Strong		<0.02	0.006	0.02
BH19_A_5.75	02-Sep-21	EP2110220				12.20	6.0	4.3	1.7	Strong		-	-	-
BH19_A_6.0	02-Sep-21	EP2110220	Decreasing clay content			11.95	6.3	3.7	2.6	Strong		<0.02	<0.005	<0.02
BH19_A_6.25	02-Sep-21	EP2110220				11.70	6.2	4.2	2.0	Strong		-	-	-
BH19_A_6.5	02-Sep-21	EP2110220	SAND: grey/blue, fine to coarse			11.45	6.2	4.5	1.7	Strong		<0.02	<0.005	<0.02
BH19_A_6.75	02-Sep-21	EP2110220				11.20	5.9	4.0	1.9	Strong		-	-	-
BH19_A_7.0	02-Sep-21	EP2110220				10.95	6.2	4.0	2.2	Strong		<0.02	<0.005	<0.02
BH19_A_7.25	02-Sep-21	EP2110220	Shades to light brown/grey			10.70	6.1	3.6	2.5	Strong		-	-	-
BH19_A_7.75	02-Sep-21	EP2110220				10.45	5.9	3.9	2.0	Strong		-	-	-
BH19_A_8.0	02-Sep-21	EP2110220				10.20	5.9	3.8	2.1	Strong		<0.02	<0.005	<0.02
BH19_A_8.25	02-Sep-21	EP2110220				9.95	5.9	3.9	2.0	Slight		-	-	-
BH19_A_8.5	02-Sep-21	EP2110220	Shades to grey/blue			9.70	5.9	3.9	2.0	Slight		<0.02	0.006	<0.02
BH19_A_8.75	02-Sep-21	EP2110220	Grades to increased clay content			9.45	5.8	4.1	1.7	Slight		-	-	-
BH19_A_9.0	02-Sep-21	EP2110220				9.20	5.7	4.0	1.7	Moderate		<0.02	<0.005	<0.02

Table C-3 Soil Analytical Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH20_A_0.0	02-Sep-21	EP2110223	FILL: Dark brown, fine to coarse sand, organic material			16.08	7.8	6.1	1.7	Moderate	<0.02	0.008	<0.02
BH20_A_0.25	02-Sep-21	EP2110223	Shades to light brown			15.83	8.0	6.1	1.9	Moderate	-	-	-
BH20_A_0.5	02-Sep-21	EP2110223				15.58	8.6	5.8	2.8	Slight	<0.02	0.005	<0.02
BH20_A_0.75	02-Sep-21	EP2110223	Shades to grey/white			15.33	8.6	5.9	2.7	Slight	-	-	-
BH20_A_1.0	02-Sep-21	EP2110223				15.08	8.3	5.7	2.6	Slight	<0.02	<0.005	<0.02
BH20_A_1.25	02-Sep-21	EP2110223				14.83	8.1	5.6	2.5	Slight	-	-	-
BH20_A_1.5	02-Sep-21	EP2110223				14.58	8.2	5.5	2.7	Slight	<0.02	0.005	<0.02
BH20_A_1.75	02-Sep-21	EP2110223				14.33	8.4	6.1	2.3	Moderate	-	-	-
BH20_A_2.0	02-Sep-21	EP2110223				14.08	8.4	5.7	2.7	Slight	<0.02	<0.005	<0.02
BH20_A_2.25	02-Sep-21	EP2110223				13.83	8.0	5.6	2.4	Slight	-	-	-
BH20_A_2.5	02-Sep-21	EP2110223	Gravelly SAND: Dark brown, fine to coarse sand with gravels(1			13.58	7.9	5.5	2.4	Slight	<0.02	<0.005	<0.02
BH20_A_2.75	02-Sep-21	EP2110223	cm)			13.33	6.9	5.0	1.9	Slight	-	-	-
BH20_A_3.5	02-Sep-21	EP2110223	SAND: Dark brown, coarse grained			12.58	7.3	5.2	2.1	Slight	<0.02	0.007	<0.02
BH20_A_3.75	02-Sep-21	EP2110223				12.33	7.2	5.0	2.2	Slight	-	-	-
BH20_A_4.0	02-Sep-21	EP2110223	Shades to light brown			12.08	6.8	4.7	2.1	Slight	<0.02	0.005	<0.02
BH20_A_4.25	02-Sep-21	EP2110223		2.40	13.68	11.83	6.9	4.4	2.5	Slight	-	-	-
BH20_A_4.5	02-Sep-21	EP2110223	Gravelly SAND: Dark brown, fine to coarse sand with gravels(1			11.58	7.0	4.4	2.6	Slight	<0.02	0.007	<0.02
BH20_A_4.75	02-Sep-21	EP2110223/EP2112980	Shades to grey, grades to increased clay content			11.33	6.1	2.3	3.8	Moderate	<0.02	0.006	<0.02
BH20_A_5.0	02-Sep-21	EP2110223				11.08	6.2	3.5	2.7	Slight	<0.02	0.053	0.05
BH20_A_5.25	02-Sep-21	EP2110223/EP2112980				10.83	6.1	4.0	2.1	Slight	<0.02	<0.005	<0.02
BH20_A_5.5	02-Sep-21	EP2110223	Clayey SAND: Grey, fine to coarse sand, low plasticity			10.58	6.3	4.1	2.2	Slight	<0.02	<0.005	<0.02
BH20_A_5.75	02-Sep-21	EP2110223				10.33	6.1	4.1	2.0	Slight	-	-	-
BH20_A_6.0	02-Sep-21	EP2110223				10.08	6.2	4.3	1.9	Slight	<0.02	0.008	<0.02
BH20_A_6.25	02-Sep-21	EP2112980				9.83	-	-	-	-	<0.02	0.012	0.02
BH20_A_6.5	02-Sep-21	EP2110223				9.58	6.2	4.2	2.0	Slight	<0.02	0.022	0.03
BH20_A_6.75	02-Sep-21	EP2110223				9.33	6.0	3.9	2.1	Slight	-	-	-
BH20_A_7.0	02-Sep-21	EP2110223	SAND: Grey/blue coarse grained			9.08	6.0	3.5	2.5	Slight	<0.02	0.04	0.04
BH20_A_7.25	02-Sep-21	EP2110223				8.83	5.8	4.3	1.5	Slight	<0.02	<0.005	<0.02
BH20_A_7.5	02-Sep-21	EP2110223				8.58	5.8	4.3	1.5	Slight	<0.02	<0.005	<0.02
BH20_A_7.75	02-Sep-21	EP2110223				8.33	5.5	4.4	1.1	Slight	-	-	-
BH20_A_8.0	02-Sep-21	EP2110223				8.08	5.4	4.3	1.1	Slight	<0.02	0.006	<0.02
BH21_A_0.0	03-Sep-21	EP2110343	FILL: Fine sand, well sorted			16.21	6.1	4.2	1.9	Slight	<0.02	0.005	<0.02
BH21_A_0.25	03-Sep-21	EP2110343	Shades to light grey/cream			15.96	5.9	4.2	1.7	Slight	-	-	-
BH21_A_0.5	03-Sep-21	EP2110343				15.71	5.9	3.9	2.0	Slight	<0.02	<0.005	<0.02
BH21_A_0.75	03-Sep-21	EP2110343				15.46	6.0	4.1	1.9	Slight	-	-	-
BH21_A_1.0	03-Sep-21	EP2110343				15.21	6.1	3.7	2.4	Slight	<0.02	0.005	<0.02
BH21_A_1.25	03-Sep-21	EP2110343				14.96	5.5	4.2	1.3	Slight	-	-	-
BH21_A_1.5	03-Sep-21	EP2110343				14.71	5.7	3.8	1.9	Slight	<0.02	0.005	<0.02
BH21_A_1.75	03-Sep-21	EP2110343				14.46	5.2	4.2	1.0	Slight	-	-	-
BH21_A_2.0	03-Sep-21	EP2110343		Dry	Dry	14.21	5.0	4.4	0.6	Slight	<0.02	<0.005	<0.02
BH21_A_2.25	03-Sep-21	EP2110343				13.96	4.9	4.5	0.4	Slight	-	-	-
BH21_A_2.5	03-Sep-21	EP2110343				13.71	5.3	4.1	1.2	Slight	<0.02	0.005	<0.02
BH21_A_2.75	03-Sep-21	EP2110343	COFFEE ROCK: 1 cm to 4 cm in size			13.46	5.1	4.0	1.1	Slight	-	-	-
BH21_A_3.0	03-Sep-21	EP2110343	SAND; Grey, coarse, well sorted.			13.21	5.2	4.1	1.1	Slight	<0.02	<0.005	<0.02
BH21_A_3.25	03-Sep-21	EP2110343	Grades to slightly increased clay content			12.96	5.1	4.1	1.0	Slight	-	-	-
BH21_A_3.5	03-Sep-21	EP2110343				12.71	5.1	4.0	1.1	Slight	<0.02	<0.005	<0.02
BH21_A_3.75	03-Sep-21	EP2110343				12.46	5.1	4.1	1.0	Slight	-	-	-
BH21_A_4.0	03-Sep-21	EP2110343				12.21	5.1	4.0	1.1	Slight	<0.02	<0.005	<0.02
BH22_A_0.0	03-Sep-21	EP2110343	FILL: Dark brown, fine to coarse sand, organic material			20.00	5.2	3.9	1.3	Slight	<0.02	<0.005	<0.02
BH22_A_0.25	03-Sep-21	EP2110343				19.75	4.8	4.0	0.8	Slight	-	-	-
BH22_A_0.5	03-Sep-21	EP2110343				19.50	4.8	4.2	0.6	Slight	<0.02	0.005	<0.02
BH22_A_0.75	03-Sep-21	EP2110343				19.25	4.9	4.7	0.2	Slight	-	-	-
BH22_A_1.0	03-Sep-21	EP2110343				19.00	5.6	4.1	1.5	Slight	<0.02	0.005	<0.02
BH22_A_1.25	03-Sep-21	EP2110343				18.75	5.6	4.4	1.2	Slight	-	-	-
BH22_A_1.5	03-Sep-21	EP2110343	Black staining (5 cm)			18.50	5.8	4.2	1.6	Slight	<0.02	<0.005	<0.02
BH22_A_1.75	03-Sep-21	EP2110343				18.25	5.3	4.0	1.3	Slight	-	-	-
BH22_A_2.0	03-Sep-21	EP2110343		Dry	Dry	18.00	5.1	4.2	0.9	Slight	<0.02	0.005	<0.02
BH22_A_2.25	03-Sep-21	EP2110343				17.75	5.1	4.8	0.3	Slight	-	-	-
BH22_A_2.5	03-Sep-21	EP2110343				17.50	5.2	4.7	0.5	Slight	<0.02	<0.005	<0.02
BH22_A_2.75	03-Sep-21	EP2110343				17.25	5.0	4.7	0.3	Slight	-	-	-
BH22_A_3.0	03-Sep-21	EP2110343	FILL: Brown, fine to coarse sand, organic material			17.00	5.2	4.8	0.4	Slight	<0.02	<0.005	<0.02
BH22_A_3.25	03-Sep-21	EP2110343				16.75	5.3	4.2	1.1	Moderate	<0.02	<0.005	<0.02
BH22_A_3.5	03-Sep-21	EP2110343	COFFEE ROCK: Dark brown, weathered, cobbles (1-2 cm)			16.50	4.9	4.1	0.8	Slight	0.04	0.005	0.04
BH22_A_3.75	03-Sep-21	EP2110343	SAND: Light brown, fine to coarse sand, trace gravels			16.25	5.1	4.3	0.8	Slight	<0.02	<0.005	<0.02
BH22_A_4.0	03-Sep-21	EP2110343				16.00	5.0	4.3	0.7	Slight	<0.02	<0.005	<0.02
BH23_A_0.0	03-Sep-21	EP2110344	FILL: Dark brown, fine to coarse sand, organic material			19.48	5.7	3.8	1.9	Moderate	<0.02	<0.005	<0.02
BH23_A_0.25	03-Sep-21	EP2110344				19.23	5.4	4.2	1.2	Slight	-	-	-
BH23_A_0.5	03-Sep-21	EP2110344	Shades to light grey/cream			18.98	5.6	3.9	1.7	Slight	<0.02	<0.005	<0.02
BH23_A_0.75	03-Sep-21	EP2110344				18.73	5.6	4.2	1.4	Slight	-	-	-
BH23_A_1.0	03-Sep-21	EP2110344				18.48	5.6	4.6	1.0	Slight	<0.02	<0.005	<0.02
BH23_A_1.25	03-Sep-21	EP2110344				18.23	5.6	4.3	1.3	Slight	-	-	-
BH23_A_1.5	03-Sep-21	EP2110344				17.98	5.4	4.4	1.0	Slight	<0.02	<0.005	<0.02
BH23_A_1.75	03-Sep-21	EP2110344				17.73	5.9	3.6	2.3	Slight	-	-	-
BH23_A_2.0	03-Sep-21	EP2110344	Shades to light brown	2.45	17.03	17.48	5.7	4.2	1.5	Slight	<0.02	0.006	<0.02
BH23_A_2.25	03-Sep-21	EP2110344	COFFEE ROCK: Dark brown, weathered, cobbles (1-3 cm)			17.23	5.7	4.4	1.3	Slight	-	-	-
BH23_A_2.5	03-Sep-21	EP2110344				16.98	5.8	4.4	1.4	Slight	<0.02	<0.005	<0.02
BH23_A_2.75	03-Sep-21	EP2110344	SAND: Dark brown, fine to coarse sand			16.73	5.7	4.4	1.3	Slight	-	-	-
BH23_A_3.0	03-Sep-21	EP2110344	Shades to light grey/cream			16.48	5.7	4.4	1.3	Slight	<0.02	<0.005	<0.02
BH23_A_3.25	03-Sep-21	EP2110344				16.23	6.0	4.4	1.6	Slight	-	-	-
BH23_A_3.5	03-Sep-21	EP2110344	Grades to increased clay content			15.98	5.6	4.4	1.2	Slight	<0.02	0.005	<0.02
BH23_A_3.75	03-Sep-21	EP2110344				15.73	5.4	4.0	1.4	Slight	-	-	-
BH23_A_4.0	03-Sep-21	EP2110344				15.48	5.4	4.0	1.4	Slight	<0.02	<0.005	0.02

Table C-3 Soil Analytical Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH24_A_0.0	11-Aug-21	EP2109197	FILL: Dark brown, fine to coarse sand with grass			18.21	7.4	5.6	1.8	Moderate	<0.02	0.005	<0.02
BH24_A_0.25	11-Aug-21	EP2109197				17.96	7.8	5.4	2.4	Moderate	-	-	-
BH24_A_0.5	11-Aug-21	EP2109197	SAND: Creamy/grey, fine to coarse sand			17.71	7.9	5.8	2.1	Moderate	<0.02	0.005	<0.02
BH24_A_0.75	11-Aug-21	EP2109197				17.46	7.5	5.8	1.7	Moderate	-	-	-
BH24_A_1.0	11-Aug-21	EP2109197	COFFEE ROCK/SAND: Yellow/brown			17.21	7.4	5.9	1.5	Slight	<0.02	0.006	<0.02
BH24_A_1.25	11-Aug-21	EP2109197				16.96	6.8	5.7	1.1	Slight	-	-	-
BH24_A_1.5	11-Aug-21	EP2109197	Silty SAND: Light grey, fine to coarse sand, well sorted			16.71	7.0	5.5	1.5	Slight	<0.02	0.006	0.02
BH24_A_1.75	11-Aug-21	EP2109197				16.46	6.6	5.2	1.4	Slight	-	-	-
BH24_A_2.0	11-Aug-21	EP2109197				16.21	7.2	5.5	1.7	Slight	<0.02	<0.005	<0.02
BH24_A_2.25	11-Aug-21	EP2109197				15.96	7.1	5.4	1.7	Slight	-	-	-
BH24_A_2.5	11-Aug-21	EP2109197				15.71	7.2	5.4	1.8	Slight	<0.02	<0.005	<0.02
BH24_A_2.75	11-Aug-21	EP2109197				15.46	6.9	5.2	1.7	Slight	-	-	-
BH24_A_3.0	11-Aug-21	EP2109197		1.20	17.01	15.21	6.6	5.0	1.6	Slight	<0.02	<0.005	<0.02
BH24_A_3.25	11-Aug-21	EP2109197				14.96	6.6	4.6	2.0	Slight	-	-	-
BH24_A_3.5	11-Aug-21	EP2109197				14.71	6.4	4.8	1.6	Slight	<0.02	<0.005	<0.02
BH24_A_3.75	11-Aug-21	EP2109197				14.46	6.2	4.4	1.8	Slight	-	-	-
BH24_A_4.0	11-Aug-21	EP2109197				14.21	6.0	4.6	1.4	Slight	<0.02	<0.005	<0.02
BH24_A_4.25	11-Aug-21	EP2109197				13.96	6.1	4.6	1.5	Slight	-	-	-
BH24_A_4.5	11-Aug-21	EP2109198				13.71	6.2	4.5	1.7	Slight	<0.02	<0.005	<0.02
BH24_A_4.75	11-Aug-21	EP2109198				13.46	6.2	4.7	1.5	Slight	-	-	-
BH24_A_5.0	11-Aug-21	EP2109198				13.21	6.1	4.7	1.4	Slight	<0.02	<0.005	<0.02
BH24_A_5.25	11-Aug-21	EP2109198				12.96	6.0	4.7	1.3	Slight	-	-	-
BH24_A_5.5	11-Aug-21	EP2109198				12.71	6.0	4.5	1.5	Slight	<0.02	<0.005	<0.02
BH24_A_5.75	11-Aug-21	EP2109198				12.46	5.9	4.4	1.5	Slight	-	-	-
BH24_A_6.0	11-Aug-21	EP2109198				12.21	5.9	4.3	1.6	Slight	<0.02	<0.005	<0.02
BH25_A_0.0	12-Aug-21	EP2109198	FILL: Dark brown sand, natural			18.83	7.4	5.3	2.1	Moderate	<0.02	0.005	<0.02
BH25_A_0.25	12-Aug-21	EP2109198	SAND: Yellow/brown, fine to coarse sand			18.58	7.7	5.2	2.5	Moderate	-	-	-
BH25_A_0.5	12-Aug-21	EP2109198				18.33	7.6	5.5	2.1	Moderate	<0.02	<0.005	<0.02
BH25_A_0.75	12-Aug-21	EP2109198				18.08	7.9	6.0	1.9	Moderate	-	-	-
BH25_A_1.0	12-Aug-21	EP2109198				17.83	7.9	5.9	2.0	Moderate	<0.02	0.006	<0.02
BH25_A_1.25	12-Aug-21	EP2109198				17.58	7.9	5.8	2.1	Slight	-	-	-
BH25_A_1.5	12-Aug-21	EP2109198	COFFEE ROCK/SAND: Cream with brown fine to coarse sand,			17.33	7.6	5.9	1.7	Slight	<0.02	0.011	<0.02
BH25_A_1.75	12-Aug-21	EP2109198	sub-angular, sub-rounded, gravel			17.08	7.9	6.1	1.8	Slight	-	-	-
BH25_A_2.0	12-Aug-21	EP2109198	Silty SAND: Light grey, fine to coarse sand, well sorted			16.83	7.8	6.1	1.7	Slight	<0.02	<0.005	<0.02
BH25_A_2.25	12-Aug-21	EP2109198				16.58	7.8	5.9	1.9	Slight	-	-	-
BH25_A_2.5	12-Aug-21	EP2109198				16.33	7.7	5.8	1.9	Slight	<0.02	<0.005	<0.02
BH25_A_2.75	12-Aug-21	EP2109198				16.08	7.4	5.4	2.0	Slight	-	-	-
BH25_A_3.0	12-Aug-21	EP2109198		1.72	17.11	15.83	6.6	5.0	1.6	Slight	<0.02	<0.005	<0.02
BH25_A_3.25	12-Aug-21	EP2109198				15.58	6.4	4.7	1.7	Slight	-	-	-
BH25_A_3.5	12-Aug-21	EP2109198				15.33	6.4	4.9	1.5	Slight	<0.02	0.006	<0.02
BH25_A_3.75	12-Aug-21	EP2109198				15.08	6.5	4.7	1.8	Slight	-	-	-
BH25_A_4.0	12-Aug-21	EP2109198				14.83	6.8	5.2	1.6	Slight	<0.02	0.006	<0.02
BH25_A_4.25	12-Aug-21	EP2109198				14.58	6.6	4.6	2.0	Slight	-	-	-
BH25_A_4.5	12-Aug-21	EP2109198				14.33	6.5	4.9	1.6	Slight	<0.02	<0.005	<0.02
BH25_A_4.75	12-Aug-21	EP2109198				14.08	6.6	5.5	1.1	Slight	-	-	-
BH25_A_5.0	12-Aug-21	EP2109198	Grades to increased coarse sand content			13.83	6.6	5.2	1.4	Slight	<0.02	<0.005	<0.02
BH25_A_5.25	12-Aug-21	EP2109198				13.58	6.6	5.4	1.2	Slight	-	-	-
BH25_A_5.5	12-Aug-21	EP2109198				13.33	6.6	5.3	1.3	Slight	<0.02	<0.005	<0.02
BH25_A_5.75	12-Aug-21	EP2109198				13.08	6.6	5.4	1.2	Slight	-	-	-
BH25_A_6.0	12-Aug-21	EP2109198				12.83	6.6	5.3	1.3	Slight	<0.02	<0.005	<0.02
BH26_A_0.0	11-Aug-21	EP2109197	FILL: Dark brown sand w/ some organic material.			20.08	8.4	6.0	2.4	Moderate	<0.02	<0.005	<0.02
BH26_A_0.25	11-Aug-21	EP2109197	SAND: Light cream F - C grained, poorly sorted.			19.83	8.1	6.0	2.1	Moderate	-	-	-
BH26_A_0.5	11-Aug-21	EP2109197				19.58	8.2	6.3	1.9	Moderate	<0.02	<0.005	<0.02
BH26_A_0.75	11-Aug-21	EP2109197				19.33	8.4	6.3	2.1	Slight	-	-	-
BH26_A_1.0	11-Aug-21	EP2109197				19.08	8.2	6.4	1.8	Slight	<0.02	<0.005	<0.02
BH26_A_1.25	11-Aug-21	EP2109197				18.83	8.5	6.0	2.5	Slight	-	-	-
BH26_A_1.5	11-Aug-21	EP2109197	Gravelly SAND: Light brown, fine to coarse sand, fine to			18.58	8.5	6.3	2.2	Slight	<0.02	<0.005	<0.02
BH26_A_1.75	11-Aug-21	EP2109197	coarse, sub-angular, sub-rounded, gravel			18.33	8.3	6.3	2.0	Slight	-	-	-
BH26_A_2.0	11-Aug-21	EP2109197	Silty SAND: Light grey, fine to coarse sand			18.08	8.2	6.3	1.9	Slight	<0.02	<0.005	<0.02
BH26_A_2.25	11-Aug-21	EP2109197				17.83	8.2	6.0	2.2	Slight	-	-	-
BH26_A_2.5	11-Aug-21	EP2109197				17.58	8.2	6.2	2.0	Slight	<0.02	0.006	<0.02
BH26_A_2.75	11-Aug-21	EP2109197				17.33	7.8	6.0	1.8	Slight	-	-	-
BH26_A_3.0	11-Aug-21	EP2109197		2.20	17.88	17.08	7.8	5.8	2.0	Slight	<0.02	<0.005	<0.02
BH26_A_3.25	11-Aug-21	EP2109197				16.83	5.6	4.4	1.2	Slight	-	-	-
BH26_A_3.5	11-Aug-21	EP2109197				16.58	5.8	4.6	1.2	Slight	<0.02	<0.005	<0.02
BH26_A_3.75	11-Aug-21	EP2109197				16.33	7.0	5.5	1.5	Slight	-	-	-
BH26_A_4.0	11-Aug-21	EP2109197				16.08	5.8	4.4	1.4	Slight	<0.02	<0.005	<0.02
BH26_A_4.25	11-Aug-21	EP2109197				15.83	5.4	4.3	1.1	Slight	-	-	-
BH26_A_4.5	11-Aug-21	EP2109197				15.58	5.4	4.3	1.1	Slight	<0.02	<0.005	<0.02
BH26_A_4.75	11-Aug-21	EP2109197				15.33	5.4	4.4	1.0	Slight	-	-	-
BH26_A_5.0	11-Aug-21	EP2109197	Grades to increased coarse sand content			15.08	5.1	4.2	0.9	Slight	<0.02	<0.005	<0.02
BH26_A_5.25	11-Aug-21	EP2109197				14.83	5.4	4.3	1.1	Slight	-	-	-
BH26_A_5.5	11-Aug-21	EP2109197				14.58	5.4	4.3	1.1	Slight	<0.02	<0.005	<0.02
BH26_A_5.75	11-Aug-21	EP2109197				14.33	5.4	4.3	1.1	Slight	-	-	-
BH26_A_6.0	11-Aug-21	EP2109197				14.08	5.4	4.3	1.1	Slight	<0.02	<0.005	<0.02
BH26_A_6.0 A	11-Aug-21	EP2109197				14.08	5.6	4.4	1.2	Slight	<0.02	<0.005	<0.02

Table C-3 Soil Analytical Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH27_A_0.0	03-Sep-21	EP2110345	FILL: Grey/brown sand, fine to coarse			22.50	5.5	3.6	1.9	Moderate	<0.02	<0.005	<0.02
BH27_A_0.25	03-Sep-21	EP2110345				22.25	5.6	3.8	1.8	Moderate	-	-	-
BH27_A_0.5	03-Sep-21	EP2110345				22.00	5.6	4.2	1.4	Moderate	<0.02	<0.005	<0.02
BH27_A_0.75	03-Sep-21	EP2110345				21.75	5.8	4.3	1.5	Moderate	-	-	-
BH27_A_1.0	03-Sep-21	EP2110345	Shades to light brown			21.50	6.1	4.2	1.9	Slight	<0.02	0.005	<0.02
BH27_A_1.25	03-Sep-21	EP2110345				21.25	6.0	4.3	1.7	Slight	-	-	-
BH27_A_1.5	03-Sep-21	EP2110345				21.00	6.0	4.4	1.6	Slight	<0.02	<0.005	<0.02
BH27_A_1.75	03-Sep-21	EP2110345				20.75	5.9	4.2	1.7	Slight	-	-	-
BH27_A_2.0	03-Sep-21	EP2110345				20.50	6.2	4.4	1.8	Slight	<0.02	<0.005	<0.02
BH27_A_2.25	03-Sep-21	EP2110345				20.25	6.3	4.5	1.8	Slight	-	-	-
BH27_A_2.5	03-Sep-21	EP2110345				20.00	6.2	4.6	1.6	Slight	<0.02	<0.005	<0.02
BH27_A_2.75	03-Sep-21	EP2110345				19.75	6.1	4.4	1.7	Slight	-	-	-
BH27_A_3.0	03-Sep-21	EP2110345		Dry	Dry	19.50	6.1	4.2	1.9	Slight	<0.02	<0.005	<0.02
BH27_A_3.25	03-Sep-21	EP2110345	SAND: Grey, fine to coarse sand, well sorted			19.25	5.9	4.2	1.7	Moderate	-	-	-
BH27_A_3.5	03-Sep-21	EP2110345				19.00	5.9	4.2	1.7	Slight	<0.02	0.005	0.02
BH27_A_3.75	03-Sep-21	EP2110345				18.75	6.0	4.2	1.8	Slight	-	-	-
BH27_A_4.0	03-Sep-21	EP2110345				18.50	5.9	4.4	1.5	Slight	<0.02	<0.005	<0.02
BH27_A_4.25	03-Sep-21	EP2110345				18.25	5.8	4.6	1.2	Slight	-	-	-
BH27_A_4.5	03-Sep-21	EP2110345				18.00	4.9	3.9	1.0	Slight	<0.02	<0.005	<0.02
BH27_A_4.75	03-Sep-21	EP2110345	Grades to slight increase in clay content, still predominantly			17.75	4.6	3.5	1.1	Slight	-	-	-
BH27_A_5.0	03-Sep-21	EP2110345	clay, shades to orange mottling			17.50	4.4	3.5	0.9	Slight	<0.02	<0.005	<0.02
BH27_A_5.25	03-Sep-21	EP2110345				17.25	4.4	3.3	1.1	Slight	-	-	-
BH27_A_5.5	03-Sep-21	EP2110345				17.00	4.4	3.3	1.1	Slight	<0.02	<0.005	0.02
BH27_A_5.75	03-Sep-21	EP2110345				16.75	4.4	3.5	0.9	Slight	-	-	-
BH27_A_6.0	03-Sep-21	EP2110345				16.50	4.6	3.6	1.0	Slight	<0.02	<0.005	<0.02
BH28_A_0.0	09-Aug-21	EP2109130	FILL: Dark brown natural sand with grass			20.78	8.4	6.4	2.0	Moderate	<0.02	<0.005	<0.02
BH28_A_0.25	09-Aug-21	EP2109130	LIMESTONE SAND: Light brown fine to coarse sand, fine to			20.53	8.2	6.4	1.8	Moderate	-	-	-
BH28_A_0.5	09-Aug-21	EP2109130	coarse sub-rounded, sub-angular gravel			20.28	8.0	6.3	1.7	Moderate	<0.02	<0.005	<0.02
BH28_A_0.75	09-Aug-21	EP2109130				20.03	8.1	6.4	1.7	Moderate	-	-	-
BH28_A_1.0	09-Aug-21	EP2109130				19.78	7.5	5.8	1.7	Slight	<0.02	<0.005	<0.02
BH28_A_1.25	09-Aug-21	EP2109130				19.53	7.7	5.5	2.2	Slight	-	-	-
BH28_A_1.5	09-Aug-21	EP2109130	SAND: Cream/light brown			19.28	7.4	5.5	1.9	Slight	<0.02	<0.005	<0.02
BH28_A_1.75	09-Aug-21	EP2109130				19.03	6.0	4.7	1.3	Slight	-	-	-
BH28_A_2.0	09-Aug-21	EP2109130	Clayey SAND: Light grey, fine to coarse sand, low plasticity			18.78	5.2	4.1	1.1	Slight	<0.02	<0.005	<0.02
BH28_A_2.25	09-Aug-21	EP2109130				18.53	5.1	4.0	1.1	Slight	-	-	-
BH28_A_2.5	09-Aug-21	EP2109130				18.28	5.0	4.1	0.9	Slight	<0.02	<0.005	<0.02
BH28_A_2.75	09-Aug-21	EP2109130				18.03	5.1	4.1	1.0	Slight	-	-	-
BH28_A_3.0	09-Aug-21	EP2109130		3.04	17.74	17.78	5.1	4.1	1.0	Slight	<0.02	<0.005	<0.02
BH28_A_3.25	09-Aug-21	EP2109130	Silty SAND: Light grey, fine sand, well sorted			17.53	5.0	4.1	0.9	Slight	-	-	-
BH28_A_3.5	09-Aug-21	EP2109130				17.28	4.8	4.0	0.8	Slight	<0.02	<0.005	<0.02
BH28_A_3.75	09-Aug-21	EP2109130				17.03	4.9	4.1	0.8	Slight	-	-	-
BH28_A_4.0	09-Aug-21	EP2109130				16.78	5.1	4.2	0.9	Slight	<0.02	<0.005	<0.02
BH28_A_4.25	09-Aug-21	EP2109130				16.53	5.0	4.1	0.9	Slight	-	-	-
BH28_A_4.5	09-Aug-21	EP2109130				16.28	5.2	4.0	1.2	Slight	<0.02	<0.005	<0.02
BH28_A_4.75	09-Aug-21	EP2109130				16.03	5.1	4.1	1.0	Slight	-	-	-
BH28_A_5.0	09-Aug-21	EP2109130				15.78	5.3	4.1	1.2	Slight	<0.02	<0.005	<0.02
BH28_A_5.25	09-Aug-21	EP2109130				15.53	5.3	4.2	1.1	Slight	-	-	-
BH28_A_5.5	09-Aug-21	EP2109130				15.28	5.2	4.2	1.0	Slight	<0.02	<0.005	<0.02
BH28_A_5.75	09-Aug-21	EP2109130				15.03	5.2	4.1	1.1	Slight	-	-	-
BH28_A_6.0	09-Aug-21	EP2109130				14.78	5.2	4.0	1.2	Slight	<0.02	<0.005	<0.02
BH29_A_0.0	16-Aug-21	EP2109376	SAND: Dark grey, fine to coarse sand, natural			24.24	7.6	5.2	2.4	Slight	<0.02	<0.005	<0.02
BH29_A_0.25	16-Aug-21	EP2109376				23.99	7.9	5.6	2.3	Slight	-	-	-
BH29_A_0.5	16-Aug-21	EP2109376	Shades to light grey			23.74	7.8	5.5	2.3	Slight	<0.02	<0.005	<0.02
BH29_A_0.75	16-Aug-21	EP2109376				23.49	7.9	5.6	2.3	Slight	-	-	-
BH29_A_1.0	16-Aug-21	EP2109376				23.24	7.8	5.6	2.2	Slight	<0.02	<0.005	<0.02
BH29_A_1.25	16-Aug-21	EP2109376				22.99	7.8	5.5	2.3	Slight	-	-	-
BH29_A_1.5	16-Aug-21	EP2109376				22.74	7.9	5.6	2.3	Slight	<0.02	<0.005	<0.02
BH29_A_1.75	16-Aug-21	EP2109376				22.49	8.2	5.7	2.5	Slight	-	-	-
BH29_A_2.0	16-Aug-21	EP2109376	COFFEE ROCK/SAND: Brown, fine to coarse sand, fine tocoarse			22.24	7.9	5.4	2.5	Slight	<0.02	<0.005	<0.02
BH29_A_2.25	16-Aug-21	EP2109376	sub-rounded, sub-angular gravel			21.99	7.7	5.5	2.2	Slight	-	-	-
BH29_A_2.5	16-Aug-21	EP2109376				21.74	7.4	5.6	1.8	Slight	<0.02	<0.005	<0.02
BH29_A_2.75	16-Aug-21	EP2109376				21.49	7.3	5.8	1.5	Slight	-	-	-
BH29_A_3.0	16-Aug-21	EP2109376	Clayey Silty SAND: Brown with grey mottling, fine to	Dry	Dry	21.24	7.2	5.4	1.8	Slight	<0.02	0.005	<0.02
BH29_A_3.25	16-Aug-21	EP2109376	coarsesands, low plasticity			20.99	5.2	4.0	1.2	Slight	-	-	-
BH29_A_3.5	16-Aug-21	EP2109376				20.74	5.0	3.8	1.2	Slight	0.05	<0.005	0.05
BH29_A_3.75	16-Aug-21	EP2109376				20.49	5.0	3.6	1.4	Slight	-	-	-
BH29_A_4.0	16-Aug-21	EP2109376	Shades to grey with red mottling, grades to decreased clay			20.24	4.8	3.6	1.2	Slight	0.05	<0.005	0.05
BH29_A_4.25	16-Aug-21	EP2109376	content			19.99	4.7	3.6	1.1	Slight	-	-	-
BH29_A_4.5	16-Aug-21	EP2109376	Silty SAND: Grey with some red, fine to coarse sand (more			19.74	4.7	3.6	1.1	Slight	0.04	<0.005	0.04
BH29_A_4.75	16-Aug-21	EP2109376	fine)			19.49	4.6	3.5	1.1	Slight	-	-	-
BH29_A_5.0	16-Aug-21	EP2109376				19.24	4.7	3.5	1.2	Slight	0.04	<0.005	0.04
BH29_A_5.25	16-Aug-21	EP2109376				18.99	4.7	3.5	1.2	Slight	-	-	-
BH29_A_5.5	16-Aug-21	EP2109376				18.74	4.7	3.5	1.2	Slight	0.04	<0.005	0.04
BH29_A_5.75	16-Aug-21	EP2109376				18.49	4.7	3.6	1.1	Slight	-	-	-
BH29_A_6.0	16-Aug-21	EP2109376				18.24	4.8	3.4	1.4	Slight	0.04	<0.005	0.04

Table C-3 Soil Analytical Results

			Field Measurements				pH					Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate		Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-		%S	%S	%S
EQL							0.1	0.1	-	-		0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0				0.03	0.03
Bassendean Sand								3.0						<0.03
Field ID	**Sampled Date**	**Lab Report Number**												
BH30_A_0.0	16-Aug-21	EP2109377	SAND: Dark grey, fine to coarse sand with some oragnic material			26.13	7.9	6.0	1.9	Moderate		<0.02	<0.005	<0.02
BH30_A_0.25	16-Aug-21	EP2109377				25.88	8.2	5.8	2.4	Moderate				
BH30_A_0.5	16-Aug-21	EP2109377	Shades to grey			25.63	8.1	6.0	2.1	Slight		<0.02	<0.005	<0.02
BH30_A_0.75	16-Aug-21	EP2109377				25.38	7.9	6.1	1.8	Moderate				
BH30_A_1.0	16-Aug-21	EP2109377	Gravelly SAND: Brown, fine to coarse sand, fine to coarse sub-rounded, sub-angular gravel			25.13	8.2	6.2	2.0	Slight		<0.02	<0.005	<0.02
BH30_A_1.25	16-Aug-21	EP2109377				24.88	8.1	5.9	2.2	Slight		-	-	-
BH30_A_1.5	16-Aug-21	EP2109377	COFFEE ROCK/SAND: Brown with red mottling, fine tocoarse sand, sub-angular, sub-rounded gravel			24.63	8.4	6.2	2.2	Slight		<0.02	<0.005	<0.02
BH30_A_1.75	16-Aug-21	EP2109377				24.38	7.8	6.4	1.4	Moderate		-	-	-
BH30_A_2.0	16-Aug-21	EP2109377				24.13	7.6	5.9	1.7	Slight		<0.02	<0.005	<0.02
BH30_A_2.25	16-Aug-21	EP2109377				23.88	7.6	5.9	1.7	Slight		-	-	-
BH30_A_2.5	16-Aug-21	EP2109377				23.63	7.4	5.8	1.6	Slight		<0.02	<0.005	<0.02
BH30_A_2.75	16-Aug-21	EP2109377				23.38	7.4	5.8	1.6	Slight		-	-	-
BH30_A_3.0	16-Aug-21	EP2109377	Clayey SAND: Grey with red mottling, fine to coarse sand, lowto medium plasticity, stiff	Dry	Dry	23.13	7.4	5.7	1.7	Slight		<0.02	<0.005	<0.02
BH30_A_3.25	16-Aug-21	EP2109377				22.88	7.2	5.4	1.8	Slight		-	-	-
BH30_A_3.5	16-Aug-21	EP2109377				22.63	6.4	4.7	1.7	Slight		0.03	<0.005	0.03
BH30_A_3.75	16-Aug-21	EP2109377				22.38	5.7	4.5	1.2	Slight		-	-	-
BH30_A_4.0	16-Aug-21	EP2109377	CLAY: Grey with red mottling, low plasticity, stiff			22.13	5.7	4.3	1.4	Slight		<0.02	<0.005	<0.02
BH30_A_4.25	16-Aug-21	EP2109377				21.88	5.6	4.3	1.3	Slight		-	-	-
BH30_A_4.5	16-Aug-21	EP2109377				21.63	6.2	4.7	1.5	Slight		<0.02	<0.005	<0.02
BH30_A_4.75	16-Aug-21	EP2109377				21.38	6.3	4.2	2.1	Slight		-	-	-
BH30_A_5.0	16-Aug-21	EP2109377	SAND: Yellow/brown, fine to coarse sand, poorly sorted			21.13	5.2	4.2	1.0	Slight		<0.02	<0.005	<0.02
BH30_A_5.25	16-Aug-21	EP2109377				20.88	5.3	4.1	1.2	Slight		-	-	-
BH30_A_5.5	16-Aug-21	EP2109377				20.63	5.3	4.0	1.3	Slight		<0.02	<0.005	<0.02
BH30_A_5.75	16-Aug-21	EP2109377				20.38	5.1	4.0	1.1	Slight		-	-	-
BH30_A_6.0	16-Aug-21	EP2109377				20.13	5.2	4.0	1.2	Slight		<0.02	<0.005	<0.02
BH31_A_0.0	16-Aug-21	EP2109377	SAND: Dark brown, fine to coarse sand			27.52	8.0	6.0	2.0	Moderate		<0.02	<0.005	<0.02
BH31_A_0.25	16-Aug-21	EP2109377				27.27	8.0	6.2	1.8	Moderate		-	-	-
BH31_A_0.5	16-Aug-21	EP2109377	Shades to yellow brown			27.02	8.0	6.2	1.8	Slight		<0.02	0.005	<0.02
BH31_A_0.75	16-Aug-21	EP2109377				26.77	8.1	6.3	1.8	Slight		-	-	-
BH31_A_1.0	16-Aug-21	EP2109377				26.52	8.0	6.4	1.6	Slight		<0.02	<0.005	<0.02
BH31_A_1.25	16-Aug-21	EP2109377				26.27	8.1	6.4	1.7	Slight		-	-	-
BH31_A_1.5	16-Aug-21	EP2109377	Gravelly SAND: Yelow brown, fine to coarse sand,sub-angular, sub-round, fine to coarse coffee rock gravel			26.02	8.1	6.4	1.7	Slight		<0.02	<0.005	<0.02
BH31_A_1.75	16-Aug-21	EP2109377				25.77	7.1	5.5	1.6	Slight		-	-	-
BH31_A_2.0	16-Aug-21	EP2109377	COFFEE ROCK/SAND: Brown/yellow with red mottling, fine to coarse sand, trace low plasticity clay			25.52	7.4	5.8	1.6	Slight		<0.02	<0.005	<0.02
BH31_A_2.25	16-Aug-21	EP2109377				25.27	5.6	4.2	1.4	Slight		-	-	-
BH31_A_2.5	16-Aug-21	EP2109377				25.02	4.9	4.0	0.9	Slight		0.02	<0.005	0.02
BH31_A_2.75	16-Aug-21	EP2109377				24.77	4.9	3.9	1.0	Slight		-	-	-
BH31_A_3.0	16-Aug-21	EP2109377	Clayey SAND: Grey with red mottling, fine to coarse sand, low plasticity	Dry	Dry	24.52	4.7	4.0	0.7	Slight		<0.02	<0.005	<0.02
BH31_A_3.25	16-Aug-21	EP2109377				24.27	4.5	3.7	0.8	Slight		-	-	-
BH31_A_3.5	16-Aug-21	EP2109377				24.02	4.6	3.6	1.0	Slight		<0.02	<0.005	<0.02
BH31_A_3.75	16-Aug-21	EP2109377				23.77	4.5	3.6	0.9	Slight		-	-	-
BH31_A_4.0	16-Aug-21	EP2109377				23.52	4.5	3.7	0.8	Slight		<0.02	<0.005	<0.02
BH31_A_4.25	16-Aug-21	EP2109377				23.27	4.6	3.6	1.0	Slight		-	-	-
BH31_A_4.5	16-Aug-21	EP2109377	SAND: Grey, fine to coarse sand			23.02	4.6	3.3	1.3	Slight		0.02	<0.005	0.02
BH31_A_4.75	16-Aug-21	EP2109377				22.77	4.6	3.4	1.2	Slight		-	-	-
BH31_A_5.0	16-Aug-21	EP2109377				22.52	4.9	4.1	0.8	Slight		<0.02	<0.005	<0.02
BH31_A_5.25	16-Aug-21	EP2109377				22.27	5.0	3.9	1.1	Slight		-	-	-
BH31_A_5.5	16-Aug-21	EP2109377	Shades to yellow/brown			22.02	5.1	3.9	1.2	Slight		<0.02	<0.005	<0.02
BH31_A_5.75	16-Aug-21	EP2109377				21.77	5.1	3.8	1.3	Slight		-	-	-
BH31_A_6.0	16-Aug-21	EP2109377				21.52	5.0	3.9	1.1	Slight		<0.02	<0.005	<0.02
BH32_A_0.0	17-Aug-21	EP2109375	SAND: Dark brown, fine to coarse sand, natural with organic material			29.66	8.4	5.9	2.5	Moderate		<0.02	<0.005	<0.02
BH32_A_0.25	17-Aug-21	EP2109375	Shades to yellow/brown			29.41	8.4	5.8	2.6	Moderate		-	-	-
BH32_A_0.5	17-Aug-21	EP2109375				29.16	8.3	5.9	2.4	Moderate		<0.02	<0.005	<0.02
BH32_A_0.75	17-Aug-21	EP2109375				28.91	8.2	6.1	2.1	Slight		-	-	-
BH32_A_1.0	17-Aug-21	EP2109375				28.66	8.4	6.2	2.2	Slight		<0.02	<0.005	<0.02
BH32_A_1.25	17-Aug-21	EP2109375				28.41	8.1	6.3	1.8	Moderate		-	-	-
BH32_A_1.5	17-Aug-21	EP2109375		Dry	Dry	28.16	7.8	6.1	1.7	Moderate		<0.02	<0.005	<0.02
BH32_A_1.75	17-Aug-21	EP2109375				27.91	8.1	6.2	1.9	Slight		-	-	-
BH32_A_2.0	17-Aug-21	EP2109375	COFFEE ROCK/SAND: Brown, fine to coarse sand, fine tocoarse sub-rounded, sub-angular gravel			27.66	8.0	5.9	2.1	Slight		<0.02	0.005	<0.02
BH32_A_2.25	17-Aug-21	EP2109375				27.41	7.6	5.9	1.7	Slight		-	-	-
BH32_A_2.5	17-Aug-21	EP2109375				27.16	7.4	5.8	1.6	Slight		<0.02	<0.005	<0.02
BH32_A_2.75	17-Aug-21	EP2109375				26.91	7.2	5.8	1.4	Slight		-	-	-
BH32_A_3.0	17-Aug-21	EP2109375				26.66	7.2	5.5	1.7	Slight		<0.02	0.005	<0.02

Table C-3 Soil Analytical Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH33_A_0.0	17-Aug-21	EP2109462	LIMESTONE: Cream, fine to coarse sand, sub-angular, sub-			22.10	8.2	6.3	1.9	Moderate	-		-
BH33_A_0.25	17-Aug-21	EP2109462	SAND: Dark brown, fine to coarse sand, poorly sorted			21.85	8.4	6.1	2.3	Moderate	-		-
BH33_A_0.5	17-Aug-21	EP2109462	Shades to light grey			21.60	8.8	6.2	2.6	Moderate	<0.02	<0.005	<0.02
BH33_A_0.75	17-Aug-21	EP2109462	Shades to yellow brown			21.35	8.8	6.0	2.8	Moderate	-	-	-
BH33_A_1.0	17-Aug-21	EP2109462				21.10	8.5	6.2	2.3	Slight	<0.02	0.006	<0.02
BH33_A_1.25	17-Aug-21	EP2109462				20.85	8.1	6.2	1.9	Slight	-	-	-
BH33_A_1.5	17-Aug-21	EP2109462				20.60	8.1	6.3	1.8	Slight	<0.02	0.005	<0.02
BH33_A_1.75	17-Aug-21	EP2109462				20.35	8.4	6.4	2.0	Slight	-	-	-
BH33_A_2.0	17-Aug-21	EP2109462				20.10	8.4	6.0	2.4	Slight	<0.02	0.006	<0.02
BH33_A_2.25	17-Aug-21	EP2109462	Gravelly SAND: Light brown with dark brown mottling, fine			19.85	8.3	6.3	2.0	Slight	-	-	-
BH33_A_2.5	17-Aug-21	EP2109462	tocoarse sand, loosely packed, fine to coarse, sub-angular,sub-			19.60	8.0	6.0	2.0	Slight	<0.02	0.005	<0.02
BH33_A_2.75	17-Aug-21	EP2109462	round, gravel			19.35	7.8	5.9	1.9	Slight	-	-	-
BH33_A_3.0	17-Aug-21	EP2109462		3.50	18.60	19.10	7.7	5.7	2.0	Slight	<0.02	0.006	<0.02
BH33_A_3.25	17-Aug-21	EP2109462				18.85	7.6	5.6	2.0	Slight	-	-	-
BH33_A_3.5	17-Aug-21	EP2109462				18.60	7.2	5.2	2.0	Slight	<0.02	<0.005	<0.02
BH33_A_3.75	17-Aug-21	EP2109462				18.35	7.2	5.4	1.8	Slight	-	-	-
BH33_A_4.0	17-Aug-21	EP2109462				18.10	7.4	5.4	2.0	Slight	<0.02	<0.005	<0.02
BH33_A_4.25	17-Aug-21	EP2109462				17.85	6.9	5.3	1.6	Slight	-	-	-
BH33_A_4.5	17-Aug-21	EP2109462	SAND: Light grey, fine to coarse sand			17.60	5.9	4.3	1.6	Slight	<0.02	0.005	<0.02
BH33_A_4.75	17-Aug-21	EP2109462				17.35	5.8	4.4	1.4	Slight	-	-	-
BH33_A_5.0	17-Aug-21	EP2109462				17.10	5.9	4.3	1.6	Slight	<0.02	0.005	<0.02
BH33_A_5.25	17-Aug-21	EP2109462				16.85	5.7	4.3	1.4	Slight	-	-	-
BH33_A_5.5	17-Aug-21	EP2109462	Silty SAND: Light grey, fine to coarse sand, well sorted			16.60	5.6	4.3	1.3	Slight	<0.02	0.007	<0.02
BH33_A_5.75	17-Aug-21	EP2109462				16.35	5.6	4.2	1.4	Slight	-	-	-
BH33_A_6.0	17-Aug-21	EP2109462				16.10	5.5	4.2	1.3	Slight	<0.02	<0.005	<0.02
BH34_A_0.0	17-Aug-21	EP2109462	SAND: Grey, fine to coarse sand, poorly sorted			22.46	7.8	5.5	2.3	Slight	<0.02	0.005	<0.02
BH34_A_0.25	17-Aug-21	EP2109462				22.21	8.0	5.6	2.4	Slight	-	-	-
BH34_A_0.5	17-Aug-21	EP2109462				21.96	7.8	5.5	2.3	Slight	<0.02	0.007	<0.02
BH34_A_0.75	17-Aug-21	EP2109462				21.71	7.8	5.6	2.2	Slight	-	-	-
BH34_A_1.0	17-Aug-21	EP2109462				21.46	7.8	5.6	2.2	Slight	<0.02	0.007	<0.02
BH34_A_1.25	17-Aug-21	EP2109462	Shades to light grey			21.21	8.0	5.6	2.4	Slight	-	-	-
BH34_A_1.5	17-Aug-21	EP2109462				20.96	8.2	5.6	2.6	Slight	<0.02	0.005	<0.02
BH34_A_1.75	17-Aug-21	EP2109462				20.71	8.1	6.0	2.1	Slight	-	-	-
BH34_A_2.0	17-Aug-21	EP2109462				20.46	8.0	6.0	2.0	Slight	<0.02	0.008	<0.02
BH34_A_2.25	17-Aug-21	EP2109462				20.21	7.6	5.7	1.9	Slight	-	-	-
BH34_A_2.5	17-Aug-21	EP2109462		4.57	17.89	19.96	7.8	5.6	2.2	Slight	<0.02	0.006	<0.02
BH34_A_2.75	17-Aug-21	EP2109462				19.71	8.0	5.6	2.4	Slight	-	-	-
BH34_A_3.0	17-Aug-21	EP2109462	COFFEE ROCK/SAND: Dakr brown with yellow brown fine to			19.46	8.0	5.7	2.3	Slight	<0.02	0.005	<0.02
BH34_A_3.25	17-Aug-21	EP2109462	coarse sand, sub-angular, sub-round, fine to coarse gravel			19.21	7.4	6.0	1.4	Slight	-	-	-
BH34_A_3.5	17-Aug-21	EP2109462				18.96	7.2	5.8	1.4	Slight	<0.02	0.006	<0.02
BH34_A_3.75	17-Aug-21	EP2109462				18.71	7.4	5.8	1.6	Slight	-	-	-
BH34_A_4.0	17-Aug-21	EP2109462				18.46	7.2	5.4	1.8	Slight	<0.02	0.005	<0.02
BH34_A_4.25	17-Aug-21	EP2109462				18.21	7.1	5.6	1.5	Slight	-	-	-
BH34_A_4.5	17-Aug-21	EP2109462	SAND: Grey, fine to coarse sand, loosley pakced			17.96	7.3	5.7	1.6	Slight	<0.02	0.005	<0.02
BH34_A_4.75	17-Aug-21	EP2109462				17.71	7.3	5.6	1.7	Slight	-	-	-
BH34_A_5.0	17-Aug-21	EP2109462				17.46	7.0	5.5	1.5	Slight	<0.02	0.007	<0.02
BH35_A_0.0	17-Aug-21	EP2109464	SAND: Dark brown, fine to coarse sand, loosely packed			21.89	7.4	5.4	2.0	Moderate	<0.02	<0.005	<0.02
BH35_A_0.25	17-Aug-21	EP2109464				21.64	7.4	5.3	2.1	Slight	-	-	-
BH35_A_0.5	17-Aug-21	EP2109464	Shades to yellow/brown			21.39	7.4	5.4	2.0	Slight	<0.02	<0.005	<0.02
BH35_A_0.75	17-Aug-21	EP2109464				21.14	7.4	5.5	1.9	Slight	-	-	-
BH35_A_1.0	17-Aug-21	EP2109464	Shades to light grey			20.89	7.6	5.4	2.2	Slight	<0.02	0.005	<0.02
BH35_A_1.25	17-Aug-21	EP2109464				20.64	7.5	5.5	2.0	Slight	-	-	-
BH35_A_1.5	17-Aug-21	EP2109464				20.39	7.9	5.5	2.4	Slight	<0.02	<0.005	<0.02
BH35_A_1.75	17-Aug-21	EP2109464				20.14	7.8	5.7	2.1	Moderate	-	-	-
BH35_A_2.0	17-Aug-21	EP2109464				19.89	7.7	5.4	2.3	Slight	<0.02	<0.005	<0.02
BH35_A_2.25	17-Aug-21	EP2109464				19.64	7.6	5.3	2.3	Slight	-	-	-
BH35_A_2.5	17-Aug-21	EP2109464		2.80	19.09	19.39	7.4	5.4	2.0	Slight	<0.02	<0.005	<0.02
BH35_A_2.75	17-Aug-21	EP2109464				19.14	7.5	5.4	2.1	Slight	-	-	-
BH35_A_3.0	17-Aug-21	EP2109464				18.89	7.2	5.4	1.8	Slight	<0.02	0.006	<0.02
BH35_A_3.25	17-Aug-21	EP2109464				18.64	7.2	5.6	1.6	Slight	-	-	-
BH35_A_3.5	17-Aug-21	EP2109464				18.39	7.1	5.6	1.5	Slight	<0.02	0.005	<0.02
BH35_A_3.75	17-Aug-21	EP2109464				18.14	7.2	5.4	1.8	Slight	-	-	-
BH35_A_4.0	17-Aug-21	EP2109464	COFFEE ROCK/SAND: Yellow/brown, fine to coarse sand, sub-			17.89	7.3	5.3	2.0	Slight	<0.02	<0.005	<0.02
BH35_A_4.25	17-Aug-21	EP2109464	Shades to dark brown, grades to increasing gravel content			17.64	6.4	4.8	1.6	Slight	-	-	-
BH35_A_4.5	17-Aug-21	EP2109464	SAND: Grey, fine to coarse sand, poorly sorted			17.39	5.6	3.9	1.7	Slight	<0.02	0.005	0.02
BH35_A_4.75	17-Aug-21	EP2109464				17.14	5.2	3.8	1.4	Slight	-	-	-
BH35_A_5.0	17-Aug-21	EP2109464				16.89	5.0	3.7	1.3	Slight	<0.02	0.005	<0.02

Table C-3 Soil Analytical Results

				Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
				Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
					mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL								0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand								4.0	4.0	1.0			0.03	0.03
Bassendean Sand									3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**												
BH92_A_0.0	03-Sep-21	EP2110344	FILL: Dark brown, fine to coarse sand, organic material				21.40	6.1	4.1	2.0	Moderate	<0.02	0.006	<0.02
BH92_A_0.25	03-Sep-21	EP2110344	Shades to light grey/cream with black tinge				21.15	6.1	4.1	2.0	Moderate	-	-	-
BH92_A_0.5	03-Sep-21	EP2110344					20.90	6.2	4.0	2.2	Moderate	<0.02	<0.005	<0.02
BH92_A_0.75	03-Sep-21	EP2110344					20.65	6.1	4.3	1.8	Slight	-	-	-
BH92_A_1.0	03-Sep-21	EP2110344					20.40	6.1	4.4	1.7	Slight	<0.02	<0.005	<0.02
BH92_A_1.25	03-Sep-21	EP2110344					20.15	6.5	4.2	2.3	Slight	-	-	-
BH92_A_1.5	03-Sep-21	EP2110344	COFFEE ROCK: Orange/light brown fine to coarse				19.90	6.4	4.3	2.1	Moderate	<0.02	<0.005	<0.02
BH92_A_1.75	03-Sep-21	EP2110344	sand,cobbles (2 cm)				19.65	6.4	4.1	2.3	Moderate	-	-	-
BH92_A_2.0	03-Sep-21	EP2110344					19.40	6.4	4.6	1.8	Slight	0.02	<0.005	0.02
BH92_A_2.25	03-Sep-21	EP2110344	SAND: Light brown, fine to coarse sand, well sorted				19.15	6.3	4.7	1.6	Slight	-	-	-
BH92_A_2.5	03-Sep-21	EP2110344					18.90	6.3	4.6	1.7	Slight	<0.02	0.005	0.02
BH92_A_2.75	03-Sep-21	EP2110344	SAND: Light brown, fine to coarse sand, well sorted				18.65	5.4	4.4	1.0	Slight	<0.02	<0.005	<0.02
BH92_A_3.0	03-Sep-21	EP2110344		Dry	Dry		18.40	5.1	4.0	1.1	Moderate	0.02	<0.005	0.03
BH92_A_3.25	03-Sep-21	EP2110344					18.15	5.0	3.8	1.2	Slight	-	-	-
BH92_A_3.5	03-Sep-21	EP2110344					17.90	4.7	3.6	1.1	Slight	0.02	<0.005	0.03
BH92_A_3.75	03-Sep-21	EP2110344					17.65	4.5	3.3	1.2	Slight	-	-	-
BH92_A_4.0	03-Sep-21	EP2110344	Shades to light grey/cream with red mottling				17.40	4.3	3.3	1.0	Slight	0.03	<0.005	0.03
BH92_A_4.25	03-Sep-21	EP2110344					17.15	4.3	3.4	0.9	Slight	-	-	-
BH92_A_4.5	03-Sep-21	EP2110344					16.90	4.2	3.3	0.9	Slight	0.04	<0.005	0.04
BH92_A_4.75	03-Sep-21	EP2110344					16.65	4.1	3.2	0.9	Slight	-	-	-
BH92_A_5.0	03-Sep-21	EP2110344					16.40	4.1	3.2	0.9	Slight	0.03	0.005	0.04
BH92_A_5.25	03-Sep-21	EP2110344					16.15	4.1	3.2	0.9	Slight	-	-	-
BH92_A_5.5	03-Sep-21	EP2110344	Shades to light grey				15.90	4.0	3.1	0.9	Slight	0.03	<0.005	0.03
BH92_A_5.75	03-Sep-21	EP2110344					15.65	4.2	3.1	1.1	Slight	0.02	<0.005	0.03
BH92_A_6.0	03-Sep-21	EP2110344					15.40	4.3	3.2	1.1	Moderate	<0.02	<0.005	<0.02
BH93_A_0.0	09-Aug-21	EP2109130	FILL: Dark brown sand, natural with grass				22.31	7.9	5.9	2.0	Moderate	-	-	-
BH93_A_0.25	09-Aug-21	EP2109130	SAND: Cream, fine to coarse sand, poorly sorted				22.06	8.5	5.8	2.7	Slight	<0.02	<0.005	<0.02
BH93_A_0.5	09-Aug-21	EP2109130					21.81	8.4	6.1	2.3	Slight	-	-	-
BH93_A_0.75	09-Aug-21	EP2109130					21.56	8.1	5.9	2.2	Slight	<0.02	<0.005	<0.02
BH93_A_1.0	09-Aug-21	EP2109130	LIMESTONE SAND: Light brown fine to coarse sand, fine to				21.31	8.0	5.9	2.1	Slight	-	-	-
BH93_A_1.25	09-Aug-21	EP2109130	coarse sub-rounded, sub-angular gravel				21.06	7.8	5.9	1.9	Slight	<0.02	<0.005	<0.02
BH93_A_1.5	09-Aug-21	EP2109130	COFFEE ROCK/SAND: Brown with dark red mottling, fine to				20.81	7.9	6.1	1.8	Slight	-	-	-
BH93_A_1.75	09-Aug-21	EP2109130	coarse sand, fine to coarse sub-rounded, sub-angular gravel				20.56	7.7	5.9	1.8	Slight	<0.02	<0.005	<0.02
BH93_A_2.0	09-Aug-21	EP2109130					20.31	7.6	5.6	2.0	Slight	-	-	-
BH93_A_2.25	09-Aug-21	EP2109130					20.06	7.6	5.8	1.8	Slight	<0.02	<0.005	<0.02
BH93_A_2.5	09-Aug-21	EP2109130					19.81	7.4	5.7	1.7	Slight	-	-	-
BH93_A_2.75	09-Aug-21	EP2109130					19.56	7.0	5.4	1.6	Slight	<0.02	<0.005	<0.02
BH93_A_3.0	09-Aug-21	EP2109130		5.30	17.01		19.31	5.9	4.2	1.7	Slight	-	-	-
BH93_A_3.25	09-Aug-21	EP2109130					19.06	4.9	4.0	0.9	Slight	<0.02	<0.005	<0.02
BH93_A_3.5	09-Aug-21	EP2109130	Silty SAND: Grey, fine sand, well sorted				18.81	5.1	4.0	1.1	Slight	-	-	-
BH93_A_3.75	09-Aug-21	EP2109130					18.56	4.9	4.1	0.8	Slight	<0.02	<0.005	<0.02
BH93_A_4.0	09-Aug-21	EP2109130					18.31	5.1	4.0	1.1	Slight	-	-	-
BH93_A_4.25	09-Aug-21	EP2109130					18.06	5.2	4.0	1.2	Slight	<0.02	<0.005	<0.02
BH93_A_4.5	09-Aug-21	EP2109130					17.81	5.2	4.1	1.1	Slight	-	-	-
BH93_A_4.75	09-Aug-21	EP2109130					17.56	5.5	4.4	1.1	Slight	<0.02	<0.005	<0.02
BH93_A_5.0	09-Aug-21	EP2109130	Coarse sand noted				17.31	5.1	4.1	1.0	Slight	-	-	-
BH93_A_5.25	09-Aug-21	EP2109130					17.06	5.1	4.1	1.0	Slight	<0.02	<0.005	<0.02
BH93_A_5.5	09-Aug-21	EP2109130					16.81	5.2	4.1	1.1	Slight	-	-	-
BH93_A_5.75	09-Aug-21	EP2109130					16.56	5.2	4.2	1.0	Slight	<0.02	<0.005	<0.02
BH93_A_6.0	09-Aug-21	EP2109130					16.31	5.2	4.2	1.0	Slight	-	-	-
BH94_A_0.0	16-Aug-21	EP2109376	SAND: natural, grey, fine to coarse				22.58	8.4	5.8	2.6	Moderate	<0.02	<0.005	<0.02
BH94_A_0.25	16-Aug-21	EP2109376					22.33	8.6	5.7	2.9	Moderate	-	-	-
BH94_A_0.5	16-Aug-21	EP2109376	Shades to light grey				22.08	8.6	5.6	3.0	Slight	<0.02	<0.005	<0.02
BH94_A_0.75	16-Aug-21	EP2109376					21.83	8.6	5.6	3.0	Slight	-	-	-
BH94_A_1.0	16-Aug-21	EP2109376	COFFEE ROCK/SAND: brown, fine to coarse sand				21.58	8.2	5.7	2.5	Slight	<0.02	<0.005	<0.02
BH94_A_1.25	16-Aug-21	EP2109376					21.33	7.8	5.7	2.1	Slight	-	-	-
BH94_A_1.5	16-Aug-21	EP2109376					21.08	7.9	5.8	2.1	Moderate	<0.02	<0.005	<0.02
BH94_A_1.75	16-Aug-21	EP2109376					20.83	8.3	6.0	2.3	Moderate	-	-	-
BH94_A_2.0	16-Aug-21	EP2109376	CLAYEY SAND: grey with brown mottly fine to coarse sand,				20.58	7.6	5.5	2.1	Slight	<0.02	0.005	<0.02
BH94_A_2.25	16-Aug-21	EP2109376	low plasticity.				20.33	7.7	5.6	2.1	Slight	-	-	-
BH94_A_2.5	16-Aug-21	EP2109376					20.08	6.7	4.7	2.0	Slight	0.02	<0.005	0.02
BH94_A_2.75	16-Aug-21	EP2109376					19.83	5.5	4.1	1.4	Moderate	-	-	-
BH94_A_3.0	16-Aug-21	EP2109376	SILTY SAND: grey, fine to coarse sands	5.80	16.78		19.58	5.1	4.0	1.1	Moderate	0.05	<0.005	0.06
BH94_A_3.25	16-Aug-21	EP2109376					19.33	5.4	3.7	1.7	Slight	-	-	-
BH94_A_3.5	16-Aug-21	EP2109376					19.08	5.0	3.6	1.4	Moderate	0.06	<0.005	0.06
BH94_A_3.75	16-Aug-21	EP2109376					18.83	5.0	3.6	1.4	Slight	-	-	-
BH94_A_4.0	16-Aug-21	EP2109376					18.58	5.0	3.8	1.2	Slight	0.05	<0.005	0.05
BH94_A_4.25	16-Aug-21	EP2109376					18.33	4.9	3.7	1.2	Slight	-	-	-
BH94_A_4.5	16-Aug-21	EP2109376					18.08	4.9	3.8	1.1	Slight	0.03	<0.005	0.04
BH94_A_4.75	16-Aug-21	EP2109376					17.83	4.8	3.7	1.1	Slight	-	-	-
BH94_A_5.0	16-Aug-21	EP2109376	More coarse sands noted				17.58	4.8	3.6	1.2	Slight	0.03	<0.005	0.04
BH94_A_5.25	16-Aug-21	EP2109376					17.33	5.0	3.9	1.1	Slight	-	-	-
BH94_A_5.5	16-Aug-21	EP2109376					17.08	5.0	3.8	1.2	Slight	0.02	<0.005	0.02
BH94_A_5.75	16-Aug-21	EP2109376					16.83	5.0	3.8	1.2	Slight	-	-	-
BH94_A_6.0	16-Aug-21	EP2109376					16.58	5.0	3.7	1.3	Slight	<0.02	<0.005	<0.02

Table C-3 Soil Analytical Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH95_A_0.0	13-Sep-21	EP2110726	FILL: dark grey, fine to coarse, well sorted			25.64	5.6	3.9	1.7	Slight	<0.02	<0.005	<0.02
BH95_A_0.25	13-Sep-21	EP2110726				25.39	5.7	3.8	1.9	Slight	-	-	-
BH95_A_0.5	13-Sep-21	EP2110726	Shades to light grey/white			25.14	6.0	4.0	2.0	Slight	<0.02	<0.005	<0.02
BH95_A_0.75	13-Sep-21	EP2110726				24.89	5.9	3.9	2.0	Slight	-	-	-
BH95_A_1.0	13-Sep-21	EP2110726				24.64	5.9	4.2	1.7	Slight	<0.02	<0.005	<0.02
BH95_A_1.25	13-Sep-21	EP2110726				24.39	5.9	3.8	2.1	Slight	-	-	-
BH95_A_1.5	13-Sep-21	EP2110726	Shades to dark grey			24.14	6.0	3.8	2.2	Slight	<0.02	<0.005	<0.02
BH95_A_1.75	13-Sep-21	EP2110726				23.89	5.9	3.7	2.2	Slight	-	-	-
BH95_A_2.0	13-Sep-21	EP2110726	Shades to light grey/white			23.64	5.6	4.3	1.3	Slight	<0.02	0.005	<0.02
BH95_A_2.25	13-Sep-21	EP2110726				23.39	5.8	4.5	1.3	Slight	-	-	-
BH95_A_2.5	13-Sep-21	EP2110726				23.14	5.9	4.1	1.8	Slight	<0.02	<0.005	<0.02
BH95_A_2.75	13-Sep-21	EP2110726				22.89	5.7	4.3	1.4	Slight	-	-	-
BH95_A_3.0	13-Sep-21	EP2110726		Dry	Dry	22.64	6.2	4.6	1.6	Slight	<0.02	<0.005	<0.02
BH95_A_3.25	13-Sep-21	EP2110726				22.39	8.0	5.5	2.5	Slight	-	-	-
BH95_A_3.5	13-Sep-21	EP2110726				22.14	6.7	4.6	2.1	Slight	<0.02	<0.005	<0.02
BH95_A_3.75	13-Sep-21	EP2110726				21.89	6.0	4.4	1.6	Slight	-	-	-
BH95_A_4.0	13-Sep-21	EP2110726				21.64	6.4	4.8	1.6	Slight	<0.02	<0.005	<0.02
BH95_A_4.25	13-Sep-21	EP2110726				21.39	6.3	4.6	1.7	Slight	-	-	-
BH95_A_4.5	13-Sep-21	EP2110726	Shades to cream			21.14	5.8	4.4	1.4	Slight	<0.02	<0.005	<0.02
BH95_A_4.75	13-Sep-21	EP2110726	Shades to yellow orange			20.89	6.4	4.7	1.7	Slight	-	-	-
BH95_A_5.0	13-Sep-21	EP2110726				20.64	5.8	4.4	1.4	Slight	<0.02	<0.005	<0.02
BH95_A_5.25	13-Sep-21	EP2110726	Weathered COFFEE ROCK: light brown/red, 1cm-3cm gravelss			20.39	6.2	4.5	1.7	Slight	-	-	-
BH95_A_5.5	13-Sep-21	EP2110726				20.14	6.2	4.6	1.6	Slight	<0.02	<0.005	<0.02
BH95_A_5.75	13-Sep-21	EP2110726	Grades to coarse, trace gravels			19.89	6.3	4.7	1.6	Slight	-	-	-
BH95_A_6.0	13-Sep-21	EP2110726				19.64	6.2	4.8	1.4	Slight	<0.02	<0.005	<0.02
BH96_A_0.0	18-Oct-21	EP2112543	CLAY: Black, fine peaty clay, medium plasticity			9.63	5.7	3.8	1.9	Extreme	0.16	0.007	0.17
BH96_A_0.25	18-Oct-21	EP2112543				9.38	5.5	3.4	2.1	Extreme	-	-	-
BH96_A_0.5	18-Oct-21	EP2112543				9.13	5.4	3.7	1.7	Extreme	0.18	0.007	0.19
BH96_A_0.75	18-Oct-21	EP2112543				8.88	5.4	3.8	1.6	Extreme	-	-	-
BH96_A_1.0	18-Oct-21	EP2112543				8.63	5.6	3.8	1.8	Moderate	0.08	<0.005	0.09
BH96_A_1.25	18-Oct-21	EP2112543				8.38	6.3	4.2	2.1	Strong	0.03	<0.005	0.03
BH96_A_1.5	18-Oct-21	EP2112543				8.13	6.3	3.7	2.6	Moderate	0.02	0.005	0.02
BH96_A_1.75	18-Oct-21	EP2112543				7.88	6.2	4.0	2.2	Strong	-	-	-
BH96_A_2.0	18-Oct-21	EP2112543				7.63	6.4	4.2	2.2	Strong	<0.02	<0.005	<0.02
BH96_A_2.25	18-Oct-21	EP2112543				7.38	6.0	4.3	1.7	Strong	-	-	-
BH96_A_2.5	18-Oct-21	EP2112543		2.83	6.80	7.13	6.0	4.7	1.3	Strong	<0.02	<0.005	<0.02
BH96_A_2.75	18-Oct-21	EP2112543	Silty CLAY: Brown to grey, medium plasticity			6.88	6.0	5.3	0.7	Strong	-	-	-
BH96_A_3.0	18-Oct-21	EP2112543				6.63	6.0	4.3	1.7	Strong	<0.02	<0.005	<0.02
BH96_A_3.25	18-Oct-21	EP2112543				6.38	6.0	4.3	1.7	Strong	-	-	-
BH96_A_3.5	18-Oct-21	EP2112543	Clayey SAND: Grey with red mottling, fine to medium sand			6.13	5.7	4.2	1.5	Strong	<0.02	<0.005	<0.02
BH96_A_3.75	18-Oct-21	EP2112543				5.88	5.9	4.6	1.3	Strong	-	-	-
BH96_A_4.0	18-Oct-21	EP2112543	Sandy CLAY: Brown medium to coarse sand			5.63	6.1	3.8	2.3	Moderate	<0.02	<0.005	<0.02
BH96_A_4.25	18-Oct-21	EP2112543				5.38	6.1	4.7	1.4	Moderate	-	-	-
BH96_A_4.5	18-Oct-21	EP2112543	Sandy CLAY: Brown medium to coarse sand			5.13	6.0	4.5	1.5	Moderate	<0.02	<0.005	<0.02
BH96_A_4.75	18-Oct-21	EP2112543	Clayey SAND: Grey with red mottlingm fine to medium clayey			4.88	6.0	5.2	0.8	Strong	0.04	<0.005	0.04
BH96_A_5.0	18-Oct-21	EP2112543	sand with minor gravel			4.63	6.0	5.1	0.9	Strong	0.03	<0.005	0.03
BH97_A_0.0	18-Oct-21	EP2112538	Silty clayey SAND: Brown, fine to medium sand with			8.22	7.7	6.0	1.7	Moderate	<0.02	<0.005	<0.02
BH97_A_0.25	18-Oct-21	EP2112538	Silty CLAY: Black, high plasticity with some vegetation			7.97	7.0	4.7	2.3	Strong	-	-	-
BH97_A_0.5	18-Oct-21	EP2112538				7.72	6.7	4.0	2.7	Strong	0.03	0.009	0.04
BH97_A_0.75	18-Oct-21	EP2112538				7.47	6.6	4.4	2.2	Strong	-	-	-
BH97_A_1	18-Oct-21	EP2112538				7.22	6.6	4.4	2.2	Strong	0.04	0.009	0.05
BH97_A_1.25	18-Oct-21	EP2112538				6.97	6.7	5.4	1.3	Strong	-	-	-
BH97_A_1.5	18-Oct-21	EP2112538				6.72	6.6	5.6	1.0	Strong	0.03	<0.005	0.03
BH97_A_1.75	18-Oct-21	EP2112538				6.47	6.6	5.8	0.8	Strong	<0.02	<0.005	<0.02
BH97_A_2.0	18-Oct-21	EP2112538				6.22	6.7	5.3	1.4	Strong	0.02	<0.005	0.02
BH97_A_2.25	18-Oct-21	EP2112538				5.97	6.7	6.5	0.2	Strong	0.02	<0.005	0.02
BH97_A_2.5	18-Oct-21	EP2112538	Silty CLAY: Dark brown transitioning to light gret, fine	Not recorded	Not recorded	5.72	6.8	6.8	0.0	Strong	0.02	0.006	0.03
BH97_A_2.75	18-Oct-21	EP2112538	withsome organic matter			5.47	6.4	3.8	2.6	Strong	-	-	-
BH97_A_3.0	18-Oct-21	EP2112538				5.22	6.5	4.0	2.5	Strong	0.02	0.008	0.03
BH97_A_3.25	18-Oct-21	EP2112538	Sandy silty CLAY: Brown to red, fine to medium sand			4.97	6.8	4.8	2.0	Strong	-	-	-
BH97_A_3.5	18-Oct-21	EP2112538				4.72	6.6	5.0	1.6	Strong	0.02	0.008	0.03
BH97_A_3.75	18-Oct-21	EP2112538				4.47	6.3	3.0	3.3	Moderate	<0.02	0.021	0.03
BH97_A_4.0	18-Oct-21	EP2112538				4.22	6.3	4.0	2.3	Moderate	0.02	0.005	0.02
BH97_A_4.25	18-Oct-21	EP2112538				3.97	6.1	3.6	2.5	Moderate	0.03	<0.005	0.03
BH97_A_4.5	18-Oct-21	EP2112538	Sandy silty CLAY: Grey			3.72	6.3	3.7	2.6	Strong	0.02	0.008	0.03
BH97_A_4.75	18-Oct-21	EP2112538				3.47	6.5	3.3	3.2	Strong	-	-	-
BH97_A_5.0	18-Oct-21	EP2112538				3.22	6.5	3.0	3.5	Moderate	0.02	0.01	0.03
BH98_A_0.0	18-Oct-21	EP2112543	CLAY: Black, fine peaty clay, medium plasticity			7.79	6.3	4.6	1.7	Extreme	0.12	0.009	0.13
BH98_A_0.25	18-Oct-21	EP2112543				7.54	6.0	3.8	2.2	Extreme	-	-	-
BH98_A_0.5	18-Oct-21	EP2112543				7.29	6.5	4.2	2.3	Extreme	0.04	<0.005	0.03
BH98_A_0.75	18-Oct-21	EP2112543				7.04	6.9	4.6	2.3	Extreme	0.03	<0.005	0.03
BH98_A_1.0	18-Oct-21	EP2112543				6.79	6.5	4.5	2.0	Extreme	0.02	<0.005	0.02
BH98_A_1.25	18-Oct-21	EP2112543				6.54	6.2	4.9	1.3	Extreme	-	-	-
BH98_A_1.5	18-Oct-21	EP2112543				6.29	6.0	4.6	1.4	Strong	0.02	0.005	0.02
BH98_A_1.75	18-Oct-21	EP2112543				6.04	6.0	5.1	0.9	Strong	-	-	-
BH98_A_2.0	18-Oct-21	EP2112543				5.79	6.1	4.6	1.5	Strong	0.02	<0.005	0.02
BH98_A_2.25	18-Oct-21	EP2112543				5.54	6.1	4.8	1.3	Strong	-	-	-
BH98_A_2.5	18-Oct-21	EP2112543		Not recorded	Not recorded	5.29	6.1	5.2	0.9	Strong	<0.02	<0.005	<0.02
BH98_A_2.75	18-Oct-21	EP2112543				5.04	6.0	4.6	1.4	Strong	-	-	-
BH98_A_3.0	18-Oct-21	EP2112543				4.79	6.2	4.5	1.7	Strong	0.02	<0.005	0.02
BH98_A_3.25	18-Oct-21	EP2112543				4.54	6.0	4.3	1.7	Strong	0.02	<0.005	0.02
BH98_A_3.5	18-Oct-21	EP2112543	Clayey SAND: Grey with red mottling, fine to medium sand			4.29	6.1	4.0	2.1	Strong	0.03	<0.005	0.03
BH98_A_3.75	18-Oct-21	EP2112543				4.04	6.0	4.2	1.8	Strong	-	-	-
BH98_A_4.0	18-Oct-21	EP2112543				3.79	5.8	4.6	1.2	Strong	0.03	<0.005	0.03
BH98_A_4.25	18-Oct-21	EP2112543				3.54	5.6	4.9	0.7	Strong	0.02	<0.005	0.02
BH98_A_4.5	18-Oct-21	EP2112543	Sandy CLAY: Brown, medium to coarse sand			3.29	5.4	4.4	1.0	Strong	0.02	<0.005	0.02
BH98_A_4.75	18-Oct-21	EP2112543				3.04	5.1	4.2	0.9	Strong	-	-	-
BH98_A_5.0	18-Oct-21	EP2112543				2.79	5.2	4.2	1.0	Strong	0.02	<0.005	0.02

Table C-3 Soil Analytical Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH99_A_0.0	13-Sep-21	EP2110727	SAND: Light brown/grey, organic material, trace gravel			9.63	6.9	4.2	2.7	Moderate	<0.02	<0.005	<0.02
BH99_A_0.25	13-Sep-21	EP2110727	Clayey SAND: Red/brown, fine to coarse sand, trace gravel			9.38	7.2	5.1	2.1	Strong	-	-	-
BH99_A_0.5	13-Sep-21	EP2110727				9.13	7.2	5.3	1.9	Strong	<0.02	0.005	<0.02
BH99_A_0.75	13-Sep-21	EP2110727				8.88	7.2	5.4	1.8	Strong	-	-	-
BH99_A_1.0	13-Sep-21	EP2110727	Grades to increased clay content			8.63	7.0	6.1	0.9	Strong	<0.02	<0.005	<0.02
BH99_A_1.25	13-Sep-21	EP2110727				8.38	6.1	5.7	0.4	Strong	-	-	-
BH99_A_1.5	13-Sep-21	EP2110727				8.13	6.0	5.6	0.4	Strong	0.02	<0.005	0.02
BH99_A_1.75	13-Sep-21	EP2110727	Grades to decreased clay content			7.88	6.0	4.8	1.2	Slight	-	-	-
BH99_A_2.0	13-Sep-21	EP2110727				7.63	5.9	4.4	1.5	Slight	<0.02	<0.005	0.02
BH99_A_2.25	13-Sep-21	EP2110727				7.38	5.8	4.4	1.4	Slight	-	-	-
BH99_A_2.5	13-Sep-21	EP2110727		2.83	6.80	7.13	5.2	5.0	0.2	Strong	0.02	<0.005	0.02
BH99_A_2.75	13-Sep-21	EP2110727				6.88	5.3	3.7	1.6	Slight	-	-	-
BH99_A_3.0	13-Sep-21	EP2110727	Shades to brown with grey mottling			6.63	6.6	4.8	1.8	Strong	<0.02	<0.005	<0.02
BH99_A_3.25	13-Sep-21	EP2110727	Grades to increased sand content, shades to light brown/grey			6.38	6.7	5.3	1.4	Slight	-	-	-
BH99_A_3.5	13-Sep-21	EP2110727	Shades to yellow/brown			6.13	6.8	5.3	1.5	Slight	<0.02	<0.005	<0.02
BH99_A_3.75	13-Sep-21	EP2110727				5.88	6.8	5.4	1.4	Slight	-	-	-
BH99_A_4.0	13-Sep-21	EP2110727				5.63	7.0	5.4	1.6	Slight	<0.02	<0.005	<0.02
BH99_A_4.25	13-Sep-21	EP2110727				5.38	7.1	5.9	1.2	Slight	-	-	-
BH99_A_4.5	13-Sep-21	EP2110727	Clayey SAND: Grey, fine to coarse sand, well sorted			5.13	7.0	5.7	1.3	Slight	<0.02	<0.005	<0.02
BH99_A_4.75	13-Sep-21	EP2110727				4.88	6.8	6.6	0.2	Strong	-	-	-
BH99_A_5.0	13-Sep-21	EP2110727				4.63	6.4	5.4	1.0	Strong	0.02	<0.005	0.02
BH100_A_0.0	14-Sep-21	EP2110806	SAND: dark brown/red, fine to coarse with some organic			10.84	6.0	3.6	2.4	Strong	0.04	<0.005	0.04
BH100_A_0.25	14-Sep-21	EP2110806	matter			10.59	6.3	5.6	0.7	Strong	-	-	-
BH100_A_0.5	14-Sep-21	EP2110806	Shades to light brown/yellow, dark brown mottling			10.34	6.5	6.3	0.2	Strong	0.03	<0.005	0.04
BH100_A_0.75	14-Sep-21	EP2110806				10.09	6.7	6.5	0.2	Strong	-	-	-
BH100_A_1.0	14-Sep-21	EP2110806				9.84	6.6	5.9	0.7	Strong	0.03	<0.005	0.03
BH100_A_1.25	14-Sep-21	EP2110806	Shades to light brown, orange mottling with some organic			9.59	5.7	4.2	1.5	Slight	-	-	-
BH100_A_1.5	14-Sep-21	EP2110806	matter			9.34	5.3	4.5	0.8	Strong	0.05	<0.005	0.05
BH100_A_1.75	14-Sep-21	EP2110806				9.09	5.4	4.2	1.2	Slight	-	-	-
BH100_A_2.0	14-Sep-21	EP2110806				8.84	5.4	5.5	-0.1	Strong	0.04	<0.005	0.04
BH100_A_2.25	14-Sep-21	EP2110806				8.59	5.3	4.2	1.1	Slight	-	-	-
BH100_A_2.5	14-Sep-21	EP2110806		Dry	Dry	8.34	5.1	4.1	1.0	Slight	0.05	<0.005	0.05
BH100_A_2.75	14-Sep-21	EP2110806				8.09	5.4	4.2	1.2	Moderate	-	-	-
BH100_A_3.0	14-Sep-21	EP2110806	Grades to increased clay content, grey mottling, shades to incr			7.84	5.0	4.2	0.8	Moderate	0.05	<0.005	0.05
BH100_A_3.25	14-Sep-21	EP2110806				7.59	5.1	4.2	0.9	Moderate	-	-	-
BH100_A_3.5	14-Sep-21	EP2110806				7.34	5.7	4.5	1.2	Moderate	0.03	<0.005	0.03
BH100_A_3.75	14-Sep-21	EP2110806	Grades to cream, trace coffee rock (1cm-5cm)			7.09	5.8	4.5	1.3	Strong	-	-	-
BH100_A_4.0	14-Sep-21	EP2110806				6.84	6.6	4.8	1.8	Strong	0.05	<0.005	0.05
BH100_A_4.25	14-Sep-21	EP2110806	Grades to increasing clay, trace gravel			6.59	6.7	5.7	1.0	Strong	-	-	-
BH100_A_4.5	14-Sep-21	EP2110806				6.34	6.7	5.8	0.9	Strong	0.04	<0.005	0.04
BH100_A_4.75	14-Sep-21	EP2110806	Shades to yellow			6.09	6.2	4.8	1.4	Strong	-	-	-
BH100_A_5.0	14-Sep-21	EP2110806				5.84	6.3	4.9	1.4	Strong	0.04	<0.005	0.04
BH101_A_0.0	10-Aug-21	EP2109463	SAND: Dark grey, fine to coarse sand with some oragnic			21.06	7.2	5.1	2.1	Moderate	<0.02	<0.005	<0.02
BH101_A_0.25	10-Aug-21	EP2109463	Shades to yellow/brown, no organic material			20.81	7.7	5.1	2.6	Slight	-	-	-
BH101_A_0.5	10-Aug-21	EP2109463				20.56	7.7	5.3	2.4	Slight	<0.02	<0.005	<0.02
BH101_A_0.75	10-Aug-21	EP2109463				20.31	7.6	5.6	2.0	Slight	-	-	-
BH101_A_1.0	10-Aug-21	EP2109463				20.06	7.2	5.2	2.0	Slight	<0.02	0.006	<0.02
BH101_A_1.25	10-Aug-21	EP2109463				19.81	7.2	5.4	1.8	Slight	-	-	-
BH101_A_1.5	10-Aug-21	EP2109463	COFFEE ROCK/SAND: Yellow with brown gravel, fine tocoarse			19.56	7.1	5.2	1.9	Slight	<0.02	<0.005	<0.02
BH101_A_1.75	10-Aug-21	EP2109463	sand, sub-angular, sub-rounded, fine to coarse gravel			19.31	6.7	4.8	1.9	Slight	-	-	-
BH101_A_2.0	10-Aug-21	EP2109463				19.06	6.5	4.6	1.9	Slight	<0.02	<0.005	<0.02
BH101_A_2.25	10-Aug-21	EP2109463				18.81	6.5	4.7	1.8	Slight	-	-	-
BH101_A_2.5	10-Aug-21	EP2109463				18.56	6.5	4.6	1.9	Slight	<0.02	<0.005	<0.02
BH101_A_2.75	10-Aug-21	EP2109463				18.31	6.0	4.5	1.5	Slight	-	-	-
BH101_A_3.0	10-Aug-21	EP2109463	SAND: Light brown, fine to coarse sand	5.80	15.26	18.06	5.9	4.4	1.5	Slight	<0.02	<0.005	<0.02
BH101_A_3.25	10-Aug-21	EP2109463				17.81	5.3	4.2	1.1	Slight	-	-	-
BH101_A_3.5	10-Aug-21	EP2109463				17.56	4.9	3.7	1.2	Slight	<0.02	<0.005	<0.02
BH101_A_3.75	10-Aug-21	EP2109463				17.31	5.1	3.8	1.3	Slight	-	-	-
BH101_A_4.0	10-Aug-21	EP2109463				17.06	4.7	3.7	1.0	Slight	<0.02	0.009	0.02
BH101_A_4.25	10-Aug-21	EP2109463	Clayey SAND: Grey with light brown/red mottling, fine to			16.81	4.7	3.5	1.2	Slight	-	-	-
BH101_A_4.5	10-Aug-21	EP2109463	coarse sand, very low plasticity			16.56	4.5	3.4	1.1	Slight	<0.02	<0.005	0.02
BH101_A_4.75	10-Aug-21	EP2109463				16.31	5.0	3.8	1.2	Slight	-	-	-
BH101_A_5.0	10-Aug-21	EP2109463	Silty SAND: Grey, fine to coarse sand, well sorted			16.06	5.0	3.8	1.2	Slight	<0.02	0.006	0.02
BH101_A_5.25	10-Aug-21	EP2109463				15.81	4.9	4.0	0.9	Slight	-	-	-
BH101_A_5.5	10-Aug-21	EP2109463				15.56	5.2	3.9	1.3	Slight	0.02	0.006	0.02
BH101_A_5.75	10-Aug-21	EP2109463				15.31	5.3	3.8	1.5	Slight	-	-	-
BH101_A_6.0	10-Aug-21	EP2109462				15.06	5.7	4.4	1.3	slight	<0.02	0.005	<0.02

Table C-3 Soil Analytical Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit		%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH102_A_0.0	10-Aug-21	EP2109463	SAND: Dark brown, fine to coarse sand with organic material			22.09	8.1	5.5	2.6	Moderate	<0.02	0.005	<0.02
BH102_A_0.25	10-Aug-21	EP2109463	Shades to light grey			21.84	8.4	5.6	2.8	Slight	-	-	-
BH102_A_0.5	10-Aug-21	EP2109463				21.59	8.4	5.6	2.8	Slight	<0.02	<0.005	<0.02
BH102_A_0.75	10-Aug-21	EP2109463				21.34	8.2	5.7	2.5	Slight	-	-	-
BH102_A_1.0	10-Aug-21	EP2109463				21.09	8.2	5.8	2.4	Slight	<0.02	<0.005	<0.02
BH102_A_1.25	10-Aug-21	EP2109463				20.84	8.0	5.9	2.1	Slight	-	-	-
BH102_A_1.5	10-Aug-21	EP2109463				20.59	7.8	6.0	1.8	Slight	<0.02	0.005	<0.02
BH102_A_1.75	10-Aug-21	EP2109463	Gravelly SAND: Yellow/brown, fine to coarse sand,sub-angular			20.34	8.0	6.0	2.0	Moderate	-	-	-
BH102_A_2.0	10-Aug-21	EP2109463	to sub-rounded, fine to coarse gravel			20.09	7.4	5.6	1.8	Slight	<0.02	<0.005	<0.02
BH102_A_2.25	10-Aug-21	EP2109463				19.84	7.2	5.5	1.7	Slight	-	-	-
BH102_A_2.5	10-Aug-21	EP2109463				19.59	7.1	5.3	1.8	Slight	<0.02	<0.005	<0.02
BH102_A_2.75	10-Aug-21	EP2109463				19.34	6.6	5.0	1.6	Slight	-	-	-
BH102_A_3.0	10-Aug-21	EP2109463	Silty SAND: Grey, fine to coarse sand	3.80	18.29	19.09	6.6	4.8	1.8	Slight	<0.02	<0.005	<0.02
BH102_A_3.25	10-Aug-21	EP2109463				18.84	6.2	4.9	1.3	Slight	-	-	-
BH102_A_3.5	10-Aug-21	EP2109463				18.59	5.4	4.1	1.3	Slight	<0.02	0.006	0.02
BH102_A_3.75	10-Aug-21	EP2109463				18.34	4.8	3.8	1.0	Slight	-	-	-
BH102_A_4.0	10-Aug-21	EP2109463				18.09	4.8	3.7	1.1	Slight	<0.02	<0.005	<0.02
BH102_A_4.25	10-Aug-21	EP2109463				17.84	4.8	3.6	1.2	Slight	-	-	-
BH102_A_4.5	10-Aug-21	EP2109463				17.59	4.8	3.8	1.0	Slight	<0.02	0.005	0.02
BH102_A_4.75	10-Aug-21	EP2109463				17.34	4.7	3.8	0.9	Slight	-	-	-
BH102_A_5.0	10-Aug-21	EP2109463	Grades to fine sand			17.09	4.9	3.8	1.1	Slight	<0.02	<0.005	<0.02
BH102_A_5.25	10-Aug-21	EP2109463				16.84	4.9	3.6	1.3	Slight	-	-	-
BH102_A_5.5	10-Aug-21	EP2109463				16.59	5.0	3.8	1.2	Slight	<0.02	<0.005	<0.02
BH102_A_5.75	10-Aug-21	EP2109463				16.34	5.2	3.8	1.4	Slight	-	-	-
BH102_A_6.0	10-Aug-21	EP2109463				16.09	5.1	3.9	1.2	Slight	<0.02	<0.005	<0.02
BH104_A_0.0	19-Oct-21	EP2112529	Clayey SAND: Grey, fine to coarse sand, low plasticity			8.78	6.9	4.7	2.2	Moderate	<0.02	<0.005	<0.02
BH104_A_0.25	19-Oct-21	EP2112529	Clayey SAND: Light grey, fine to medium sand, low plasticity			8.53	7.1	4.6	2.5	Moderate	-	-	-
BH104_A_0.5	19-Oct-21	EP2112529				8.28	7.2	4.6	2.6	Moderate	<0.02	<0.005	<0.02
BH104_A_0.75	19-Oct-21	EP2112529/EP2114604	SILT: Black peat material			8.03	6.8	4.0	2.8	Extreme	0.02	<0.005	0.02
BH104_A_1.0	19-Oct-21	EP2112529				7.78	5.9	3.8	2.1	Extreme	0.08	0.006	0.09
BH104_A_1.25	19-Oct-21	EP2112529				7.53	6.1	3.9	2.2	Extreme	-	-	-
BH104_A_1.5	19-Oct-21	EP2112529				7.28	6.2	4.2	2.0	Extreme	0.05	<0.005	0.05
BH104_A_1.75	19-Oct-21	EP2112529				7.03	5.8	3.9	1.9	Extreme	-	-	-
BH104_A_2.0	19-Oct-21	EP2112529				6.78	6.1	4.7	1.4	Extreme	0.02	0.008	0.03
BH104_A_2.25	19-Oct-21	EP2112529/EP2114604	Silty SAND: Dark brown, fine sand			6.53	6.6	5.6	1.0	Extreme	0.02	<0.005	0.02
BH104_A_2.5	19-Oct-21	EP2112529				6.28	6.7	5.5	1.2	Extreme	<0.02	<0.005	<0.02
BH104_A_2.75	19-Oct-21	EP2112529				6.03	6.6	4.8	1.8	Extreme	-	-	-
BH104_A_3.0	19-Oct-21	EP2112529	SILT: Dark brown	2.22	6.56	5.78	6.8	5.4	1.4	Extreme	<0.02	<0.005	<0.02
BH104_A_3.25	19-Oct-21	EP2112529				5.53	6.2	4.0	2.2	Extreme	-	-	-
BH104_A_3.5	19-Oct-21	EP2112529				5.28	6.4	5.2	1.2	Extreme	<0.02	<0.005	<0.02
BH104_A_3.75	19-Oct-21	EP2112529				5.03	6.9	6.8	0.1	Extreme	-	-	-
BH104_A_4.0	19-Oct-21	EP2112529				4.78	6.8	4.0	2.8	Extreme	<0.02	0.005	0.02
BH104_A_4.25	19-Oct-21	EP2112529				4.53	6.8	5.2	1.6	Extreme	-	-	-
BH104_A_4.5	19-Oct-21	EP2112529				4.28	6.9	6.4	0.5	Extreme	<0.02	<0.005	<0.02
BH104_A_4.75	19-Oct-21	EP2112529/EP2114604				4.03	6.7	5.0	1.7	Extreme	0.02	<0.005	0.02
BH104_A_5.0	19-Oct-21	EP2112529				3.78	6.5	4.0	2.5	Extreme	0.02	0.013	0.04
BH104_A_5.25	19-Oct-21	EP2112529				3.53	6.6	3.7	2.9	Extreme	-	-	-
BH104_A_5.5	19-Oct-21	EP2112529				3.28	6.7	3.8	2.9	Extreme	0.04	0.018	0.06
BH104_A_5.75	19-Oct-21	EP2112529				3.03	6.5	3.6	2.9	Extreme	-	-	-
BH104_A_6.0	19-Oct-21	EP2112529				2.78	6.6	3.5	3.1	Extreme	0.04	0.009	0.05
BH105_A_0.0	14-Sep-21	EP2110809	SAND: dark brown/ shades to light brown, organic matter, trace limestone and gravels			8.90	8.3	5.7	2.6	Moderate	<0.02	<0.005	<0.02
BH105_A_0.25	14-Sep-21	EP2110809	Shades to dark brown			8.65	8.3	6.2	2.1	Moderate	-	-	-
BH105_A_0.5	14-Sep-21	EP2110809	Shades to red/brown			8.40	8.5	6.3	2.2	Moderate	<0.02	<0.005	<0.02
BH105_A_0.75	14-Sep-21	EP2110809				8.15	8.1	7.0	1.1	Strong	-	-	-
BH105_A_1.0	14-Sep-21	EP2110809				7.90	8.3	7.4	0.9	Strong	<0.02	0.005	<0.02
BH105_A_1.25	14-Sep-21	EP2110809				7.65	8.2	6.3	1.9	Strong	-	-	-
BH105_A_1.5	14-Sep-21	EP2110809				7.40	8.0	6.4	1.6	Strong	<0.02	<0.005	<0.02
BH105_A_1.75	14-Sep-21	EP2110809	Grades to fine sands/ well sorted			7.15	8.1	6.2	1.9	Strong	-	-	-
BH105_A_2.0	14-Sep-21	EP2110809	Shades to light brown / yellow			6.90	8.1	6.1	2.0	Strong	<0.02	0.005	<0.02
BH105_A_2.25	14-Sep-21	EP2110809				6.65	8.3	6.5	1.8	Strong	-	-	-
BH105_A_2.5	14-Sep-21	EP2110809		2.43	6.47	6.40	7.1	5.8	1.3	Strong	<0.02	<0.005	<0.02
BH105_A_2.75	14-Sep-21	EP2110809	Grades to medium grains. Coarse sands. Well sorted			6.15	6.9	5.5	1.4	Strong	-	-	-
BH105_A_3.0	14-Sep-21	EP2110809				5.90	7.1	5.5	1.6	Strong	<0.02	<0.005	<0.02
BH105_A_3.25	14-Sep-21	EP2110809				5.65	6.8	5.4	1.4	Strong	-	-	-
BH105_A_3.5	14-Sep-21	EP2110809	Shades to light brown/grey, trace of gravels			5.40	7.0	5.7	1.3	Slight	0.02	<0.005	0.02
BH105_A_3.75	14-Sep-21	EP2110809/EP2112980	SAND: grey, organic matter, trace limestone and gravels with dark brown mottles			5.15	6.8	5.5	1.3	Slight	0.02	<0.005	0.02
BH105_A_4.0	14-Sep-21	EP2110809	Shades to brown, orange mottling			4.90	6.9	5.6	1.3	Slight	0.03	<0.005	0.03
BH105_A_4.25	14-Sep-21	EP2110809				4.65	6.8	5.3	1.5	Slight	-	-	-
BH105_A_4.5	14-Sep-21	EP2110809				4.40	7.1	5.5	1.6	Slight	0.03	<0.005	0.03
BH105_A_4.75	14-Sep-21	EP2110809	Grades to increased clay content			4.15	6.8	5.4	1.4	Slight	-	-	-
BH105_A_5.0	14-Sep-21	EP2110809	Clayey SAND: brown/grey, low plasticity			3.90	7.1	5.4	1.7	Slight	0.02	0.005	0.03
BH112_A_0.0	13-Sep-21	EP2110726	FILL: Black fine to coarse sand, organic matter			31.33	6.2	4.9	1.3	Slight	<0.02	<0.005	<0.02
BH112_A_0.25	13-Sep-21	EP2110726	Shades to grey			31.08	7.0	4.9	2.1	Moderate	-	-	-
BH112_A_0.5	13-Sep-21	EP2110726	Shades to cream			30.83	7.2	4.8	2.4	Slight	<0.02	<0.005	<0.02
BH112_A_0.75	13-Sep-21	EP2110726	Trace gravels			30.58	7.0	5.0	2.0	Moderate	-	-	-
BH112_A_1.0	13-Sep-21	EP2110726	Weathered COFFEE ROCK: Light brown, coarse sand			30.33	6.8	4.7	2.1	Moderate	<0.02	<0.005	<0.02
BH112_A_1.25	13-Sep-21	EP2110726/EP2112980				30.08	6.6	4.6	2.0	Slight	0.02	<0.005	0.02
BH112_A_1.5	13-Sep-21	EP2110726				29.83	5.8	4.3	1.5	Slight	0.04	<0.005	0.04
BH112_A_1.75	13-Sep-21	EP2110726	Shades to red with light brown mottling			29.58	5.6	4.1	1.5	Slight	-	-	-
BH112_A_2.0	13-Sep-21	EP2110726		7.00	24.33	29.33	5.4	4.1	1.3	Slight	0.08	<0.005	0.09
BH112_A_2.25	13-Sep-21	EP2110726				29.08	5.3	4.0	1.3	Slight	-	-	-
BH112_A_2.5	13-Sep-21	EP2110726				28.83	5.3	3.9	1.4	Slight	0.1	<0.005	0.11
BH112_A_2.75	13-Sep-21	EP2110726				28.58	5.3	3.9	1.4	Slight	-	-	-
BH112_A_3.0	13-Sep-21	EP2110726	Grades to increasing clay content, shades to red			28.33	5.2	3.9	1.3	Slight	0.04	<0.005	0.04
BH112_A_3.25	13-Sep-21	EP2110726	withgrey/brown mottling			28.08	5.1	3.8	1.3	Slight	-	-	-
BH112_A_3.5	13-Sep-21	EP2110726				27.83	5.1	3.8	1.3	Slight	0.05	<0.005	0.05
BH112_A_3.75	13-Sep-21	EP2110726	Grades to sand, shades to light brown			27.58	5.1	3.8	1.3	Slight	-	-	-
BH112_A_4.0	13-Sep-21	EP2110726				27.33	5.0	3.8	1.2	Slight	0.04	<0.005	0.04

Table C-3 Soil Analytical Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH139_A_0.0	19-Oct-21	EP2112530	SAND: Brown, fine to coarse sand with some vegetation and			17.27	7.9	5.8	2.1	Moderate	<0.02	0.009	<0.02
BH139_A_0.25	19-Oct-21	EP2112530	FILL: Yellow sand			17.02	7.7	5.9	1.8	Moderate	-	-	-
BH139_A_0.5	19-Oct-21	EP2112530				16.77	7.8	5.9	1.9	Moderate	<0.02	0.008	<0.02
BH139_A_0.75	19-Oct-21	EP2112530				16.52	7.8	6.0	1.8	Moderate	-	-	-
BH139_A_1.0	19-Oct-21	EP2112530				16.27	7.8	6.1	1.7	Moderate	<0.02	<0.005	<0.02
BH139_A_1.25	19-Oct-21	EP2112530	Grades to increasing clay content			16.02	7.6	6.0	1.6	Moderate	-	-	-
BH139_A_1.5	19-Oct-21	EP2112530	Silty CLAY: Brown with red mottling			15.77	7.6	6.0	1.6	Slight	<0.02	0.005	<0.02
BH139_A_1.75	19-Oct-21	EP2112530				15.52	7.4	6.3	1.1	Slight	-	-	-
BH139_A_2.0	19-Oct-21	EP2112530	Silty CLAY: Brown with red mottling			15.27	7.2	5.7	1.5	Slight	<0.02	0.005	<0.02
BH139_A_2.25	19-Oct-21	EP2112530				15.02	6.5	5.0	1.5	Slight	0.03	<0.005	0.03
BH139_A_2.5	19-Oct-21	EP2112530				14.77	6.3	4.9	1.4	Slight	0.03	<0.005	0.03
BH139_A_2.75	19-Oct-21	EP2112530	Silty CLAY: Light grey			14.52	6.1	4.7	1.4	Slight	0.02	<0.005	0.02
BH139_A_3.0	19-Oct-21	EP2112530		Dry	Dry	14.27	5.7	4.6	1.1	Slight	<0.02	<0.005	<0.02
BH139_A_3.25	19-Oct-21	EP2112530				14.02	5.6	4.4	1.2	Slight	0.05	<0.005	0.05
BH139_A_3.5	19-Oct-21	EP2112530				13.77	5.8	4.5	1.3	Slight	0.04	0.005	0.05
BH139_A_3.75	19-Oct-21	EP2112530				13.52	5.7	4.5	1.2	Slight	-	-	-
BH139_A_4.0	19-Oct-21	EP2112530	Sandy CLAY: Yellow to brown, fine to medium sand			13.27	5.9	4.6	1.3	Slight	0.05	0.006	0.05
BH139_A_4.25	19-Oct-21	EP2112530				13.02	5.7	4.5	1.2	Slight	0.03	<0.005	0.03
BH139_A_4.5	19-Oct-21	EP2112530				12.77	5.8	4.5	1.3	Slight	<0.02	<0.005	<0.02
BH139_A_4.75	19-Oct-21	EP2112530				12.52	5.7	4.6	1.1	Slight	-	-	-
BH139_A_5.0	19-Oct-21	EP2112530	CLAY: Yellow to brown with red mottling			12.27	5.9	4.4	1.5	Slight	<0.02	<0.005	<0.02
BH139_A_5.25	19-Oct-21	EP2112530				12.02	5.7	4.3	1.4	Slight	-	-	-
BH139_A_5.5	19-Oct-21	EP2112530	Sandy CLAY: Light grey, medium sand			11.77	5.9	4.4	1.5	Slight	<0.02	<0.005	<0.02
BH139_A_5.75	19-Oct-21	EP2112530				11.52	6.0	4.4	1.6	Slight	-	-	-
BH139_A_6.0	19-Oct-21	EP2112530				11.27	5.9	4.4	1.5	Slight	<0.02	0.005	<0.02
BH147_A_0.0	17-Aug-21	EP2109375	SAND: Dark brown, fine to coarse, natural sand			28.62	8.2	5.8	2.4	Moderate	<0.02	<0.005	<0.02
BH147_A_0.25	17-Aug-21	EP2109375				28.37	8.3	6.0	2.3	Moderate	-	-	-
BH147_A_0.5	17-Aug-21	EP2109375	Shades to yellow/brown			28.12	8.1	6.0	2.1	Slight	<0.02	<0.005	<0.02
BH147_A_0.75	17-Aug-21	EP2109375				27.87	7.9	6.0	1.9	Slight	-	-	-
BH147_A_1.0	17-Aug-21	EP2109375				27.62	7.8	6.1	1.7	Slight	<0.02	<0.005	<0.02
BH147_A_1.25	17-Aug-21	EP2109375				27.37	7.8	6.0	1.8	Slight	-	-	-
BH147_A_1.5	17-Aug-21	EP2109375				27.12	7.8	5.8	2.0	Slight	<0.02	<0.005	<0.02
BH147_A_1.75	17-Aug-21	EP2109375				26.87	7.7	5.7	2.0	Slight	-	-	-
BH147_A_2.0	17-Aug-21	EP2109375				26.62	7.7	5.6	2.1	Moderate	<0.02	<0.005	<0.02
BH147_A_2.25	17-Aug-21	EP2109375				26.37	7.8	5.7	2.1	Moderate	-	-	-
BH147_A_2.5	17-Aug-21	EP2109375	COFFEE ROCK/SAND: Brown, fine to coarse sand, fine tocoarse			26.12	7.6	5.6	2.0	Slight	<0.02	<0.005	<0.02
BH147_A_2.75	17-Aug-21	EP2109375	sub-rounded, sub-angular gravel			25.87	7.5	5.3	2.2	Slight	-	-	-
BH147_A_3.0	17-Aug-21	EP2109375		Dry	Dry	25.62	7.3	5.3	2.0	Slight	<0.02	<0.005	<0.02
BH147_A_3.25	17-Aug-21	EP2109375				25.37	7.3	5.4	1.9	Slight	-	-	-
BH147_A_3.5	17-Aug-21	EP2109375	Some organic material (roots)			25.12	7.2	5.4	1.8	Slight	<0.02	<0.005	<0.02
BH147_A_3.75	17-Aug-21	EP2109375				24.87	7.3	5.5	1.8	Slight	-	-	-
BH147_A_4.0	17-Aug-21	EP2109375				24.62	7.4	5.4	2.0	Slight	<0.02	<0.005	<0.02
BH147_A_4.25	17-Aug-21	EP2109375				24.37	7.3	5.3	2.0	Slight	-	-	-
BH147_A_4.5	17-Aug-21	EP2109375	SAND: Yellow/brown, fine to coarse sands, loosely packed			24.12	7.2	5.2	2.0	Slight	<0.02	<0.005	<0.02
BH147_A_4.75	17-Aug-21	EP2109375				23.87	7.2	5.1	2.1	Slight	-	-	-
BH147_A_5.0	17-Aug-21	EP2109375				23.62	7.0	5.3	1.7	Slight	<0.02	<0.005	<0.02
BH147_A_5.25	17-Aug-21	EP2109375				23.37	7.1	5.2	1.9	Slight	-	-	-
BH147_A_5.5	17-Aug-21	EP2109375				23.12	7.0	5.2	1.8	Slight	<0.02	0.005	<0.02
BH147_A_5.75	17-Aug-21	EP2109375	Some silt noted			22.87	7.0	5.2	1.8	Slight	-	-	-
BH147_A_6.0	17-Aug-21	EP2109375				22.62	7.1	5.2	1.9	Slight	<0.02	<0.005	<0.02
BH148_A_0.0	13-Sep-21	EP2110727	FILL: Black, fine sand with organic material			31.12	6.8	4.4	2.4	Moderate	<0.02	<0.005	<0.02
BH148_A_0.25	13-Sep-21	EP2110727	Shades to grey			30.87	6.8	4.8	2.0	Moderate	-	-	-
BH148_A_0.5	13-Sep-21	EP2110727	Shades to cream			30.62	6.8	4.8	2.0	Slight	<0.02	<0.005	<0.02
BH148_A_0.75	13-Sep-21	EP2110727				30.37	7.1	4.8	2.3	Slight	-	-	-
BH148_A_1.0	13-Sep-21	EP2110727	Shades to light brown/yellow	1.50	29.62	30.12	6.9	4.9	2.0	Slight	<0.02	<0.005	<0.02
BH148_A_1.25	13-Sep-21	EP2110727				29.87	6.5	4.8	1.7	Moderate	-	-	-
BH148_A_1.5	13-Sep-21	EP2110727				29.62	6.2	4.8	1.4	Moderate	<0.02	<0.005	<0.02
BH148_A_1.75	13-Sep-21	EP2110727				29.37	5.9	4.6	1.3	Slight	-	-	-
BH148_A_2.0	13-Sep-21	EP2110727				29.12	6.1	4.7	1.4	Slight	<0.02	<0.005	<0.02

Table C-4 Positive ASS Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH06_A_1.75	17-Aug-21	EP2109464	SAND: dark brown/grey fine to coarse sand	1.52	10.86	10.63	7.0	5.1	1.9	Slight	-	-	-
BH06_A_2.0	17-Aug-21	EP2109464	CLAY: grey with some organic materials, low-med pastisity clays			10.38	6.3	5.2	1.1	Slight	0.03	<0.005	0.03
BH06_A_2.25	17-Aug-21	EP2109464				10.13	6.0	3.9	2.1	Slight	-	-	-
BH06_A_2.5	17-Aug-21	EP2109464				9.88	6.3	2.8	3.5	Strong	0.06	0.005	0.06
BH06_A_2.75	17-Aug-21	EP2109464				9.63	6.1	2.6	3.5	Strong	-	-	-
BH06_A_3.0	17-Aug-21	EP2109464				9.38	6.1	3.6	2.5	Slight	<0.02	<0.005	<0.02
BH06_A_5.25	17-Aug-21	EP2109464	Silty CLAY: black fine to coarse sand, low-med stiff clays-sticky			7.13	6.0	4.2	1.8	Slight	-	-	-
BH06_A_5.5	17-Aug-21	EP2109464				6.88	6.0	3.9	2.1	Slight	0.05	0.009	0.05
BH06_A_5.75	17-Aug-21	EP2109464	SAND: grey fine to coarse sand (more coarse)			6.63	5.6	4.4	1.2	Slight	-	-	-
BH06_A_6.0	17-Aug-21	EP2109464				6.38	5.9	4.0	1.9	Slight	<0.02	<0.005	<0.02
BH08_A_3.5	13-Sep-21	EP2110727	SAND: Light brown/yellow, fine to coarse sand, some trace gravels	3.10	6.92	6.52	7.0	5.5	1.5	Strong	<0.02	0.005	<0.02
BH08_A_3.75	13-Sep-21	EP2110727/EP2114604				6.27	6.9	5.6	1.3	Strong	0.04	<0.005	0.04
BH08_A_4.0	13-Sep-21	EP2110727	Clayey SAND: Grey with brown mottling, low plasticity			6.02	6.7	5.4	1.3	Strong	0.04	<0.005	0.04
BH08_A_4.25	13-Sep-21	EP2110727				5.77	6.9	5.4	1.5	Strong	-	-	-
BH08_A_4.5	13-Sep-21	EP2110727	Clayey SAND: Grey, low plasticity			5.52	6.6	5.0	1.6	Strong	0.04	<0.005	0.04
BH08_A_4.75	13-Sep-21	EP2110727				5.27	6.5	5.8	0.7	Strong	-	-	-
BH08_A_5.0	13-Sep-21	EP2110727				5.02	6.8	6.2	0.6	Strong	0.04	0.005	0.04
BH09_A_1.0	14-Sep-21	EP2110806	SAND: dark brown, fine to coarse, organic matter	2.19	6.12	7.31	6.8	4.8	2.0	Strong	<0.02	0.007	<0.02
BH09_A_1.25	14-Sep-21	EP2110806/EP2112980				7.06	6.4	3.9	2.5	Strong	0.03	0.006	0.04
BH09_A_1.5	14-Sep-21	EP2110806				6.81	6.1	3.8	2.3	Strong	0.03	<0.005	0.03
BH09_A_1.75	14-Sep-21	EP2110806	Shades to light brown, orange mottling			6.56	6.5	4.6	1.9	Slight	-	-	-
BH09_A_2.0	14-Sep-21	EP2110806				6.31	6.1	4.5	1.6	Slight	<0.02	<0.005	<0.02
BH09_A_2.25	14-Sep-21	EP2110806/EP2114604	Grades to coarse sand, grey mottling			6.06	4.8	3.6	1.2	Slight	0.02	<0.005	0.03
BH09_A_2.5	14-Sep-21	EP2110806	Grades to increased clay content			5.81	4.4	3.2	1.2	Slight	0.04	0.005	0.04
BH09_A_2.75	14-Sep-21	EP2110806/EP2112980	Grades to decreased clay content			5.56	6.7	3.8	2.9	Strong	<0.02	0.005	<0.02
BH09_A_3.75	14-Sep-21	EP2110806/EP2112980	Shades to grey, fine to coarse grains, well sorted			4.56	5.8	4.5	1.3	Slight	<0.02	0.005	<0.02
BH09_A_4.0	14-Sep-21	EP2110806				4.31	7.1	5.5	1.6	Strong	0.02	0.006	0.03
BH09_A_4.25	14-Sep-21	EP2110806/EP2114604				4.06	6.9	5.6	1.3	Strong	<0.02	<0.005	<0.02
BH10_A_1.25	19-Oct-21	EP2112529/EP2114604	SAND: fine to medium grained, creamy yellow with gravel	Not Recorded	Not Recorded	6.60	7.6	5.4	2.2	Extreme	<0.02	<0.005	<0.02
BH10_A_1.5	19-Oct-21	EP2112529	Silty SAND: black, high plasticity			6.35	6.1	4.0	2.1	Extreme	0.04	<0.005	0.04
BH10_A_1.75	19-Oct-21	EP2112529/EP2114604				6.10	6.4	5.4	1.0	Extreme	<0.02	0.005	<0.02

Table C-4 Positive ASS Results

			Field Measurements				pH					Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate		Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-		%S	%S	%S
EQL							0.1	0.1	-	-		0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0				0.03	0.03
Bassendean Sand								3.0						<0.03
Field ID	**Sampled Date**	**Lab Report Number**												
BH11_A_0.5	19-Oct-21	EP2112530	SILT: Dark brown			7.60	6.6	4.3	2.3	Moderate		0.02	<0.005	0.02
BH11_A_0.75	19-Oct-21	EP2112530/EP2114604				7.35	6.2	3.7	2.5	Moderate		0.04	<0.005	0.04
BH11_A_1.0	19-Oct-21	EP2112530				7.10	5.9	3.1	2.8	Moderate		0.06	0.014	0.08
BH11_A_1.25	19-Oct-21	EP2112530				6.85	6.3	4.2	2.1	Strong		<0.02	<0.005	<0.02
BH11_A_1.5	19-Oct-21	EP2112530				6.60	6.3	5.3	1.0	Strong		0.02	0.005	0.03
BH11_A_1.75	19-Oct-21	EP2112530/EP2114604				6.35	6.3	6.6	-0.3	Strong		<0.02	<0.005	0.02
BH11_A_2.0	19-Oct-21	EP2112530				6.10	6.1	5.9	0.2	Strong		<0.02	0.008	0.02
BH11_A_2.25	19-Oct-21	EP2112530/EP2114604				5.85	6.1	5.2	0.9	Strong		0.02	<0.005	0.02
BH11_A_2.5	19-Oct-21	EP2112530				5.60	6.1	5.6	0.5	Strong		0.02	0.006	0.03
BH11_A_2.75	19-Oct-21	EP2112530				5.35	5.9	5.5	0.4	Strong		-	-	-
BH11_A_3.0	19-Oct-21	EP2112530				5.10	5.9	6.0	-0.1	Strong		0.02	<0.005	0.03
BH11_A_3.25	19-Oct-21	EP2112530		0.50	7.60	4.85	5.7	4.3	1.4	Strong		-	-	-
BH11_A_3.5	19-Oct-21	EP2112530				4.60	6.2	4.1	2.1	Extreme		0.03	0.005	0.04
BH11_A_3.75	19-Oct-21	EP2112530				4.35	6.2	4.1	2.1	Extreme		-	-	-
BH11_A_4.0	19-Oct-21	EP2112530				4.10	6.2	3.5	2.7	Extreme		0.05	0.013	0.06
BH11_A_4.25	19-Oct-21	EP2112530				3.85	6.1	3.9	2.2	Extreme		-	-	-
BH11_A_4.5	19-Oct-21	EP2112530				3.60	6.4	3.9	2.5	Extreme		0.04	<0.005	0.04
BH11_A_4.75	19-Oct-21	EP2112530				3.35	6.3	3.8	2.5	Extreme		-	-	-
BH11_A_5.0	19-Oct-21	EP2112530				3.10	6.4	3.7	2.7	Extreme		0.03	0.006	0.03
BH11_A_5.25	19-Oct-21	EP2112530/EP2114604				2.85	6.5	3.8	2.7	Extreme		0.03	<0.005	0.03
BH11_A_5.5	19-Oct-21	EP2112529				2.60	6.9	2.8	4.1	Strong		<0.02	<0.005	<0.02
BH11_A_5.75	19-Oct-21	EP2112529/EP2114604				2.35	6.9	3.2	3.7	Strong		<0.02	<0.005	<0.02
BH11_A_6.0	19-Oct-21	EP2112529				2.10	6.8	2.3	4.5	Strong		<0.02	0.029	0.04
BH12_A_0.0	18-Oct-21	EP2112538	Sandy CLAY: Light brown, medium sand with			8.38	5.4	3.0	2.4	Strong		0.07	<0.005	0.07
BH12_A_0.25	18-Oct-21	EP2112538	somevegetatation, well rounded gravel, medium plasticity			8.13	5.1	3.3	1.8	Strong		-	-	-
BH12_A_0.5	18-Oct-21	EP2112538	Silty CLAY: Dark brown, high plasticity			7.88	5.1	3.4	1.7	Strong		0.23	0.007	0.25
BH12_A_0.75	18-Oct-21	EP2112538				7.63	5.3	3.2	2.1	Strong		-	-	-
BH12_A_1.0	18-Oct-21	EP2112538	Shades to black			7.38	5.9	3.4	2.5	Strong		0.12	<0.005	0.12
BH12_A_1.25	18-Oct-21	EP2112538				7.13	5.7	3.4	2.3	Moderate		-	-	-
BH12_A_1.5	18-Oct-21	EP2112538	Silty CLAY: Dark brown, high plasticity, with red mottling			6.88	6.2	4.1	2.1	Moderate		0.08	<0.005	0.08
BH12_A_1.75	18-Oct-21	EP2112538				6.63	6.0	3.4	2.6	Moderate		-	-	-
BH12_A_2.0	18-Oct-21	EP2112538				6.38	6.2	4.4	1.8	Slight		0.03	<0.005	0.03
BH12_A_2.25	18-Oct-21	EP2112538	Silty CLAY: Grey with red mottling, minor gravels, medium	Dry	Dry	6.13	6.3	5.9	0.4	Moderate		-	-	-
BH12_A_2.5	18-Oct-21	EP2112538	plasticity			5.88	6.2	5.3	0.9	Slight		0.02	<0.005	0.03
BH12_A_2.75	18-Oct-21	EP2112538				5.63	6.4	5.4	1.0	Slight		-	-	-
BH12_A_3.0	18-Oct-21	EP2112538				5.38	6.6	5.6	1.0	Slight		0.04	<0.005	0.05
BH12_A_3.25	18-Oct-21	EP2112538				5.13	6.6	5.6	1.0	Slight		-	-	-
BH12_A_3.5	18-Oct-21	EP2112538				4.88	7.0	6.1	0.9	Moderate		0.04	<0.005	0.04
BH12_A_3.75	18-Oct-21	EP2112538				4.63	7.3	6.0	1.3	Slight		-	-	-
BH12_A_4.0	18-Oct-21	EP2112538				4.38	7.6	6.1	1.5	Slight		<0.02	0.132	0.14
BH12_A_4.25	18-Oct-21	EP2112538	SAND: Light grey, medium sand with minor clay			4.13	7.7	6.5	1.2	Slight		<0.02	<0.005	<0.02
BH14_A_1.0	15-Sep-21	EP2110870-AA	Clayey SAND: Red mottling, dark grey sand with trace gravels			15.60	6.6	5.0	1.6	Slight		<0.02	<0.005	0.02
BH14_A_1.25	15-Sep-21	EP2110870-AA				15.35	6.8	4.9	1.9	Slight		0.03	<0.005	0.03
BH14_A_1.5	15-Sep-21	EP2110870-AA				15.10	6.0	4.4	1.6	Slight		0.03	<0.005	0.04
BH14_A_1.75	15-Sep-21	EP2110870-AA				14.85	6.2	4.0	2.2	Slight		-	-	-
BH14_A_2.0	15-Sep-21	EP2110870-AA	Sandy CLAY: red/grey mottling, low plasticity			14.60	5.4	4.3	1.1	Slight		0.05	<0.005	0.05
BH14_A_2.25	15-Sep-21	EP2110870-AA		5.50	11.10	14.35	5.5	4.4	1.1	Slight		-	-	-
BH14_A_2.5	15-Sep-21	EP2110870-AA	Shades to light brown, grades to decreasing clay content			14.10	5.2	4.4	0.8	Slight		0.04	<0.005	0.04
BH14_A_2.75	15-Sep-21	EP2110870-AA	Clayey SAND: light brown/grey with orange mottling			13.85	5.4	4.4	1.0	Slight		-	-	-
BH14_A_3.0	15-Sep-21	EP2110870-AA				13.60	5.3	4.7	0.6	Slight		0.04	<0.005	0.04
BH14_A_3.25	15-Sep-21	EP2110870-AA	Shades to light grey, grades to fine, well sorted sand			13.35	5.7	5.0	0.7	Slight		0.03	<0.005	0.03
BH14_A_3.5	15-Sep-21	EP2110870-AA	SAND: light grey/orange, fine to coarse sand			13.10	6.3	5.2	1.1	Slight		0.02	<0.005	0.02

Table C-4 Positive ASS Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH15_A_3.25	15-Sep-21	EP2110869	FILL: Dark brown, fine to coarse sand, organic matterGrades	Dry	Dry	13.68	6.3	4.8	1.5	Slight	0.02	<0.005	0.02
BH15_A_3.5	15-Sep-21	EP2110869	Clayey SAND: Grey, low plasticity with organic matter			13.43	6.3	5.2	1.1	Slight	0.02	<0.005	0.03
BH15_A_4.0	15-Sep-21	EP2110869	SAND: Grey/light brown, fine to coarse sand, trace gravels			13.18	7.2	6.5	0.7	Slight	<0.02	<0.005	<0.02
BH16_A_3.75	02-Sep-21	EP2110216	CLAY: high plasticity; trace sand, fine grained, subangular to subrounded; pale grey orange mottled brown.	Not Recorded	Not Recorded	13.46	6.2	4.7	1.5	Slight	0.02	<0.005	0.02
BH16_A_4.0	02-Sep-21	EP2110216	CLAY: low plasticity; dark grey mottled brown red, trace clay.			13.21	6.2	5.1	1.1	Slight	0.03	<0.005	0.03
BH16_A_4.25	02-Sep-21	EP2110216				12.96	6.3	5.2	1.1	Slight	-	-	-
BH16_A_4.5	02-Sep-21	EP2110216				12.71	6.9	5.3	1.6	Slight	0.02	0.005	0.03
BH16_A_4.75	02-Sep-21	EP2110216				12.46	7.0	4.8	2.2	Slight	-	-	-
BH16_A_5.0	02-Sep-21	EP2110216	CLAY: low plasticity; dark grey mottled brown red, trace clay.			12.21	6.3	4.6	1.7	Slight	0.04	<0.005	0.04
BH20_A_4.5	02-Sep-21	EP2110223	Gravelly SAND: Dark brown, fine to coarse sand with gravels(1 cm) Shades to grey, grades to increased clay content	2.40	13.68	11.58	7.0	4.4	2.6	Slight	<0.02	0.007	<0.02
BH20_A_4.75	02-Sep-21	EP2110223/EP2112980				11.33	6.1	2.3	3.8	Moderate	<0.02	0.006	<0.02
BH20_A_5.0	02-Sep-21	EP2110223				11.08	6.2	3.5	2.7	Slight	<0.02	0.053	0.05
BH20_A_5.25	02-Sep-21	EP2110223/EP2112980				10.83	6.1	4.0	2.1	Slight	<0.02	<0.005	<0.02
BH20_A_6.25	02-Sep-21	EP2112980	Clayey SAND: Grey, fine to coarse sand, low plasticity			9.83	-	-	-	-	<0.02	0.012	0.02
BH20_A_6.5	02-Sep-21	EP2110223				9.58	6.2	4.2	2.0	Slight	<0.02	0.022	0.03
BH20_A_6.75	02-Sep-21	EP2110223				9.33	6.0	3.9	2.1	Slight	-	-	-
BH20_A_7.0	02-Sep-21	EP2110223	SAND: Grey/blue coarse grained			9.08	6.0	3.5	2.5	Slight	<0.02	0.04	0.04
BH20_A_7.25	02-Sep-21	EP2110223				8.83	5.8	4.3	1.5	Slight	<0.02	<0.005	<0.02
BH22_A_3.25	03-Sep-21	EP2110343	FILL: Brown, fine to coarse sand, organic material	Dry	Dry	16.75	5.3	4.2	1.1	Moderate	<0.02	<0.005	<0.02
BH22_A_3.5	03-Sep-21	EP2110343	COFFEE ROCK: Dark brown, weathered, cobbles (1-2 cm)			16.50	4.9	4.1	0.8	Slight	0.04	0.005	0.04
BH22_A_3.75	03-Sep-21	EP2110343	SAND: Light brown, fine to coarse sand, trace gravels			16.25	5.1	4.3	0.8	Slight	<0.02	<0.005	<0.02
BH29_A_3.25	16-Aug-21	EP2109376	Clayey Silty SAND: Brown with grey mottling, fine to coarsesands, low plasticity	Dry	Dry	20.99	5.2	4.0	1.2	Slight	-	-	-
BH29_A_3.5	16-Aug-21	EP2109376				20.74	5.0	3.8	1.2	Slight	0.05	<0.005	0.05
BH29_A_3.75	16-Aug-21	EP2109376				20.49	5.0	3.6	1.4	Slight	-	-	-
BH29_A_4.0	16-Aug-21	EP2109376	Shades to grey with red mottling, grades to decreased clay content			20.24	4.8	3.6	1.2	Slight	0.05	<0.005	0.05
BH29_A_4.25	16-Aug-21	EP2109376				19.99	4.7	3.6	1.1	Slight	-	-	-
BH29_A_4.5	16-Aug-21	EP2109376	Silty SAND: Grey with some red, fine to coarse sand (more fine)			19.74	4.7	3.6	1.1	Slight	0.04	<0.005	0.04
BH29_A_4.75	16-Aug-21	EP2109376				19.49	4.6	3.5	1.1	Slight	-	-	-
BH29_A_5.0	16-Aug-21	EP2109376				19.24	4.7	3.5	1.2	Slight	0.04	<0.005	0.04
BH29_A_5.25	16-Aug-21	EP2109376				18.99	4.7	3.5	1.2	Slight	-	-	-
BH29_A_5.5	16-Aug-21	EP2109376				18.74	4.7	3.5	1.2	Slight	0.04	<0.005	0.04
BH29_A_5.75	16-Aug-21	EP2109376				18.49	4.7	3.6	1.1	Slight	-	-	-
BH29_A_6.0	16-Aug-21	EP2109376				18.24	4.8	3.4	1.4	Slight	0.04	<0.005	0.04
BH30_A_3.25	16-Aug-21	EP2109377	Clayey SAND: Grey with red mottling, fine to coarse sand, low to medium plasticity, stiff	Dry	Dry	22.88	7.2	5.4	1.8	Slight	-	-	-
BH30_A_3.5	16-Aug-21	EP2109377				22.63	6.4	4.7	1.7	Slight	0.03	<0.005	0.03
BH30_A_3.75	16-Aug-21	EP2109377				22.38	5.7	4.5	1.2	Slight	-	-	-
BH92_A_2.75	03-Sep-21	EP2110344	SAND: Light brown, fine to coarse sand, well sorted	Dry	Dry	18.65	5.4	4.4	1.0	Slight	<0.02	<0.005	<0.02
BH92_A_3.0	03-Sep-21	EP2110344				18.40	5.1	4.0	1.1	Moderate	0.02	<0.005	0.03
BH92_A_3.25	03-Sep-21	EP2110344				18.15	5.0	3.8	1.2	Slight	-	-	-
BH92_A_3.5	03-Sep-21	EP2110344				17.90	4.7	3.6	1.1	Slight	0.02	<0.005	0.03
BH92_A_3.75	03-Sep-21	EP2110344				17.65	4.5	3.3	1.2	Slight	-	-	-
BH92_A_4.0	03-Sep-21	EP2110344	Shades to light grey/cream with red mottling			17.40	4.3	3.3	1.0	Slight	0.03	<0.005	0.03
BH92_A_4.25	03-Sep-21	EP2110344				17.15	4.3	3.4	0.9	Slight	-	-	-
BH92_A_4.5	03-Sep-21	EP2110344				16.90	4.2	3.3	0.9	Slight	0.04	<0.005	0.04
BH92_A_4.75	03-Sep-21	EP2110344				16.65	4.1	3.2	0.9	Slight	-	-	-
BH92_A_5.0	03-Sep-21	EP2110344				16.40	4.1	3.2	0.9	Slight	0.03	0.005	0.04
BH92_A_5.25	03-Sep-21	EP2110344				16.15	4.1	3.2	0.9	Slight	-	-	-
BH92_A_5.5	03-Sep-21	EP2110344	Shades to light grey			15.90	4.0	3.1	0.9	Slight	0.03	<0.005	0.03
BH92_A_5.75	03-Sep-21	EP2110344				15.65	4.2	3.1	1.1	Slight	0.02	<0.005	0.03
BH92_A_6.0	03-Sep-21	EP2110344				15.40	4.3	3.2	1.1	Moderate	<0.02	<0.005	<0.02
BH94_A_2.75	16-Aug-21	EP2109376	CLAYEY SAND: grey with brown mottly fine to coarse sand, low plasticity.	5.80	16.78	19.83	5.5	4.1	1.4	Moderate	-	-	-
BH94_A_3.0	16-Aug-21	EP2109376	SILTY SAND: grey, fine to coarse sands			19.58	5.1	4.0	1.1	Moderate	0.05	<0.005	0.06
BH94_A_3.25	16-Aug-21	EP2109376				19.33	5.4	3.7	1.7	Slight	-	-	-
BH94_A_3.5	16-Aug-21	EP2109376				19.08	5.0	3.6	1.4	Moderate	0.06	<0.005	0.06
BH94_A_3.75	16-Aug-21	EP2109376				18.83	5.0	3.6	1.4	Slight	-	-	-
BH94_A_4.0	16-Aug-21	EP2109376				18.58	5.0	3.8	1.2	Slight	0.05	<0.005	0.05
BH94_A_4.25	16-Aug-21	EP2109376				18.33	4.9	3.7	1.2	Slight	-	-	-
BH94_A_4.5	16-Aug-21	EP2109376				18.08	4.9	3.8	1.1	Slight	0.03	<0.005	0.04
BH94_A_4.75	16-Aug-21	EP2109376				17.83	4.8	3.7	1.1	Slight	-	-	-
BH94_A_5.0	16-Aug-21	EP2109376	More coarse sands noted			17.58	4.8	3.6	1.2	Slight	0.03	<0.005	0.04
BH94_A_5.25	16-Aug-21	EP2109376				17.33	5.0	3.9	1.1	Slight	-	-	-

Table C-4 Positive ASS Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH96_A_0.0	18-Oct-21	EP2112543	CLAY: Black, fine peaty clay, medium plasticity	2.83	6.80	9.63	5.7	3.8	1.9	Extreme	0.16	0.007	0.17
BH96_A_0.25	18-Oct-21	EP2112543				9.38	5.5	3.4	2.1	Extreme	-	-	-
BH96_A_0.5	18-Oct-21	EP2112543				9.13	5.4	3.7	1.7	Extreme	0.18	0.007	0.19
BH96_A_0.75	18-Oct-21	EP2112543				8.88	5.4	3.8	1.6	Extreme	-	-	-
BH96_A_1.0	18-Oct-21	EP2112543				8.63	5.6	3.8	1.8	Moderate	0.08	<0.005	0.09
BH96_A_1.25	18-Oct-21	EP2112543				8.38	6.3	4.2	2.1	Strong	0.03	<0.005	0.03
BH96_A_1.5	18-Oct-21	EP2112543				8.13	6.3	3.7	2.6	Moderate	0.02	0.005	0.02
BH96_A_4.5	18-Oct-21	EP2112543	Sandy CLAY: Brown medium to coarse sand			5.13	6.0	4.5	1.5	Moderate	<0.02	<0.005	<0.02
BH96_A_4.75	18-Oct-21	EP2112543	Clayey SAND: Grey with red mottlingm fine to medium clayey			4.88	6.0	5.2	0.8	Strong	0.04	<0.005	0.04
BH96_A_5.0	18-Oct-21	EP2112543	sand with minor gravel			4.63	6.0	5.1	0.9	Strong	0.03	<0.005	0.03
BH97_A_0.25	18-Oct-21	EP2112538	Silty CLAY: Black, high plasticity with some vegetation	Not Recorded	Not Recorded	7.97	7.0	4.7	2.3	Strong	-	-	-
BH97_A_0.5	18-Oct-21	EP2112538				7.72	6.7	4.0	2.7	Strong	0.03	0.009	0.04
BH97_A_0.75	18-Oct-21	EP2112538				7.47	6.6	4.4	2.2	Strong	-	-	-
BH97_A_1	18-Oct-21	EP2112538				7.22	6.6	4.4	2.2	Strong	0.04	0.009	0.05
BH97_A_1.25	18-Oct-21	EP2112538				6.97	6.7	5.4	1.3	Strong	-	-	-
BH97_A_1.5	18-Oct-21	EP2112538				6.72	6.6	5.6	1.0	Strong	0.03	<0.005	0.03
BH97_A_1.75	18-Oct-21	EP2112538				6.47	6.6	5.8	0.8	Strong	<0.02	<0.005	<0.02
BH97_A_2.0	18-Oct-21	EP2112538				6.22	6.7	5.3	1.4	Strong	0.02	<0.005	0.02
BH97_A_2.25	18-Oct-21	EP2112538				5.97	6.7	6.5	0.2	Strong	0.02	<0.005	0.02
BH97_A_2.5	18-Oct-21	EP2112538	Silty CLAY: Dark brown transitioning to light gret, fine			5.72	6.8	6.8	0.0	Strong	0.02	0.006	0.03
BH97_A_2.75	18-Oct-21	EP2112538	withsome organic matter			5.47	6.4	3.8	2.6	Strong	-	-	-
BH97_A_3.0	18-Oct-21	EP2112538				5.22	6.5	4.0	2.5	Strong	0.02	0.008	0.03
BH97_A_3.25	18-Oct-21	EP2112538	Sandy silty CLAY: Brown to red, fine to medium sand			4.97	6.8	4.8	2.0	Strong	-	-	-
BH97_A_3.5	18-Oct-21	EP2112538				4.72	6.6	5.0	1.6	Strong	0.02	0.008	0.03
BH97_A_3.75	18-Oct-21	EP2112538				4.47	6.3	3.0	3.3	Moderate	<0.02	0.021	0.03
BH97_A_4.0	18-Oct-21	EP2112538				4.22	6.3	4.0	2.3	Moderate	0.02	0.005	0.02
BH97_A_4.25	18-Oct-21	EP2112538				3.97	6.1	3.6	2.5	Moderate	0.03	<0.005	0.03
BH97_A_4.5	18-Oct-21	EP2112538	Sandy silty CLAY: Grey			3.72	6.3	3.7	2.6	Strong	0.02	0.008	0.03
BH97_A_4.75	18-Oct-21	EP2112538				3.47	6.5	3.3	3.2	Strong	-	-	-
BH97_A_5.0	18-Oct-21	EP2112538				3.22	6.5	3.0	3.5	Moderate	0.02	0.01	0.03
BH98_A_0.0	18-Oct-21	EP2112543	CLAY: Black, fine peaty clay, medium plasticity	Not recorded	Not recorded	7.79	6.3	4.6	1.7	Extreme	0.12	0.009	0.13
BH98_A_0.25	18-Oct-21	EP2112543				7.54	6.0	3.8	2.2	Extreme	-	-	-
BH98_A_0.5	18-Oct-21	EP2112543				7.29	6.5	4.2	2.3	Extreme	0.04	<0.005	0.03
BH98_A_0.75	18-Oct-21	EP2112543				7.04	6.9	4.6	2.3	Extreme	0.03	<0.005	0.03
BH98_A_1.0	18-Oct-21	EP2112543				6.79	6.5	4.5	2.0	Extreme	0.02	<0.005	0.02
BH98_A_3.25	18-Oct-21	EP2112543				4.54	6.0	4.3	1.7	Strong	0.02	<0.005	0.02
BH98_A_3.5	18-Oct-21	EP2112543	Clayey SAND: Grey with red mottling, fine to medium sand			4.29	6.1	4.0	2.1	Strong	0.03	<0.005	0.03
BH98_A_3.75	18-Oct-21	EP2112543				4.04	6.0	4.2	1.8	Strong	-	-	-
BH98_A_4.0	18-Oct-21	EP2112543				3.79	5.8	4.6	1.2	Strong	0.03	<0.005	0.03
BH98_A_4.25	18-Oct-21	EP2112543				3.54	5.6	4.9	0.7	Strong	0.02	<0.005	0.02
BH100_A_0.0	14-Sep-21	EP2110806	SAND: dark brown/red, fine to coarse with some organic	Dry	Dry	10.84	6.0	3.6	2.4	Strong	0.04	<0.005	0.04
BH100_A_0.25	14-Sep-21	EP2110806	matter			10.59	6.3	5.6	0.7	Strong	-	-	-
BH100_A_0.5	14-Sep-21	EP2110806	Shades to light brown/yellow, dark brown mottling			10.34	6.5	6.3	0.2	Strong	0.03	<0.005	0.04
BH100_A_0.75	14-Sep-21	EP2110806				10.09	6.7	6.5	0.2	Strong	-	-	-
BH100_A_1.0	14-Sep-21	EP2110806				9.84	6.6	5.9	0.7	Strong	0.03	<0.005	0.03
BH100_A_1.25	14-Sep-21	EP2110806	Shades to light brown, orange mottling with some organic			9.59	5.7	4.2	1.5	Slight	-	-	-
BH100_A_1.5	14-Sep-21	EP2110806	matter			9.34	5.3	4.5	0.8	Strong	0.05	<0.005	0.05
BH100_A_1.75	14-Sep-21	EP2110806				9.09	5.4	4.2	1.2	Slight	-	-	-
BH100_A_2.0	14-Sep-21	EP2110806				8.84	5.4	5.5	-0.1	Strong	0.04	<0.005	0.04
BH100_A_2.25	14-Sep-21	EP2110806				8.59	5.3	4.2	1.1	Slight	-	-	-
BH100_A_2.5	14-Sep-21	EP2110806				8.34	5.1	4.1	1.0	Slight	0.05	<0.005	0.05
BH100_A_2.75	14-Sep-21	EP2110806				8.09	5.4	4.2	1.2	Moderate	-	-	-
BH100_A_3.0	14-Sep-21	EP2110806	Grades to increased clay content, grey mottling, shades to incr			7.84	5.0	4.2	0.8	Moderate	0.05	<0.005	0.05
BH100_A_3.25	14-Sep-21	EP2110806				7.59	5.1	4.2	0.9	Moderate	-	-	-
BH100_A_3.5	14-Sep-21	EP2110806				7.34	5.7	4.5	1.2	Moderate	0.03	<0.005	0.03
BH100_A_3.75	14-Sep-21	EP2110806	Grades to cream, trace coffee rock (1cm-5cm)			7.09	5.8	4.5	1.3	Strong	-	-	-
BH100_A_4.0	14-Sep-21	EP2110806				6.84	6.6	4.8	1.8	Strong	0.05	<0.005	0.05
BH100_A_4.25	14-Sep-21	EP2110806	Grades to increasing clay, trace gravel			6.59	6.7	5.7	1.0	Strong	-	-	-
BH100_A_4.5	14-Sep-21	EP2110806				6.34	6.7	5.8	0.9	Strong	0.04	<0.005	0.04
BH100_A_4.75	14-Sep-21	EP2110806	Shades to yellow			6.09	6.2	4.8	1.4	Strong	-	-	-
BH100_A_5.0	14-Sep-21	EP2110806				5.84	6.3	4.9	1.4	Strong	0.04	<0.005	0.04

Table C-4 Positive ASS Results

			Field Measurements				pH				Actual Acidity	Potential Acidity	Acid Base Accounting
			Stratigraphy	DTW	DTW	Depth	pH F	pH FOX	Difference	Reaction Rate	Sulfidic - Titratable Actual Acidity	Chromium Reducible Sulfur	Net Acidity excluding ANC (sulfur units)
				mbgl	m AHD	RL mAHD	pH Unit	pH Unit	pH Unit	-	%S	%S	%S
EQL							0.1	0.1	-	-	0.02	0.005	0.02
Criteria - sand							4.0	4.0	1.0			0.03	0.03
Bassendean Sand								3.0					<0.03
Field ID	**Sampled Date**	**Lab Report Number**											
BH104_A_0.75	19-Oct-21	EP2112529/EP2114604	SILT: Black peat material			8.03	6.8	4.0	2.8	Extreme	0.02	<0.005	0.02
BH104_A_1.0	19-Oct-21	EP2112529				7.78	5.9	3.8	2.1	Extreme	0.08	0.006	0.09
BH104_A_1.25	19-Oct-21	EP2112529				7.53	6.1	3.9	2.2	Extreme	-	-	-
BH104_A_1.5	19-Oct-21	EP2112529				7.28	6.2	4.2	2.0	Extreme	0.05	<0.005	0.05
BH104_A_1.75	19-Oct-21	EP2112529				7.03	5.8	3.9	1.9	Extreme	-	-	-
BH104_A_2.0	19-Oct-21	EP2112529				6.78	6.1	4.7	1.4	Extreme	0.02	0.008	0.03
BH104_A_2.25	19-Oct-21	EP2112529/EP2114604	Silty SAND: Dark brown, fine sand	2.22	6.56	6.53	6.6	5.6	1.0	Extreme	0.02	<0.005	0.02
BH104_A_4.75	19-Oct-21	EP2112529/EP2114604	SILT: Dark brown			4.03	6.7	5.0	1.7	Extreme	0.02	<0.005	0.02
BH104_A_5.0	19-Oct-21	EP2112529				3.78	6.5	4.0	2.5	Extreme	0.02	0.013	0.04
BH104_A_5.25	19-Oct-21	EP2112529				3.53	6.6	3.7	2.9	Extreme	-	-	-
BH104_A_5.5	19-Oct-21	EP2112529				3.28	6.7	3.8	2.9	Extreme	0.04	0.018	0.06
BH104_A_5.75	19-Oct-21	EP2112529				3.03	6.5	3.6	2.9	Extreme	-	-	-
BH104_A_6.0	19-Oct-21	EP2112529				2.78	6.6	3.5	3.1	Extreme	0.04	0.009	0.05
BH105_A_3.75	14-Sep-21	EP2110809/EP2112980	SAND: grey, organic matter, trace limestone and gravels with dark brown mottles			5.15	6.8	5.5	1.3	Slight	0.02	<0.005	0.02
BH105_A_4.0	14-Sep-21	EP2110809	Shades to brown, orange mottling			4.90	6.9	5.6	1.3	Slight	0.03	<0.005	0.03
BH105_A_4.25	14-Sep-21	EP2110809		2.43	6.47	4.65	6.8	5.3	1.5	Slight	-	-	-
BH105_A_4.5	14-Sep-21	EP2110809				4.40	7.1	5.5	1.6	Slight	0.03	<0.005	0.03
BH105_A_4.75	14-Sep-21	EP2110809	Grades to increased clay content			4.15	6.8	5.4	1.4	Slight	-	-	-
BH105_A_5.0	14-Sep-21	EP2110809	Clayey SAND: brown/grey, low plasticity			3.90	7.1	5.4	1.7	Slight	0.02	0.005	0.03
BH112_A_1.25	13-Sep-21	EP2110726/EP2112980	Weathered COFFEE ROCK: Light brown, coarse sandRed mottling			30.08	6.6	4.6	2.0	Slight	0.02	<0.005	0.02
BH112_A_1.5	13-Sep-21	EP2110726				29.83	5.8	4.3	1.5	Slight	0.04	<0.005	0.04
BH112_A_1.75	13-Sep-21	EP2110726	Shades to red with light brown mottling			29.58	5.6	4.1	1.5	Slight	-	-	-
BH112_A_2.0	13-Sep-21	EP2110726				29.33	5.4	4.1	1.3	Slight	0.08	<0.005	0.09
BH112_A_2.25	13-Sep-21	EP2110726				29.08	5.3	4.0	1.3	Slight	-	-	-
BH112_A_2.5	13-Sep-21	EP2110726				28.83	5.3	3.9	1.4	Slight	0.1	<0.005	0.11
BH112_A_2.75	13-Sep-21	EP2110726		7.00	24.33	28.58	5.3	3.9	1.4	Slight	-	-	-
BH112_A_3.0	13-Sep-21	EP2110726	Grades to increasing clay content, shades to red withgrey/brown mottling			28.33	5.2	3.9	1.3	Slight	0.04	<0.005	0.04
BH112_A_3.25	13-Sep-21	EP2110726				28.08	5.1	3.8	1.3	Slight	-	-	-
BH112_A_3.5	13-Sep-21	EP2110726				27.83	5.1	3.8	1.3	Slight	0.05	<0.005	0.05
BH112_A_3.75	13-Sep-21	EP2110726	Grades to sand, shades to light brown			27.58	5.1	3.8	1.3	Slight	-	-	-
BH112_A_4.0	13-Sep-21	EP2110726				27.33	5.0	3.8	1.2	Slight	0.04	<0.005	0.04
BH139_A_2.0	19-Oct-21	EP2112530	Silty CLAY: Brown with red mottling			15.27	7.2	5.7	1.5	Slight	<0.02	0.005	<0.02
BH139_A_2.25	19-Oct-21	EP2112530				15.02	6.5	5.0	1.5	Slight	0.03	<0.005	0.03
BH139_A_2.5	19-Oct-21	EP2112530				14.77	6.3	4.9	1.4	Slight	0.03	<0.005	0.03
BH139_A_2.75	19-Oct-21	EP2112530	Silty CLAY: Light grey			14.52	6.1	4.7	1.4	Slight	0.02	<0.005	0.02
BH139_A_3.0	19-Oct-21	EP2112530				14.27	5.7	4.6	1.1	Slight	<0.02	<0.005	<0.02
BH139_A_3.25	19-Oct-21	EP2112530			Dry	14.02	5.6	4.4	1.2	Slight	0.05	<0.005	0.05
BH139_A_3.5	19-Oct-21	EP2112530				13.77	5.8	4.5	1.3	Slight	0.04	0.005	0.05
BH139_A_3.75	19-Oct-21	EP2112530				13.52	5.7	4.5	1.2	Slight	-	-	-
BH139_A_4.0	19-Oct-21	EP2112530	Sandy CLAY: Yellow to brown, fine to medium sand			13.27	5.9	4.6	1.3	Slight	0.05	0.006	0.05
BH139_A_4.25	19-Oct-21	EP2112530				13.02	5.7	4.5	1.2	Slight	0.03	<0.005	0.03
BH139_A_4.5	19-Oct-21	EP2112530				12.77	5.8	4.5	1.3	Slight	<0.02	<0.005	<0.02

Table C-5: Analytical Results
Surface Water

			Metals																								
			Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Calcium (filtered)	Cadmium	Cadmium (filtered)	Chromium (hexavalent)	Chromium (hexavalent) (filtered)	Chromium (III+VI)	Chromium (III+VI) (filtered)	Copper	Copper (filtered)	Iron	Iron (filtered)	Magnesium (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Molybdenum	Molybdenum (filtered)	Nickel
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			5	5	0.2	0.2	1,000	0.05	0.05	1	1	0.2	0.2	0.5	0.5	2	2	1,000	0.1	0.1	0.5	0.5	0.04	0.04	0.1	0.1	0.5
PFAS NEMP (2020) Freshwater 95%																											
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs																									34	34	
ANZG (2018) Freshwater 95% toxicant DGVs			55	55				0.2	0.2	0.4	0.4			1.4	1.4				3.4	3.4	1,900	1,900	0.6	0.6			11
Field ID	**Date**	**Lab Report Number**																									
SW07	27-Aug-21	EP2109968	220	<10	<1	<1	-	<0.1	<0.1	-	-	<1	<1	<1	4	4,410	300	-	<1	<1	175	163	<0.1	<0.1	-	-	1
	01-Oct-21	EP2111722	180	30	<1	<1	-	<0.1	<0.1	-	-	<1	<1	<1	2	4,540	110	-	<1	<1	203	205	<0.1	<0.1	-	-	-
	13-Oct-21	EP2112250	226	<5	0.3	<0.2	39,000	<0.05	<0.05	<5	<1	0.4	<0.2	1.2	0.6	4,950	229	33,000	0.4	<0.1	160	149	<0.04	<0.04	0.3	0.2	0.8
	23-Nov-21	EP2114367	600	20	<1	<1	-	<0.1	<0.1	-	-	<1	<1	<1	<1	6,330	590	-	1	<1	861	440	<0.1	<0.1	-	-	1
	23-Nov-21	EP2114367	600	20	<1	<1	-	<0.1	<0.1	-	-	<1	<1	<1	<1	6,330	590	-	1	<1	861	440	<0.1	<0.1	-	-	1
	17-Dec-21	EP2115758	190	<10	<1	<1	-	<0.1	<0.1	-	-	<1	<1	<1	<1	4,220	90	-	<1	<1	1,170	126	<0.1	<0.1	-	-	<1
SW08	27-Aug-21	EP2109968	210	<10	<1	<1	-	<0.1	<0.1	-	-	<1	<1	<1	4	4,300	340	-	<1	<1	164	158	<0.1	<0.1	-	-	<1
	01-Oct-21	EP2111722	1,130	<10	<1	<1	-	<0.1	<0.1	-	-	1	<1	2	2	8,010	140	-	3	<1	294	218	<0.1	<0.1	-	-	1
	13-Oct-21	EP2112250	155	<5	0.3	<0.2	39,000	<0.05	<0.05	<5	<1	0.5	<0.2	0.6	1.7	4,770	293	33,000	0.3	<0.1	155	146	<0.04	<0.04	0.3	0.3	0.8
	23-Nov-21	EP2114367	9,420	20	2	<1	-	0.1	<0.1	-	-	12	<1	31	<1	31,400	650	-	27	<1	1,810	579	<0.1	<0.1	-	-	9
	23-Nov-21	EP2114367	9,420	20	2	<1	-	0.1	<0.1	-	-	12	<1	31	<1	31,400	650	-	27	<1	1,810	579	<0.1	<0.1	-	-	9
	17-Dec-21	EP2115758	1,060	10	<1	<1	-	<0.1	<0.1	-	-	1	<1	2	<1	6,270	100	-	3	<1	676	388	<0.1	<0.1	-	-	1

Table C-5: Analytical Results
Surface Water

										TRH							BTEX										
			Nickel (filtered)	Phosphorus	Potassium (filtered)	Selenium	Selenium (filtered)	Silver	Zinc	Zinc (filtered)	C6-C10	>C6-C10 less BTEX (F1)	C10-C16	>C10-C16 less Naphthalene (F2)	C16-C34	C34-C40	>C10 - C40 (Sum of total)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.5	10	1,000	0.2	0.2	0.1	1	1	20	20	100	100	100	100	100	1	1	1	1	1	1	1	1	1	1
PFAS NEMP (2020) Freshwater 95%																											
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs																			180	80							30
ANZG (2018) Freshwater 95% toxicant DGVs			11			11	11	0.05	8	8								950	180	80		350					
Field ID	**Date**	**Lab Report Number**																									
SW07	27-Aug-21	EP2109968	1	-	-	<10	<10	-	8	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	<10	<10	-	<5	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	0.6	-	8,000	<0.2	<0.2	<0.1	4	2	<20	<20	<100	<100	<100	<100	<100	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	23-Nov-21	EP2114367	<1	50	-	<10	<10	-	<5	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	<1	50	-	<10	<10	-	<5	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	<1	70	-	<10	<10	-	<5	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	<1	-	-	<10	<10	-	11	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	<1	-	-	<10	<10	-	10	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	0.7	-	8,000	<0.2	<0.2	<0.1	4	3	<20	<20	<100	<100	<100	<100	<100	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	23-Nov-21	EP2114367	<1	460	-	<10	<10	-	161	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	<1	460	-	<10	<10	-	161	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	<1	60	-	<10	<10	-	10	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

			MAH						Hydrocarbon Gases	Pesticides																
			n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	Methane	Haloxyfop	Azoxystrobin	Brodifacoum	Carfentrazone-ethyl	Fenoxycarb	Fipronil	Fluproponate	Imazapyr	Indoxacarb	Metalaxyl-M	Metaldehyde	Nicarbazin	Pyrasulfotole	Pyroxsulam	Spirotetramat	Toltrazuril	Avermectin
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			1	1	1	1	1	1	10	0.1	0.1	0.05	0.1	0.1	0.01	0.1	10	0.1	0.1	10	0.1	0.1	0.1	0.1	0.1	0.1
PFAS NEMP (2020) Freshwater 95%																										
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs																										
ANZG (2018) Freshwater 95% toxicant DGVs																										
Field ID	**Date**	**Lab Report Number**																								
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<1	<1	<1	<1	<1	<1	15	<0.1	<0.1	<0.05	<0.1	<0.1	<0.01	<0.1	<10.0	<0.1	<0.1	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<1	<1	<1	<1	<1	<1	16	<0.1	<0.1	<0.05	<0.1	<0.1	<0.01	<0.1	<10.0	<0.1	<0.1	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

			Pesticides by LCMSMS (Positive)																									
			Londax	Imidacloprid	Pyriproxyfen	Dichlorprop-P	Diflufenican	Aminopyralid	Novaluron	Penconazole	Pyraclostrobin	Rimsulfuron	Siduron	Pyrimethanil	Propamocarb	Bensulide	Boscalid	Atrazine-desethyl	Atrazine-desisopropyl	Cyproconazole	Hexaconazole	Irgarol	Iodosulfuron methyl	Quinclorac	Tetraconazole	Trinexapac Ethyl	Trifloxystrobin
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.1	0.01	0.1	0.1	0.02	0.1	0.1	0.01	0.1	0.1	0.1	0.02	0.1	0.1	0.1	0.1	0.1	0.02	0.02	0.002	0.1	0.1	0.1	1	0.1
PFAS NEMP (2020) Freshwater 95%																												
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs																												
ANZG (2018) Freshwater 95% toxicant DGVs																												
Field ID	**Date**	**Lab Report Number**																										
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.1	<0.01	<0.1	<0.1	<0.02	<0.1	<0.1	<0.01	<0.1	<0.1	<0.1	<0.02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.002	<0.1	<0.1	<0.1	<1	<0.1
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.1	<0.01	<0.1	<0.1	<0.02	<0.1	<0.1	<0.01	<0.1	<0.1	<0.1	<0.02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.002	<0.1	<0.1	<0.1	<1	<0.1
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

				Regulated PFAS					PFAS																		
			Trifloxysulfuron-sodium	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctanesulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	Sum of PFHxS and PFOS	Sum of PFAS	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	Sum of WA DWER PFAS (n=10)*	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	N-Ethyl perfluorooctane sulfonamide (NEtFOSA)	N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE)	N-Methyl perfluorooctane sulfonamide (NMeFOSA)	N-methylperfluorooctane sulfonamidoacetic acid (NMeFOSAA)	N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	Perfluorobutane sulfonic acid (PFBS)	Perfluorobutanoic acid (PFBA)	Perfluorodecanesulfonic acid (PFDS)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanoic acid (PFHxA)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.1	0.0005	0.0002	0.0005	0.0002	0.0002	0.001	0.0002	0.001	0.001	0.001	0.001	0.0005	0.001	0.001	0.0005	0.001	0.0005	0.002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
PFAS NEMP (2020) Freshwater 95%					0.13	220																					
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs																											
ANZG (2018) Freshwater 95% toxicant DGVs																											
Field ID	**Date**	**Lab Report Number**																									
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.1	0.0269	0.0585	0.0132	0.0854	0.234	<0.001	0.230	0.002	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0054	0.0373	<0.0005	<0.0005	<0.0005	<0.0005	0.0114	0.0278
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.1	0.0267	0.0644	0.0125	0.0911	0.171	<0.001	0.165	0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	0.0048	0.0126	<0.0005	<0.0005	<0.0005	0.0020	0.0071	0.0162
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

									PAH																			
			Perfluorononanoic acid (PFNA)	Perfluorooctane sulfonamide (PFOSA)	Perfluoropentane sulfonic acid (PFPeS)	Perfluoropentanoic acid (PFPeA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a)pyrene TEQ calc (Zero)	Benzo(g,h,i)perylene	Benzo(b+j)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.02	0.02	0.02	0.02	0.005	0.005	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.005
PFAS NEMP (2020) Freshwater 95%																												
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs												0.1		0.1							1				0.6			
ANZG (2018) Freshwater 95% toxicant DGVs																								16				
Field ID	**Date**	**Lab Report Number**																										
SW07	27-Aug-21	EP2109968																										
	01-Oct-21	EP2111722																										
	13-Oct-21	EP2112250	<0.0005	0.0006	0.0036	0.0475	<0.0005	<0.0005	<0.0005	<0.02	<0.02	<0.02	<0.02	<0.005	<0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.005
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.0005	0.0006	0.0037	0.0193	<0.0005	<0.0005	<0.0005	<0.02	<0.02	<0.02	<0.02	<0.005	<0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.005
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

			Alkalinity				Inorganics																				Ke	
			Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Ammonia as N	Anions Total	Cations Total	Chloride	Electrical conductivity *(lab)	Ferrous Iron	Ionic Balance	Kjeldahl Nitrogen Total	Nitrate (as N)	Nitrite (as N)	Nitrite + Nitrate as N	Nitrogen (Total)	pH (Lab)	Reactive Phosphorus as P	Filtered Total Phosphorus as P	Sulfate as SO4 - Turbidimetric (filtered)	Sodium (filtered)	Sulphide	TSS	1,1-dichloroethene	cis-1,2-dichloroethene
			µg/L	µg/L	µg/L	µg/L	µg/L	meq/L	meq/L	µg/L	uS/cm	µg/L	%	µg/L	µg/L	µg/L	µg/L	µg/L	pH_Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			1,000	1,000	1,000	1,000	10	0.01	0.01	1,000	1	50	0.01	100	10	10	10	100	0.01	10	10	1,000	1,000	100	5,000	1	1
PFAS NEMP (2020) Freshwater 95%																												
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs																										700		
ANZG (2018) Freshwater 95% toxicant DGVs							900																					
Field ID	**Date**	**Lab Report Number**																										
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	600	-	-	110	700	-	-	20	-	-	-	<5,000	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	600	-	-	70	700	-	-	40	-	-	-	<5,000	-	-
	13-Oct-21	EP2112250	134,000	<1,000	<1,000	134,000	230	14.8	12.4	398,000	1,400	140	8.68	600	90	10	100	700	7.50	<10	20	43,000	174,000	<100	-	<1	<1
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	1,300	-	-	40	1,300	-	-	-	-	-	-	14,000	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	1,300	-	-	40	1,300	-	-	-	-	-	-	14,000	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	1,400	-	-	40	1,400	-	-	-	-	-	-	14,000	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	600	-	-	110	700	-	-	20	-	-	-	<5,000	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	900	-	-	60	1,000	-	-	80	-	-	-	34,000	-	-
	13-Oct-21	EP2112250	134,000	<1,000	<1,000	134,000	240	14.9	12.4	402,000	1,400	220	9.23	600	120	10	130	700	7.46	<10	10	43,000	173,000	<100	-	<1	<1
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	4,100	-	-	40	4,100	-	-	-	-	-	-	267,000	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	4,100	-	-	40	4,100	-	-	-	-	-	-	267,000	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	900	-	-	30	900	-	-	-	-	-	-	43,000	-	-

Table C-5: Analytical Results
Surface Water

			y Chlorinated Hydrocarbons				Organics	Chlorinated Hydrocarbons																			
			Tetrachloroethene	Trichloroethene	trans-1,2-dichloroethene	Vinyl chloride	BOD	1,1,2,2-tetrachloroethane	1,1,1,2-tetrachloroethane	1,1,2-trichloroethane	1,1,1-trichloroethane	1,1-dichloroethane	1,1-dichloropropene	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromodichloromethane	Bromochloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			1	1	1	0.05	2,000	1	1	1	1	1	1	1	1	0.05	1	1	1	1	1	1	0.02	1	10	1	10
PFAS NEMP (2020) Freshwater 95%																											
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs			70			100		400		330	270					1,900	900	1,100					240			370	
ANZG (2018) Freshwater 95% toxicant DGVs										6,500																	
Field ID	**Date**	**Lab Report Number**																									
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<1	<1	<1	<0.050	3,000	<1	<1	<1	<1	<1	<1	<1	<1	<0.05	<1	<1	<1	<1	<1	<1	<0.02	<1	<10	<1	<10
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<1	<1	<1	<0.050	5,000	<1	<1	<1	<1	<1	<1	<1	<1	<0.05	<1	<1	<1	<1	<1	<1	<0.02	<1	<10	<1	<10
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

																										Org
			cis-1,3-dichloropropene	Dibromomethane	Dichloromethane	Hexachlorobutadiene	trans-1,3-dichloropropene	Acephate	Azinophos methyl	Bolstar (Sulprofos)	Bromophos-ethyl	Carbophenothion	Azinphos Ethyl	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-O & Demeton-S	Demeton-S	Demeton-S-methyl	Diazinon	Dichlorvos	Dimethoate	Disulfoton	Ethoprop	Ethion
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			2	1	0.2	0.5	2	0.5	0.02	0.05	0.1	0.02	0.02	0.02	0.02	0.2	0.01	0.02	0.02	0.02	0.02	0.01	0.2	0.02	0.05	0.01	0.02
PFAS NEMP (2020) Freshwater 95%																											
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs					4,000															0.04	4						
ANZG (2018) Freshwater 95% toxicant DGVs									0.02						0.01							0.01		0.15			
Field ID	**Date**	**Lab Report Number**																									
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<2	<1	<0.2	<0.5	<2	<0.5	<0.02	<0.05	<0.10	<0.02	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.20	<0.02	<0.05	<0.01	<0.02
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<2	<1	<0.2	<0.5	<2	<0.5	<0.02	<0.05	<0.10	<0.02	<0.02	<0.02	<0.02	<0.2	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.20	<0.02	<0.05	<0.01	<0.02
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

	anophosphorous Pesticides																							
	Fensulfothion	Fenamiphos	Fenitrothion	Fenthion	EPN	Malathion	Methidathion	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Omethoate	Parathion	Phorate	Pirimphos-ethyl	Pyrazophos	Prothiofos	Ronnel	Terbufos	Thiometon	Trichloronate	Tetrachlorvinphos	Triazophos	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.01	0.01	2	0.05	0.05	0.02	0.1	2	0.02	0.02	0.01	0.2	0.1	0.01	0.1	0.1	10	0.01	0.5	0.5	0.01	0.005	1	1	1
PFAS NEMP (2020) Freshwater 95%																									
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs																							0.5		
ANZG (2018) Freshwater 95% toxicant DGVs			0.2			0.05						0.004												20	160
Field ID	**Date**	**Lab Report Number**																								
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.01	<0.01	<2	<0.05	<0.05	<0.02	<0.1	<2.0	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.1	<0.1	<10	<0.01	<0.5	<0.5	<0.01	<0.005	<1.0	<1.0	<1.0
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.01	<0.01	<2	<0.05	<0.05	<0.02	<0.1	<2.0	<0.02	<0.02	<0.01	<0.2	<0.1	<0.01	<0.1	<0.1	<10	<0.01	<0.5	<0.5	<0.01	<0.005	<1.0	<1.0	<1.0
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

			Phenols										Organochlorine Pesticides															
			2,4-dimethylphenol	2,6-dichlorophenol	2-chlorophenol	2-nitrophenol	2-methylphenol	3&4-Methylphenol (m&p-cresol)	4-chloro-3-methylphenol	Pentachlorophenol	Phenol	Picloram	a-BHC	Aldrin	Dieldrin	Aldrin + Dieldrin	b-BHC	chlordane	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	4,4-DDE	DDT	DDT+DDE+DDD	Endosulfan	Endrin ketone
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			1	1	1	1	1	2	1	2	1	10	0.002	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002
PFAS NEMP (2020) Freshwater 95%																												
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs			2	34		2								0.001	0.01								0.03					
ANZG (2018) Freshwater 95% toxicant DGVs					490					10	320							0.08						0.01		0.2		
Field ID	**Date**	**Lab Report Number**																										
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0	<10	<0.002	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<2.0	<1.0	<10	<0.002	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

												PCBs															
			Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Oxychlordane	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	3-Hydroxy Carbofuran	Aldicarb	Amitraz	Bendiocarb	Carbaryl	Carbofuran	Cyromazine
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.02	0.05	100	0.1	0.01	0.01	0.05
PFAS NEMP (2020) Freshwater 95%																											
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs											0.005																
ANZG (2018) Freshwater 95% toxicant DGVs						0.02		0.2	0.09							0.6		0.03								1.2	
Field ID	**Date**	**Lab Report Number**																									
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.02	<0.05	<100	<0.10	<0.01	<0.01	<0.05
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.02	<0.05	<100	<0.10	<0.01	<0.01	<0.05
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

			Pesticides																									
			Diflubenzuron	Formothion	Methomyl	Oxamyl	Pirimicarb	Pirimiphos-methyl	Profenofos	Promecarb	Propargite	Sulfotepp	Temephos	Trichlorfon	Thiodicarb	Thiamethoxam	Chloroxuron	Metribuzin	Oryzalin	2,4,5-Trichlorophenoxy Acetic Acid	2,4,5-TP (Silvex)	2,4-D	Propachlor	2,4-Dichlorprop	2,6-Dichlorophenoxyacetic Acid (2,6-D)	Vernolate	2,4,6-Trichlorophenoxy-acetic acid
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.1	20	0.01	0.01	0.1	0.01	0.01	0.1	0.1	0.005	0.02	0.02	0.01	0.02	0.1	0.02	0.05	10	10	10	0.1	10	10	0.1	10
PFAS NEMP (2020) Freshwater 95%																												
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs									0.02				0.05															
ANZG (2018) Freshwater 95% toxicant DGVs					3.5															36		280						
Field ID	**Date**	**Lab Report Number**																										
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.1	<20	<0.01	<0.01	<0.1	<0.01	<0.01	<0.1	<0.1	<0.005	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.05	<10	<10	<10	<0.1	<10	<10	<0.1	<10
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.1	<20	<0.01	<0.01	<0.1	<0.01	<0.01	<0.1	<0.1	<0.005	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.05	<10	<10	<10	<0.1	<10	<10	<0.1	<10
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

			Herbicides																									
			4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	4-Chlorophenoxyacetic acid	Ametryn	Asulam	Atrazine	Bromacil	Bromoxynil	Butachlor	Chlorsulfuron	Clopyralid	Cyanazine	Dicamba	Diclofop-methyl	Diphenamid	Diuron	Endothall	s-Ethyl dipropylthiocarbamate	Flamprop-methyl	Fluometuron	Fluroxypyr	Hexaflurate	Hexazinone	Isoproturon	2-Methyl-4-chlorophenoxyacetic acid	2-Methyl-4-Chlorophenoxy Butanoic Acid
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			10	10	0.01	2	0.01	0.02	0.05	0.1	0.2	10	0.02	10	0.05	0.1	0.02	1	0.1	0.1	0.01	10	0.1	0.02	0.1	10	10
PFAS NEMP (2020) Freshwater 95%																												
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs								180																		1.4		
ANZG (2018) Freshwater 95% toxicant DGVs							13																					
Field ID	**Date**	**Lab Report Number**																										
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<10	<10	<0.01	<2	<0.01	<0.02	<0.05	<0.1	<0.2	<10	<0.02	<10	<0.05	<0.1	<0.02	<1.0	<0.1	<0.1	<0.01	<10	<0.1	<0.02	<0.1	<10	<10
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<10	<10	<0.01	<2	<0.01	<0.02	<0.05	<0.1	<0.2	<10	<0.02	<10	<0.05	<0.1	<0.02	<1.0	<0.1	<0.1	<0.01	<10	<0.1	<0.02	<0.1	<10	<10
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

			Mecoprop	Metachlor	Metolachlor	Molinate	Napropamide	Nitralin	Norflurazon	Oxyfluorfen	Pebulate	Pendimethalin	Prometryn	Pronamide	Propanil	Propazine	Simazine	Tebuthiuron	Terbacil	Terbutryn	Terbutylazine	Thiobencarb	Triclopyr	Trifluralin	1,2-dibromoethane	cis-1,4-Dichloro-2-butene	trans-1,4-Dichloro-2-butene
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			10	0.1	0.01	0.1	0.1	0.1	0.1	1	0.1	0.05	0.01	0.1	0.1	0.01	0.02	0.02	0.1	0.01	0.01	0.01	10	10	1	1	1
PFAS NEMP (2020) Freshwater 95%																											
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs																											
ANZG (2018) Freshwater 95% toxicant DGVs						3.4											3.2	2.2				2.8		4.4			
Field ID	**Date**	**Lab Report Number**																									
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<10	<0.1	<0.01	<0.1	<0.1	<0.1	<0.1	<1.0	<0.1	<0.05	<0.01	<0.1	<0.1	<0.01	0.27	<0.02	<0.1	<0.01	<0.01	<0.01	<10	<10.0	<1	<1	<1
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<10	<0.1	<0.01	<0.1	<0.1	<0.1	<0.1	<1.0	<0.1	<0.05	<0.01	<0.1	<0.1	<0.01	0.28	<0.02	<0.1	<0.01	<0.01	<0.01	<10	<10.0	<1	<1	<1
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

			alogenated Hydrocarbons					Halogenated Benzenes											Solvents					VOCs		Oth	
			Pentachloroethane	Bromomethane	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Chlorobenzene	Hexachlorobenzene	Trichlorobenzene (total)	Methyl Ethyl Ketone	2-hexanone (MBK)	4-Methyl-2-pentanone	Carbon disulfide	Vinyl acetate	1,3-Dichloropropene	Trihalomethanes	Naphthalophos	Acidity (as CaCO3)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			1	10	10	1	10	1	1	1	1	0.1	1	1	1	1	0.002	1	10	10	10	1	10	2	1	1	1,000
PFAS NEMP (2020) Freshwater 95%																											
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs			80													55	0.05					20		0.1			
ANZG (2018) Freshwater 95% toxicant DGVs								10	170	160	260	60															
Field ID	**Date**	**Lab Report Number**																									
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<1	<10	<10	<1	<10	<1	<1	<1	<1	<0.1	<1	<1	<1	<1	<0.002	<1	<10	<10	<10	<1	<10	<2	<1	<1.0	8,000
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<1	<10	<10	<1	<10	<1	<1	<1	<1	<0.1	<1	<1	<1	<1	<0.002	<1	<10	<10	<10	<1	<10	<2	<1	<1.0	9,000
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-5: Analytical Results
Surface Water

			ıer		Biological	Carbamates	Fungicides																	
			Chlorantraniliprole	Triadimenol	E. Coli	Methiocarb	Cyprodinil	Benomyl	Carbendazim	Carboxin	Chlorothalonil	Difenoconazole	Etridiazole	Fenarimol	Fosetyl-al	Iprodione	Metalaxyl	Flusilazole (NuStar)	Paclobutrazol	Prochloraz	Propiconazole	Systhane	Triadimefon	Tebuconazole
			µg/L	µg/L	cfu/100 ml	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.1	0.1	1	0.01	0.01	0.01	0.1	0.1	2	0.02	0.5	0.02	10	0.05	0.1	0.02	0.05	0.1	0.05	0.1	0.1	0.01
PFAS NEMP (2020) Freshwater 95%																								
ANZG (2018) Freshwater (unknown reliability) toxicant DGVs																								
ANZG (2018) Freshwater 95% toxicant DGVs																								
Field ID	**Date**	**Lab Report Number**																						
SW07	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.1	<0.1	340	<0.01	<0.01	<0.01	<0.1	<0.1	<2	<0.02	<0.5	<0.02	<10	<0.05	<0.1	<0.02	<0.05	<0.1	<0.05	<0.1	<0.1	<0.01
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	27-Aug-21	EP2109968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	01-Oct-21	EP2111722	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13-Oct-21	EP2112250	<0.1	<0.1	360	<0.01	<0.01	<0.01	<0.1	<0.1	<2	<0.02	<0.5	<0.02	<10	<0.05	<0.1	<0.02	<0.05	<0.1	<0.05	<0.1	<0.1	<0.01
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23-Nov-21	EP2114367	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17-Dec-21	EP2115758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX D – LABORATORY CERTIFICATES

D-1 Laboratory Certificates

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2109375

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: GEHBI - WP4 **Client:** ARCADIS **Project Manager:** Bronwyn Van. V.
Phone: (0408 751 386)

ALS Compass COC Reference: 26476 **# Samples:** 40 **Sampler:** S Babra
Phone: (04 04 163 073)

Turnaround Requirements: Standard x Urgent

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
Date / Time: 17/08/21	Date / Time: 1120 17/08/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: **26476** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: ND 1120 17/08	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH147_A_0.0		17/08/2021 12:02 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH147_A_0.25		17/08/2021 12:03 AM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH147_A_0.5		17/08/2021 12:03 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH147_A_0.75		17/08/2021 12:03 AM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH147_A_1.0		17/08/2021 12:03 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH147_A_1.25		17/08/2021 12:03 AM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH147_A_1.5		17/08/2021 12:04 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH147_A_1.75		17/08/2021 12:04 AM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH147_A_2.0		17/08/2021 12:04 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

COC#: **26476** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH147_A_2.25		17/08/2021 12:04 AM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH147_A_2.5		17/08/2021 12:05 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
012	BH147_A_2.75		17/08/2021 12:05 AM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH147_A_3.0		17/08/2021 12:05 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
014	BH147_A_3.25		17/08/2021 12:06 AM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH147_A_3.5		17/08/2021 12:06 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
016	BH147_A_3.75		17/08/2021 12:06 AM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH147_A_4.0		17/08/2021 12:06 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
018	BH147_A_4.25		17/08/2021 12:07 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: **26476** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH147_A_4.5		17/08/2021 12:07 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
020	BH147_A_4.75		17/08/2021 12:07 AM	Soil	ALS: 1 Non ALS: 0	No	X			
021	BH147_A_5.0		17/08/2021 12:07 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
022	BH147_A_5.25		17/08/2021 12:08 AM	Soil	ALS: 1 Non ALS: 0	No	X			
023	BH147_A_5.5		17/08/2021 12:08 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
024	BH147_A_5.75		17/08/2021 12:10 AM	Soil	ALS: 1 Non ALS: 0	No	X			
025	BH147_A_6.0		17/08/2021 12:10 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
026	SQC012_A		17/08/2021 12:10 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
027	BH32_A_0.0		17/08/2021 12:43 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 26476 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
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CONTACT PH:
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SAMPLER MOBILE:
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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH32_A_0.25		17/08/2021 12:43 AM	Soil	ALS: 1 Non ALS: 0	No	X			
029	BH32_A_0.5		17/08/2021 12:43 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
030	BH32_A_0.75		17/08/2021 12:43 AM	Soil	ALS: 1 Non ALS: 0	No	X			
031	BH32_A_1.0		17/08/2021 12:43 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
032	BH32_A_1.25		17/08/2021 12:44 AM	Soil	ALS: 1 Non ALS: 0	No	X			
033	BH32_A_1.5		17/08/2021 12:44 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
034	BH32_A_1.75		17/08/2021 12:44 AM	Soil	ALS: 1 Non ALS: 0	No	X			
035	BH32_A_2.0		17/08/2021 12:44 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
036	BH32_A_2.25		17/08/2021 12:44 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: **26476** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
037	BH32_A_2.5		17/08/2021 12:45 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
038	BH32_A_2.75		17/08/2021 12:45 AM	Soil	ALS: 1 Non ALS: 0	No	X			
039	BH32_A_3.0		17/08/2021 12:45 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
040	SQC013_A		17/08/2021 12:46 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 26476 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
/ EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH147_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621023492	Green	No	
002	BH147_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621023493	Green	No	
003	BH147_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621023494	Green	No	
004	BH147_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621023495	Green	No	
005	BH147_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621023496	Green	No	
006	BH147_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621023497	Green	No	
007	BH147_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621023498	Green	No	
008	BH147_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621023499	Green	No	
009	BH147_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621023500	Green	No	
010	BH147_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621023501	Green	No	
011	BH147_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621023502	Green	No	
012	BH147_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621023503	Green	No	
013	BH147_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621023504	Green	No	
014	BH147_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621023505	Green	No	
015	BH147_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621023422	Green	No	
016	BH147_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621023423	Green	No	
017	BH147_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621023424	Green	No	
018	BH147_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621023425	Green	No	
019	BH147_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621023426	Green	No	
020	BH147_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621023427	Green	No	
021	BH147_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621023428	Green	No	
022	BH147_A_5.25	Snap Lock Bag - frozen	1 Medium	00130621023429	Green	No	
023	BH147_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621023430	Green	No	
024	BH147_A_5.75	Snap Lock Bag - frozen	1 Medium	00130621023431	Green	No	
025	BH147_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621023432	Green	No	
026	SQC012_A	Snap Lock Bag - frozen	1 Medium	00130621023433	Green	No	

CHAIN OF CUSTODY

ALS COC#: **26476** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
/ EP2021HYDCON0003

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EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

027	BH32_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621023654	Green	No	
028	BH32_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621023481	Green	No	
029	BH32_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621023483	Green	No	
030	BH32_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621023484	Green	No	
031	BH32_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621023485	Green	No	
032	BH32_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621023486	Green	No	
033	BH32_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621023487	Green	No	
034	BH32_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621023488	Green	No	
035	BH32_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621023489	Green	No	
036	BH32_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621023490	Green	No	
037	BH32_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621023491	Green	No	
038	BH32_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621023434	Green	No	
039	BH32_A_3.0	Snap Lock Bag - frozen	1 Small	00130621023506	Green	No	
040	SQC013_A	Snap Lock Bag - frozen	1 Medium	00130621023507	Green	No	

Total Bottle Count: ALS: 40, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2109375**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 26476	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP4		
Sampler	: BRONWYN VAN VALKENGOED		

Dates

Date Samples Received	: 17-Aug-2021 11:20	Issue Date	: 18-Aug-2021
Client Requested Due Date	: 01-Sep-2021	Scheduled Reporting Date	: **01-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 11	Temperature	: 4.7 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 40 / 40

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2109375-001	17-Aug-2021 00:02	BH147_A_0.0	✓	✓
EP2109375-002	17-Aug-2021 00:03	BH147_A_0.25		✓
EP2109375-003	17-Aug-2021 00:03	BH147_A_0.5	✓	✓
EP2109375-004	17-Aug-2021 00:03	BH147_A_0.75		✓
EP2109375-005	17-Aug-2021 00:03	BH147_A_1.0	✓	✓
EP2109375-006	17-Aug-2021 00:03	BH147_A_1.25		✓
EP2109375-007	17-Aug-2021 00:04	BH147_A_1.5	✓	✓
EP2109375-008	17-Aug-2021 00:04	BH147_A_1.75		✓
EP2109375-009	17-Aug-2021 00:04	BH147_A_2.0	✓	✓
EP2109375-010	17-Aug-2021 00:04	BH147_A_2.25		✓
EP2109375-011	17-Aug-2021 00:05	BH147_A_2.5	✓	✓
EP2109375-012	17-Aug-2021 00:05	BH147_A_2.75		✓
EP2109375-013	17-Aug-2021 00:05	BH147_A_3.0	✓	✓
EP2109375-014	17-Aug-2021 00:06	BH147_A_3.25		✓
EP2109375-015	17-Aug-2021 00:06	BH147_A_3.5	✓	✓
EP2109375-016	17-Aug-2021 00:06	BH147_A_3.75		✓
EP2109375-017	17-Aug-2021 00:06	BH147_A_4.0	✓	✓
EP2109375-018	17-Aug-2021 00:07	BH147_A_4.25		✓
EP2109375-019	17-Aug-2021 00:07	BH147_A_4.5	✓	✓
EP2109375-020	17-Aug-2021 00:07	BH147_A_4.75		✓
EP2109375-021	17-Aug-2021 00:07	BH147_A_5.0	✓	✓
EP2109375-022	17-Aug-2021 00:08	BH147_A_5.25		✓
EP2109375-023	17-Aug-2021 00:08	BH147_A_5.5	✓	✓
EP2109375-024	17-Aug-2021 00:10	BH147_A_5.75		✓
EP2109375-025	17-Aug-2021 00:10	BH147_A_6.0	✓	✓
EP2109375-026	17-Aug-2021 00:10	SQC012_A	✓	✓
EP2109375-027	17-Aug-2021 00:43	BH32_A_0.0	✓	✓
EP2109375-028	17-Aug-2021 00:43	BH32_A_0.25		✓
EP2109375-029	17-Aug-2021 00:43	BH32_A_0.5	✓	✓
EP2109375-030	17-Aug-2021 00:43	BH32_A_0.75		✓
EP2109375-031	17-Aug-2021 00:43	BH32_A_1.0	✓	✓
EP2109375-032	17-Aug-2021 00:44	BH32_A_1.25		✓
EP2109375-033	17-Aug-2021 00:44	BH32_A_1.5	✓	✓
EP2109375-034	17-Aug-2021 00:44	BH32_A_1.75		✓
EP2109375-035	17-Aug-2021 00:44	BH32_A_2.0	✓	✓

			SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2109375-036	17-Aug-2021 00:44	BH32_A_2.25		✓
EP2109375-037	17-Aug-2021 00:45	BH32_A_2.5	✓	✓
EP2109375-038	17-Aug-2021 00:45	BH32_A_2.75		✓
EP2109375-039	17-Aug-2021 00:45	BH32_A_3.0	✓	✓
EP2109375-040	17-Aug-2021 00:46	SQC013_A	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ARCADIS ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Carina Andersen

- A4 - AU Tax Invoice (INV)	Email	carina.andersen@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2109375**	Page	: 1 of 10
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 17-Aug-2021 11:20
Order number	: 30058301	Date Analysis Commenced	: 18-Aug-2021
C-O-C number	: 26476	Issue Date	: 31-Aug-2021 10:36
Sampler	: BRONWYN VAN VALKENGOED, Shimona Babra		
Site	: GEHBI - WP4		
Quote number	: EP/529/21_V4		
No. of samples received	: 40		
No. of samples analysed	: 40		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required for particular samples because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH147_A_0.0	BH147_A_0.25	BH147_A_0.5	BH147_A_0.75	BH147_A_1.0
			Sampling date / time	17-Aug-2021 00:02	17-Aug-2021 00:03	17-Aug-2021 00:03	17-Aug-2021 00:03	17-Aug-2021 00:03
Compound	CAS Number	LOR	Unit	EP2109375-001	EP2109375-002	EP2109375-003	EP2109375-004	EP2109375-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.4**	----	**9.4**	----	**8.4**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**4.37**	----	**0.61**	----	**0.27**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**873**	----	**122**	----	**54**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**1.40**	----	**0.20**	----	**0.09**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	**1.5**	----	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.2**	**8.3**	**8.1**	**7.9**	**7.8**
pH (Fox)	----	0.1	pH Unit	**5.8**	**6.0**	**6.0**	**6.0**	**6.1**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH147_A_1.25	BH147_A_1.5	BH147_A_1.75	BH147_A_2.0	BH147_A_2.25
			Sampling date / time	17-Aug-2021 00:03	17-Aug-2021 00:04	17-Aug-2021 00:04	17-Aug-2021 00:04	17-Aug-2021 00:04
Compound	CAS Number	LOR	Unit	EP2109375-006	EP2109375-007	EP2109375-008	EP2109375-009	EP2109375-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.5	----	6.6	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	----	0.19	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	----	39	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	----	0.06	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.8	7.8	7.7	7.7	7.8
pH (Fox)	----	0.1	pH Unit	6.0	5.8	5.7	5.6	5.7
Reaction Rate	----	1	-	Slight	Slight	Slight	Moderate	Moderate

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH147_A_2.5	BH147_A_2.75	BH147_A_3.0	BH147_A_3.25	BH147_A_3.5
			Sampling date / time	17-Aug-2021 00:05	17-Aug-2021 00:05	17-Aug-2021 00:05	17-Aug-2021 00:06	17-Aug-2021 00:06
Compound	CAS Number	LOR	Unit	EP2109375-011	EP2109375-012	EP2109375-013	EP2109375-014	EP2109375-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.7**	**----**	**6.2**	**----**	**6.2**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	**2**	**----**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.17**	**----**	**----**	**----**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**34**	**----**	**----**	**----**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.05**	**----**	**----**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.6**	**7.5**	**7.3**	**7.3**	**7.2**
pH (Fox)	----	0.1	pH Unit	**5.6**	**5.3**	**5.3**	**5.4**	**5.4**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH147_A_3.75	BH147_A_4.0	BH147_A_4.25	BH147_A_4.5	BH147_A_4.75
			Sampling date / time	17-Aug-2021 00:06	17-Aug-2021 00:06	17-Aug-2021 00:07	17-Aug-2021 00:07	17-Aug-2021 00:07
Compound	CAS Number	LOR	Unit	EP2109375-016	EP2109375-017	EP2109375-018	EP2109375-019	EP2109375-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.0	----	5.8	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	2	----	2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.3	7.4	7.3	7.2	7.2
pH (Fox)	----	0.1	pH Unit	5.5	5.4	5.3	5.2	5.1
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH147_A_5.0	BH147_A_5.25	BH147_A_5.5	BH147_A_5.75	BH147_A_6.0
			Sampling date / time	17-Aug-2021 00:07	17-Aug-2021 00:08	17-Aug-2021 00:08	17-Aug-2021 00:10	17-Aug-2021 00:10
Compound	CAS Number	LOR	Unit	EP2109375-021	EP2109375-022	EP2109375-023	EP2109375-024	EP2109375-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.7	----	5.8	----	5.8
Titratable Actual Acidity (23F)	----	2	mole H+ / t	5	----	6	----	4
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	1	----	1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	----	1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.0	7.1	7.0	7.0	7.1
pH (Fox)	----	0.1	pH Unit	5.3	5.2	5.2	5.2	5.2
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SQC012_A	BH32_A_0.0	BH32_A_0.25	BH32_A_0.5	BH32_A_0.75
			Sampling date / time	17-Aug-2021 00:10	17-Aug-2021 00:43	17-Aug-2021 00:43	17-Aug-2021 00:43	17-Aug-2021 00:43
Compound	CAS Number	LOR	Unit	EP2109375-026	EP2109375-027	EP2109375-028	EP2109375-029	EP2109375-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.4**	**9.3**	**----**	**9.1**	**----**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	**----**	<2	**----**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	**----**	<0.02	**----**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.005**	<0.005	**----**	<0.005	**----**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.29**	**11.4**	**----**	**0.56**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**58**	**2270**	**----**	**112**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.09**	**3.65**	**----**	**0.18**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**----**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	**----**	<0.02	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
Liming Rate	----	1	kg CaCO3/t	<1	<1	**----**	<1	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	**----**	<0.02	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	**----**	<1	**----**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.8**	**8.4**	**8.4**	**8.3**	**8.2**
pH (Fox)	----	0.1	pH Unit	**5.7**	**5.9**	**5.8**	**5.9**	**6.1**
Reaction Rate	----	1	-	**Slight**	**Moderate**	**Moderate**	**Moderate**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH32_A_1.0	BH32_A_1.25	BH32_A_1.5	BH32_A_1.75	BH32_A_2.0
			Sampling date / time	17-Aug-2021 00:43	17-Aug-2021 00:44	17-Aug-2021 00:44	17-Aug-2021 00:44	17-Aug-2021 00:44
Compound	CAS Number	LOR	Unit	EP2109375-031	EP2109375-032	EP2109375-033	EP2109375-034	EP2109375-035
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.1**	----	**7.9**	----	**6.8**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	**0.005**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.37**	----	**0.37**	----	**0.24**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**73**	----	**73**	----	**49**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.12**	----	**0.12**	----	**0.08**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	**1.5**	----	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.4**	**8.1**	**7.8**	**8.1**	**8.0**
pH (Fox)	----	0.1	pH Unit	**6.2**	**6.3**	**6.1**	**6.2**	**5.9**
Reaction Rate	----	1	-	**Slight**	**Moderate**	**Moderate**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH32_A_2.25	BH32_A_2.5	BH32_A_2.75	BH32_A_3.0	SQC013_A
			Sampling date / time	17-Aug-2021 00:44	17-Aug-2021 00:45	17-Aug-2021 00:45	17-Aug-2021 00:45	17-Aug-2021 00:46
Compound	CAS Number	LOR	Unit	EP2109375-036	EP2109375-037	EP2109375-038	EP2109375-039	EP2109375-040
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.6	----	6.3	6.8
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	0.20	----	----	0.17
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	39	----	----	34
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.06	----	----	0.05
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	<10
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.6	7.4	7.2	7.2	8.1
pH (Fox)	----	0.1	pH Unit	5.9	5.8	5.8	5.5	5.9
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

QUALITY CONTROL REPORT

Work Order	: **EP2109375**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 17-Aug-2021
Order number	: 30058301	Date Analysis Commenced	: 18-Aug-2021
C-O-C number	: 26476	Issue Date	: 31-Aug-2021
Sampler	: BRONWYN VAN VALKENGOED, Shimona Babra		
Site	: GEHBI - WP4		
Quote number	: EP/529/21_V4		
No. of samples received	: 40		
No. of samples analysed	: 40		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3860868)									
EP2109375-001	BH147_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.4	9.4	0.0	0% - 20%
EP2109375-021	BH147_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	5	5	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.7	5.8	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 3860869)									
EP2109375-039	BH32_A_3.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.3	6.3	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3860868)									
EP2109375-001	BH147_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2109375-021	BH147_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 3860869)									
EP2109375-039	BH32_A_3.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3860868)									
EP2109375-001	BH147_A_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	4.37	4.35	0.5	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-C: Acid Neutralising Capacity (QC Lot: 3860868) - continued									
EP2109375-001	BH147_A_0.0	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.40	1.39	0.7	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	873	868	0.5	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 3860868)									
EP2109375-001	BH147_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2109375-021	BH147_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3860869)									
EP2109375-039	BH32_A_3.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3855245)									
EP2109375-001	BH147_A_0.0	EA037: pH (F)	----	0.1	pH Unit	8.2	8.1	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.8	5.8	0.0	0% - 20%
EP2109375-010	BH147_A_2.25	EA037: pH (F)	----	0.1	pH Unit	7.8	7.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.7	5.7	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3855246)									
EP2109375-021	BH147_A_5.0	EA037: pH (F)	----	0.1	pH Unit	7.0	7.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.3	5.2	0.0	0% - 20%
EP2109375-030	BH32_A_0.75	EA037: pH (F)	----	0.1	pH Unit	8.2	8.2	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.1	6.1	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3860868)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	98.6	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 3860869)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	92.9	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3860868)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	90.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3860869)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	91.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3860868)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3860868)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3860869)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2109375**	Page	: 1 of 6
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 17-Aug-2021
Site	: GEHBI - WP4	Issue Date	: 31-Aug-2021
Sampler	: BRONWYN VAN VALKENGOED, Shimona Babra	No. of samples received	: 40
Order number	: 30058301	No. of samples analysed	: 40

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
80* dried soil (EA033)								
BH147_A_0.0,	BH147_A_0.5,	**17-Aug-2021**	**23-Aug-2021**	17-Aug-2022	✓	**23-Aug-2021**	21-Nov-2021	✓
BH147_A_1.0,	BH147_A_1.5,							
BH147_A_2.0,	BH147_A_2.5,							
BH147_A_3.0,	BH147_A_3.5,							
BH147_A_4.0,	BH147_A_4.5,							
BH147_A_5.0,	BH147_A_5.5,							
BH147_A_6.0,	SQC012_A,							
BH32_A_0.0,	BH32_A_0.5,							
BH32_A_1.0,	BH32_A_1.5,							
BH32_A_2.0,	BH32_A_2.5,							
BH32_A_3.0,	SQC013_A							
EA033-B: Potential Acidity								
80* dried soil (EA033)								
BH147_A_0.0,	BH147_A_0.5,	**17-Aug-2021**	**23-Aug-2021**	17-Aug-2022	✓	**23-Aug-2021**	21-Nov-2021	✓
BH147_A_1.0,	BH147_A_1.5,							
BH147_A_2.0,	BH147_A_2.5,							
BH147_A_3.0,	BH147_A_3.5,							
BH147_A_4.0,	BH147_A_4.5,							
BH147_A_5.0,	BH147_A_5.5,							
BH147_A_6.0,	SQC012_A,							
BH32_A_0.0,	BH32_A_0.5,							
BH32_A_1.0,	BH32_A_1.5,							
BH32_A_2.0,	BH32_A_2.5,							
BH32_A_3.0,	SQC013_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity								
80* dried soil (EA033)								
BH147_A_0.0,	BH147_A_0.5,	**17-Aug-2021**	**23-Aug-2021**	17-Aug-2022	✓	**23-Aug-2021**	21-Nov-2021	✓
BH147_A_1.0,	BH147_A_1.5,							
BH147_A_2.0,	BH147_A_2.5,							
BH147_A_3.0,	BH147_A_3.5,							
BH147_A_4.0,	BH147_A_4.5,							
BH147_A_5.0,	BH147_A_5.5,							
BH147_A_6.0,	SQC012_A,							
BH32_A_0.0,	BH32_A_0.5,							
BH32_A_1.0,	BH32_A_1.5,							
BH32_A_2.0,	BH32_A_2.5,							
BH32_A_3.0,	SQC013_A							
EA033-D: Retained Acidity								
80* dried soil (EA033)								
BH147_A_0.0,	BH147_A_0.5,	**17-Aug-2021**	**23-Aug-2021**	17-Aug-2022	✓	**23-Aug-2021**	21-Nov-2021	✓
BH147_A_1.0,	BH147_A_1.5,							
BH147_A_2.0,	BH147_A_2.5,							
BH147_A_3.0,	BH147_A_3.5,							
BH147_A_4.0,	BH147_A_4.5,							
BH147_A_5.0,	BH147_A_5.5,							
BH147_A_6.0,	SQC012_A,							
BH32_A_0.0,	BH32_A_0.5,							
BH32_A_1.0,	BH32_A_1.5,							
BH32_A_2.0,	BH32_A_2.5,							
BH32_A_3.0,	SQC013_A							
EA033-E: Acid Base Accounting								
80* dried soil (EA033)								
BH147_A_0.0,	BH147_A_0.5,	**17-Aug-2021**	**23-Aug-2021**	17-Aug-2022	✓	**23-Aug-2021**	21-Nov-2021	✓
BH147_A_1.0,	BH147_A_1.5,							
BH147_A_2.0,	BH147_A_2.5,							
BH147_A_3.0,	BH147_A_3.5,							
BH147_A_4.0,	BH147_A_4.5,							
BH147_A_5.0,	BH147_A_5.5,							
BH147_A_6.0,	SQC012_A,							
BH32_A_0.0,	BH32_A_0.5,							
BH32_A_1.0,	BH32_A_1.5,							
BH32_A_2.0,	BH32_A_2.5,							
BH32_A_3.0,	SQC013_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis							
Snap Lock Bag - frozen (EA037)							
BH147_A_0.0, BH147_A_0.25, BH147_A_0.5, BH147_A_0.75, BH147_A_1.0, BH147_A_1.25, BH147_A_1.5, BH147_A_1.75, BH147_A_2.0, BH147_A_2.25, BH147_A_2.5, BH147_A_2.75, BH147_A_3.0, BH147_A_3.25, BH147_A_3.5, BH147_A_3.75, BH147_A_4.0, BH147_A_4.25, SQC012_A, BH147_A_4.5, BH147_A_4.75, BH147_A_5.0, BH147_A_5.25, BH147_A_5.5, BH147_A_5.75, BH147_A_6.0, BH32_A_0.0, BH32_A_0.25, BH32_A_0.5, BH32_A_0.75, BH32_A_1.0, BH32_A_1.25, BH32_A_1.5, BH32_A_1.75, BH32_A_2.0, BH32_A_2.25, BH32_A_2.5, BH32_A_2.75, BH32_A_3.0, SQC013_A	**17-Aug-2021**	**18-Aug-2021**	13-Feb-2022	✓	**18-Aug-2021**	13-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	22	**13.64**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

ALSCompass SAMPLING Intelligence

Environmental Division
Perth
Work Order Reference
EP2109376

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: GEHBI - WP4 **Client:** ARCADIS **Project Manager:** Bronwyn Van. v
Phone: (0408 751 386)

ALSCompass COC Reference: [redacted] **# Samples:** 52 **Sampler:** S. Babic
Phone: (0404 163 073)

Turnaround Requirements: Standard X Urgent

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	N/A
	Free ice / frozen ice bricks upon receipt?	YES	NO	N/A
	Random sample temperature on receipt?	4.7	°C	

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
	1120		
Date / Time: 17/08/21	Date / Time: 17/8/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 26472 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 1120 17/8/21	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? (Yes) No N/A

Free ice / frozen ice bricks present upon receipt? (Yes) No N/A

Random Sample Temperature on Receipt: 4.7 °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH94_A_0.0		16/08/2021 09:16 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH94_A_0.25		16/08/2021 09:17 PM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH94_A_0.5		16/08/2021 09:18 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH94_A_0.75		16/08/2021 09:18 PM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH94_A_1.0		16/08/2021 09:19 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH94_A_1.25		16/08/2021 09:19 PM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH94_A_1.5		16/08/2021 09:20 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH94_A_1.75		16/08/2021 09:20 PM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH94_A_2.0		16/08/2021 09:21 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 26472 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

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TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH94_A_2.25		16/08/2021 09:22 PM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH94_A_2.5		16/08/2021 09:22 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
012	BH94_A_2.75		16/08/2021 09:23 PM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH94_A_3.0		16/08/2021 09:24 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
014	BH94_A_3.25		16/08/2021 09:27 PM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH94_A_3.5		16/08/2021 09:27 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
016	BH94_A_3.75		16/08/2021 09:28 PM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH94_A_4.0		16/08/2021 09:29 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
018	BH94_A_4.25		16/08/2021 09:30 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 26472 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH94_A_4.5		16/08/2021 09:31 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
020	BH94_A_4.75		16/08/2021 09:31 PM	Soil	ALS: 1 Non ALS: 0	No	X			
021	BH94_A_5.0		16/08/2021 09:32 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
022	BH94_A_5.25		16/08/2021 09:33 PM	Soil	ALS: 1 Non ALS: 0	No	X			
023	BH94_A_5.5		16/08/2021 09:34 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
024	BH94_A_5.75		16/08/2021 09:35 PM	Soil	ALS: 1 Non ALS: 0	No	X			
025	BH94_A_6.0		16/08/2021 09:38 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
026	BH29_A_0.0		16/08/2021 09:46 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
027	BH29_A_0.25		16/08/2021 09:46 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: **26472** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH29_A_0.5		16/08/2021 09:47 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
029	BH29_A_0.75		16/08/2021 09:47 PM	Soil	ALS: 1 Non ALS: 0	No	X			
030	BH29_A_1.0		16/08/2021 09:47 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
031	BH29_A_1.25		16/08/2021 09:47 PM	Soil	ALS: 1 Non ALS: 0	No	X			
032	BH29_A_1.5		16/08/2021 09:48 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
033	BH29_A_1.75		16/08/2021 09:48 PM	Soil	ALS: 1 Non ALS: 0	No	X			
034	BH29_A_2.0		16/08/2021 09:49 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
035	BH29_A_2.25		16/08/2021 09:54 PM	Soil	ALS: 1 Non ALS: 0	No	X			
036	BH29_A_2.5		16/08/2021 09:54 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 26472 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

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TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
037	BH29_A_2.75		16/08/2021 09:54 PM	Soil	ALS: 1 Non ALS: 0	No	X			
038	BH29_A_3.0		16/08/2021 09:54 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
039	BH29_A_3.25		16/08/2021 09:54 PM	Soil	ALS: 1 Non ALS: 0	No	X			
040	BH29_A_3.5		16/08/2021 09:55 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
041	BH29_A_3.75		16/08/2021 09:55 PM	Soil	ALS: 1 Non ALS: 0	No	X			
042	BH29_A_4.0		16/08/2021 09:55 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
043	BH29_A_4.25		16/08/2021 09:55 PM	Soil	ALS: 1 Non ALS: 0	No	X			
044	BH29_A_4.5		16/08/2021 09:56 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
045	BH29_A_4.75		16/08/2021 09:56 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

(ALS) COC#: **26472** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

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SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
046	BH29_A_5.0		16/08/2021 09:56 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
047	BH29_A_5.25		16/08/2021 09:57 PM	Soil	ALS: 1 Non ALS: 0	No	X			
048	BH29_A_5.5		16/08/2021 09:57 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
049	BH29_A_5.75		16/08/2021 09:58 PM	Soil	ALS: 1 Non ALS: 0	No	X			
050	BH29_A_6.0		16/08/2021 09:58 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
051	SQC008_A		16/08/2021 10:00 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
052	SQC009_A		16/08/2021 09:59 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 26472 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

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TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH94_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621070865	Green	No	
002	BH94_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621070866	Green	No	
003	BH94_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621070867	Green	No	
004	BH94_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621070868	Green	No	
005	BH94_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621070869	Green	No	
006	BH94_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621070870	Green	No	
007	BH94_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621070871	Green	No	
008	BH94_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621070872	Green	No	
009	BH94_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621070873	Green	No	
010	BH94_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621070874	Green	No	
011	BH94_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621070875	Green	No	
012	BH94_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621070876	Green	No	
013	BH94_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621070877	Green	No	
014	BH94_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621070878	Green	No	
015	BH94_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621070879	Green	No	
016	BH94_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621070880	Green	No	
017	BH94_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621070881	Green	No	
018	BH94_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621070882	Green	No	
019	BH94_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621070883	Green	No	
020	BH94_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621070884	Green	No	
021	BH94_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621070885	Green	No	
022	BH94_A_5.25	Snap Lock Bag - frozen	1 Medium	00130621070886	Green	No	
023	BH94_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621070887	Green	No	
024	BH94_A_5.75	Snap Lock Bag - frozen	1 Medium	00130621070888	Green	No	
025	BH94_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621070889	Green	No	
026	BH29_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621070890	Green	No	

CHAIN OF CUSTODY

ALS COC#: **26472** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

027	BH29_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621070891	Green	No	
028	BH29_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621070917	Green	No	
029	BH29_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621070892	Green	No	
030	BH29_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621070893	Green	No	
031	BH29_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621070894	Green	No	
032	BH29_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621070895	Green	No	
033	BH29_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621070896	Green	No	
034	BH29_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621070897	Green	No	
035	BH29_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621070898	Green	No	
036	BH29_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621070899	Green	No	
037	BH29_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621070900	Green	No	
038	BH29_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621070901	Green	No	
039	BH29_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621070902	Green	No	
040	BH29_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621070903	Green	No	
041	BH29_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621070904	Green	No	
042	BH29_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621070905	Green	No	
043	BH29_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621070906	Green	No	
044	BH29_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621070907	Green	No	
045	BH29_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621070908	Green	No	
046	BH29_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621070909	Green	No	
047	BH29_A_5.25	Snap Lock Bag - frozen	1 Medium	00130621070910	Green	No	
048	BH29_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621070911	Green	No	
049	BH29_A_5.75	Snap Lock Bag - frozen	1 Medium	00130621070912	Green	No	
050	BH29_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621070913	Green	No	
051	SQC008_A	Snap Lock Bag - frozen	1 Medium	00130621070915	Green	No	
052	SQC009_A	Snap Lock Bag - frozen	1 Medium	00130621070914	Green	No	

Total Bottle Count: ALS: 52, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2109376**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 26472	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP4		
Sampler	: BRONWYN VAN VALKENGOED		

Dates

Date Samples Received	: 17-Aug-2021 11:20	Issue Date	: 18-Aug-2021
Client Requested Due Date	: 01-Sep-2021	Scheduled Reporting Date	: **01-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 11	Temperature	: 11.7 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 52 / 52

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2109376-001	16-Aug-2021 21:16	BH94_A_0.0	✓	✓
EP2109376-002	16-Aug-2021 21:17	BH94_A_0.25		✓
EP2109376-003	16-Aug-2021 21:18	BH94_A_0.5	✓	✓
EP2109376-004	16-Aug-2021 21:18	BH94_A_0.75		✓
EP2109376-005	16-Aug-2021 21:19	BH94_A_1.0	✓	✓
EP2109376-006	16-Aug-2021 21:19	BH94_A_1.25		✓
EP2109376-007	16-Aug-2021 21:20	BH94_A_1.5	✓	✓
EP2109376-008	16-Aug-2021 21:20	BH94_A_1.75		✓
EP2109376-009	16-Aug-2021 21:21	BH94_A_2.0	✓	✓
EP2109376-010	16-Aug-2021 21:22	BH94_A_2.25		✓
EP2109376-011	16-Aug-2021 21:22	BH94_A_2.5	✓	✓
EP2109376-012	16-Aug-2021 21:23	BH94_A_2.75		✓
EP2109376-013	16-Aug-2021 21:24	BH94_A_3.0	✓	✓
EP2109376-014	16-Aug-2021 21:27	BH94_A_3.25		✓
EP2109376-015	16-Aug-2021 21:27	BH94_A_3.5	✓	✓
EP2109376-016	16-Aug-2021 21:28	BH94_A_3.75		✓
EP2109376-017	16-Aug-2021 21:29	BH94_A_4.0	✓	✓
EP2109376-018	16-Aug-2021 21:30	BH94_A_4.25		✓
EP2109376-019	16-Aug-2021 21:31	BH94_A_4.5	✓	✓
EP2109376-020	16-Aug-2021 21:31	BH94_A_4.75		✓
EP2109376-021	16-Aug-2021 21:32	BH94_A_5.0	✓	✓
EP2109376-022	16-Aug-2021 21:33	BH94_A_5.25		✓
EP2109376-023	16-Aug-2021 21:34	BH94_A_5.5	✓	✓
EP2109376-024	16-Aug-2021 21:35	BH94_A_5.75		✓
EP2109376-025	16-Aug-2021 21:38	BH94_A_6.0	✓	✓
EP2109376-026	16-Aug-2021 21:46	BH29_A_0.0	✓	✓
EP2109376-027	16-Aug-2021 21:46	BH29_A_0.25		✓
EP2109376-028	16-Aug-2021 21:47	BH29_A_0.5	✓	✓
EP2109376-029	16-Aug-2021 21:47	BH29_A_0.75		✓
EP2109376-030	16-Aug-2021 21:47	BH29_A_1.0	✓	✓
EP2109376-031	16-Aug-2021 21:47	BH29_A_1.25		✓
EP2109376-032	16-Aug-2021 21:48	BH29_A_1.5	✓	✓
EP2109376-033	16-Aug-2021 21:48	BH29_A_1.75		✓
EP2109376-034	16-Aug-2021 21:49	BH29_A_2.0	✓	✓
EP2109376-035	16-Aug-2021 21:54	BH29_A_2.25		✓

			SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2109376-036	16-Aug-2021 21:54	BH29_A_2.5	✓	✓
EP2109376-037	16-Aug-2021 21:54	BH29_A_2.75		✓
EP2109376-038	16-Aug-2021 21:54	BH29_A_3.0	✓	✓
EP2109376-039	16-Aug-2021 21:54	BH29_A_3.25		✓
EP2109376-040	16-Aug-2021 21:55	BH29_A_3.5	✓	✓
EP2109376-041	16-Aug-2021 21:55	BH29_A_3.75		✓
EP2109376-042	16-Aug-2021 21:55	BH29_A_4.0	✓	✓
EP2109376-043	16-Aug-2021 21:55	BH29_A_4.25		✓
EP2109376-044	16-Aug-2021 21:56	BH29_A_4.5	✓	✓
EP2109376-045	16-Aug-2021 21:56	BH29_A_4.75		✓
EP2109376-046	16-Aug-2021 21:56	BH29_A_5.0	✓	✓
EP2109376-047	16-Aug-2021 21:57	BH29_A_5.25		✓
EP2109376-048	16-Aug-2021 21:57	BH29_A_5.5	✓	✓
EP2109376-049	16-Aug-2021 21:58	BH29_A_5.75		✓
EP2109376-050	16-Aug-2021 21:58	BH29_A_6.0	✓	✓
EP2109376-051	16-Aug-2021 22:00	SQC008_A	✓	✓
EP2109376-052	16-Aug-2021 21:59	SQC009_A	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ARCADIS ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Carina Andersen

- A4 - AU Tax Invoice (INV)	Email	carina.andersen@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2109376**	Page	: 1 of 13
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 17-Aug-2021 11:20
Order number	: 30058301	Date Analysis Commenced	: 18-Aug-2021
C-O-C number	: 26472	Issue Date	: 01-Sep-2021 14:39
Sampler	: BRONWYN VAN VALKENGOED, Shimona Babra		
Site	: GEHBI - WP4		
Quote number	: EP/529/21_V4		
No. of samples received	: 52		
No. of samples analysed	: 52		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required for particular samples because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH94_A_0.0	BH94_A_0.25	BH94_A_0.5	BH94_A_0.75	BH94_A_1.0
			Sampling date / time	16-Aug-2021 21:16	16-Aug-2021 21:17	16-Aug-2021 21:18	16-Aug-2021 21:18	16-Aug-2021 21:19
Compound	CAS Number	LOR	Unit	EP2109376-001	EP2109376-002	EP2109376-003	EP2109376-004	EP2109376-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.3**	**----**	**8.0**	**----**	**7.2**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**1.76**	**----**	**0.15**	**----**	**0.22**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**351**	**----**	**29**	**----**	**44**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.56**	**----**	**0.05**	**----**	**0.07**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.4**	**8.6**	**8.6**	**8.6**	**8.2**
pH (Fox)	----	0.1	pH Unit	**5.8**	**5.7**	**5.6**	**5.6**	**5.7**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH94_A_1.25	BH94_A_1.5	BH94_A_1.75	BH94_A_2.0	BH94_A_2.25
			Sampling date / time	16-Aug-2021 21:19	16-Aug-2021 21:20	16-Aug-2021 21:20	16-Aug-2021 21:21	16-Aug-2021 21:22
Compound	CAS Number	LOR	Unit	EP2109376-006	EP2109376-007	EP2109376-008	EP2109376-009	EP2109376-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	7.6	----	6.3	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	0.29	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	59	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.09	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.8	7.9	8.3	7.6	7.7
pH (Fox)	----	0.1	pH Unit	5.7	5.8	6.0	5.5	5.6
Reaction Rate	----	1	-	Slight	Moderate	Moderate	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH94_A_2.5	BH94_A_2.75	BH94_A_3.0	BH94_A_3.25	BH94_A_3.5
			Sampling date / time	16-Aug-2021 21:22	16-Aug-2021 21:23	16-Aug-2021 21:24	16-Aug-2021 21:27	16-Aug-2021 21:27
Compound	CAS Number	LOR	Unit	EP2109376-011	EP2109376-012	EP2109376-013	EP2109376-014	EP2109376-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.6	----	4.7	----	4.7
Titratable Actual Acidity (23F)	----	2	mole H+ / t	10	----	34	----	38
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.02	----	0.05	----	0.06
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.02	----	0.06	----	0.06
Net Acidity (acidity units)	----	10	mole H+ / t	12	----	36	----	38
Liming Rate	----	1	kg CaCO3/t	1	----	3	----	3
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.02	----	0.06	----	0.06
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	12	----	36	----	38
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	----	3	----	3
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.7	5.5	5.1	5.4	5.0
pH (Fox)	----	0.1	pH Unit	4.7	4.1	4.0	3.7	3.6
Reaction Rate	----	1	-	Slight	Moderate	Moderate	Slight	Moderate

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH94_A_3.75	BH94_A_4.0	BH94_A_4.25	BH94_A_4.5	BH94_A_4.75
			Sampling date / time	16-Aug-2021 21:28	16-Aug-2021 21:29	16-Aug-2021 21:30	16-Aug-2021 21:31	16-Aug-2021 21:31
Compound	CAS Number	LOR	Unit	EP2109376-016	EP2109376-017	EP2109376-018	EP2109376-019	EP2109376-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	4.8	----	4.9	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	32	----	21	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.05	----	0.03	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.05	----	0.04	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	34	----	22	----
Liming Rate	----	1	kg CaCO3/t	----	3	----	2	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.05	----	0.04	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	34	----	22	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	3	----	2	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.0	5.0	4.9	4.9	4.8
pH (Fox)	----	0.1	pH Unit	3.6	3.8	3.7	3.8	3.7
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH94_A_5.0	BH94_A_5.25	BH94_A_5.5	BH94_A_5.75	BH94_A_6.0
			Sampling date / time	16-Aug-2021 21:32	16-Aug-2021 21:33	16-Aug-2021 21:34	16-Aug-2021 21:35	16-Aug-2021 21:38
Compound	CAS Number	LOR	Unit	EP2109376-021	EP2109376-022	EP2109376-023	EP2109376-024	EP2109376-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.0**	**----**	**5.3**	**----**	**5.7**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**20**	**----**	**10**	**----**	**8**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.03**	**----**	**0.02**	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.04**	**----**	**0.02**	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	**22**	**----**	**10**	**----**	<10
Liming Rate	----	1	kg CaCO3/t	**2**	**----**	**1**	**----**	**1**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.04**	**----**	**0.02**	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**22**	**----**	**10**	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	**2**	**----**	**1**	**----**	**1**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**4.8**	**5.0**	**5.0**	**5.0**	**5.0**
pH (Fox)	----	0.1	pH Unit	**3.6**	**3.9**	**3.8**	**3.8**	**3.7**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH29_A_0.0	BH29_A_0.25	BH29_A_0.5	BH29_A_0.75	BH29_A_1.0
			Sampling date / time	16-Aug-2021 21:46	16-Aug-2021 21:46	16-Aug-2021 21:47	16-Aug-2021 21:47	16-Aug-2021 21:47
Compound	CAS Number	LOR	Unit	EP2109376-026	EP2109376-027	EP2109376-028	EP2109376-029	EP2109376-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.6**	**----**	**6.4**	**----**	**6.4**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.22**	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**44**	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.07**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.6**	**7.9**	**7.8**	**7.9**	**7.8**
pH (Fox)	----	0.1	pH Unit	**5.2**	**5.6**	**5.5**	**5.6**	**5.6**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH29_A_1.25	BH29_A_1.5	BH29_A_1.75	BH29_A_2.0	BH29_A_2.25
			Sampling date / time	16-Aug-2021 21:47	16-Aug-2021 21:48	16-Aug-2021 21:48	16-Aug-2021 21:49	16-Aug-2021 21:54
Compound	CAS Number	LOR	Unit	EP2109376-031	EP2109376-032	EP2109376-033	EP2109376-034	EP2109376-035
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.8	----	6.6	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	0.15	----	0.07	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	29	----	15	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.05	----	0.02	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.8	7.9	8.2	7.9	7.7
pH (Fox)	----	0.1	pH Unit	5.5	5.6	5.7	5.4	5.5
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH29_A_2.5	BH29_A_2.75	BH29_A_3.0	BH29_A_3.25	BH29_A_3.5
			Sampling date / time	16-Aug-2021 21:54	16-Aug-2021 21:54	16-Aug-2021 21:54	16-Aug-2021 21:54	16-Aug-2021 21:55
Compound	CAS Number	LOR	Unit	EP2109376-036	EP2109376-037	EP2109376-038	EP2109376-039	EP2109376-040
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.4	----	5.8	----	4.8
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	5	----	31
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	0.05
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	0.05
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	31
Liming Rate	----	1	kg CaCO3/t	<1	----	1	----	2
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	0.05
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	31
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	1	----	2
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.4	7.3	7.2	5.2	5.0
pH (Fox)	----	0.1	pH Unit	5.6	5.8	5.4	4.0	3.8
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH29_A_3.75	BH29_A_4.0	BH29_A_4.25	BH29_A_4.5	BH29_A_4.75
			Sampling date / time	16-Aug-2021 21:55	16-Aug-2021 21:55	16-Aug-2021 21:55	16-Aug-2021 21:56	16-Aug-2021 21:56
Compound	CAS Number	LOR	Unit	EP2109376-041	EP2109376-042	EP2109376-043	EP2109376-044	EP2109376-045
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	4.9	----	4.9	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	30	----	27	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.05	----	0.04	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.05	----	0.04	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	30	----	27	----
Liming Rate	----	1	kg CaCO3/t	----	2	----	2	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.05	----	0.04	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	30	----	27	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	2	----	2	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.0	4.8	4.7	4.7	4.6
pH (Fox)	----	0.1	pH Unit	3.6	3.6	3.6	3.6	3.5
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH29_A_5.0	BH29_A_5.25	BH29_A_5.5	BH29_A_5.75	BH29_A_6.0
			Sampling date / time	16-Aug-2021 21:56	16-Aug-2021 21:57	16-Aug-2021 21:57	16-Aug-2021 21:58	16-Aug-2021 21:58
Compound	CAS Number	LOR	Unit	EP2109376-046	EP2109376-047	EP2109376-048	EP2109376-049	EP2109376-050
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	4.8	----	4.8	----	4.8
Titratable Actual Acidity (23F)	----	2	mole H+ / t	24	----	25	----	26
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.04	----	0.04	----	0.04
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.04	----	0.04	----	0.04
Net Acidity (acidity units)	----	10	mole H+ / t	25	----	26	----	26
Liming Rate	----	1	kg CaCO3/t	2	----	2	----	2
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.04	----	0.04	----	0.04
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	25	----	26	----	26
Liming Rate excluding ANC	----	1	kg CaCO3/t	2	----	2	----	2
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	4.7	4.7	4.7	4.7	4.8
pH (Fox)	----	0.1	pH Unit	3.5	3.5	3.5	3.6	3.4
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SQC008_A	SQC009_A	----	----	----
			Sampling date / time	16-Aug-2021 22:00	16-Aug-2021 21:59	----	----	----
Compound	CAS Number	LOR	Unit	EP2109376-051	EP2109376-052	--------	--------	--------
				Result	Result	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.6**	**6.1**	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.22**	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**44**	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.07**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	----	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.7**	**7.0**	----	----	----
pH (Fox)	----	0.1	pH Unit	**5.4**	**5.3**	----	----	----
Reaction Rate	----	1	-	**Slight**	**Slight**	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EP2109376**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 17-Aug-2021
Order number	: 30058301	Date Analysis Commenced	: 18-Aug-2021
C-O-C number	: 26472	Issue Date	: 01-Sep-2021
Sampler	: BRONWYN VAN VALKENGOED, Shimona Babra		
Site	: GEHBI - WP4		
Quote number	: EP/529/21_V4		
No. of samples received	: 52		
No. of samples analysed	: 52		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3860872)									
EP2109376-001	BH94_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.3	9.3	0.0	0% - 20%
EP2109376-021	BH94_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.03	0.03	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	20	21	0.0	0% - 50%
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.0	5.1	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 3860873)									
EP2109376-040	BH29_A_3.5	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.05	0.05	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	31	31	0.0	0% - 50%
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.8	4.8	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3860872)									
EP2109376-001	BH94_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2109376-021	BH94_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 3860873)									
EP2109376-040	BH29_A_3.5	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3860872)									
EP2109376-001	BH94_A_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	1.76	1.77	0.6	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-C: Acid Neutralising Capacity (QC Lot: 3860872) - continued									
EP2109376-001	BH94_A_0.0	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.56	0.57	1.8	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	351	353	0.4	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 3860872)									
EP2109376-001	BH94_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2109376-021	BH94_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.04	0.04	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.04	0.04	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	2	2	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	2	2	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	22	23	4.4	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	22	23	4.4	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3860873)									
EP2109376-040	BH29_A_3.5	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.05	0.05	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.05	0.05	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	2	2	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	2	2	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	31	31	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	31	31	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3855248)									
EP2109376-001	BH94_A_0.0	EA037: pH (F)	----	0.1	pH Unit	8.4	8.5	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.8	5.8	0.0	0% - 20%
EP2109376-010	BH94_A_2.25	EA037: pH (F)	----	0.1	pH Unit	7.7	7.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.6	5.7	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3855249)									
EP2109376-021	BH94_A_5.0	EA037: pH (F)	----	0.1	pH Unit	4.8	4.9	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.6	3.7	0.0	0% - 20%
EP2109376-030	BH29_A_1.0	EA037: pH (F)	----	0.1	pH Unit	7.8	7.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.6	5.6	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3855250)									
EP2109376-041	BH29_A_3.75	EA037: pH (F)	----	0.1	pH Unit	5.0	4.8	2.9	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.6	3.6	0.0	0% - 20%
EP2109376-050	BH29_A_6.0	EA037: pH (F)	----	0.1	pH Unit	4.8	4.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.4	3.5	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3860872)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	92.8	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 3860873)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	92.9	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3860872)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	90.6	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3860873)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	87.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3860872)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3860872)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3860873)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2109376**	Page	: 1 of 7
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 17-Aug-2021
Site	: GEHBI - WP4	Issue Date	: 01-Sep-2021
Sampler	: BRONWYN VAN VALKENGOED, Shimona Babra	No. of samples received	: 52
Order number	: 30058301	No. of samples analysed	: 52

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
80* dried soil (EA033)								
BH94_A_0.0,	BH94_A_0.5,	**16-Aug-2021**	**23-Aug-2021**	16-Aug-2022	✓	**27-Aug-2021**	21-Nov-2021	✓
BH94_A_1.0,	BH94_A_1.5,							
BH94_A_2.0,	BH94_A_2.5,							
BH94_A_3.0,	BH94_A_3.5,							
BH94_A_4.0,	BH94_A_4.5,							
BH94_A_5.0,	BH94_A_5.5,							
BH94_A_6.0,	BH29_A_0.0,							
BH29_A_0.5,	BH29_A_1.0,							
BH29_A_1.5,	BH29_A_2.0,							
BH29_A_2.5,	BH29_A_3.0,							
BH29_A_3.5,	BH29_A_4.0,							
BH29_A_4.5,	BH29_A_5.0,							
BH29_A_5.5,	BH29_A_6.0,							
SQC008_A,	SQC009_A							
EA033-B: Potential Acidity								
80* dried soil (EA033)								
BH94_A_0.0,	BH94_A_0.5,	**16-Aug-2021**	**23-Aug-2021**	16-Aug-2022	✓	**27-Aug-2021**	21-Nov-2021	✓
BH94_A_1.0,	BH94_A_1.5,							
BH94_A_2.0,	BH94_A_2.5,							
BH94_A_3.0,	BH94_A_3.5,							
BH94_A_4.0,	BH94_A_4.5,							
BH94_A_5.0,	BH94_A_5.5,							
BH94_A_6.0,	BH29_A_0.0,							
BH29_A_0.5,	BH29_A_1.0,							
BH29_A_1.5,	BH29_A_2.0,							
BH29_A_2.5,	BH29_A_3.0,							
BH29_A_3.5,	BH29_A_4.0,							
BH29_A_4.5,	BH29_A_5.0,							
BH29_A_5.5,	BH29_A_6.0,							
SQC008_A,	SQC009_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity								
80* dried soil (EA033)								
BH94_A_0.0,	BH94_A_0.5,	**16-Aug-2021**	**23-Aug-2021**	16-Aug-2022	✓	**27-Aug-2021**	21-Nov-2021	✓
BH94_A_1.0,	BH94_A_1.5,							
BH94_A_2.0,	BH94_A_2.5,							
BH94_A_3.0,	BH94_A_3.5,							
BH94_A_4.0,	BH94_A_4.5,							
BH94_A_5.0,	BH94_A_5.5,							
BH94_A_6.0,	BH29_A_0.0,							
BH29_A_0.5,	BH29_A_1.0,							
BH29_A_1.5,	BH29_A_2.0,							
BH29_A_2.5,	BH29_A_3.0,							
BH29_A_3.5,	BH29_A_4.0,							
BH29_A_4.5,	BH29_A_5.0,							
BH29_A_5.5,	BH29_A_6.0,							
SQC008_A,	SQC009_A							
EA033-D: Retained Acidity								
80* dried soil (EA033)								
BH94_A_0.0,	BH94_A_0.5,	**16-Aug-2021**	**23-Aug-2021**	16-Aug-2022	✓	**27-Aug-2021**	21-Nov-2021	✓
BH94_A_1.0,	BH94_A_1.5,							
BH94_A_2.0,	BH94_A_2.5,							
BH94_A_3.0,	BH94_A_3.5,							
BH94_A_4.0,	BH94_A_4.5,							
BH94_A_5.0,	BH94_A_5.5,							
BH94_A_6.0,	BH29_A_0.0,							
BH29_A_0.5,	BH29_A_1.0,							
BH29_A_1.5,	BH29_A_2.0,							
BH29_A_2.5,	BH29_A_3.0,							
BH29_A_3.5,	BH29_A_4.0,							
BH29_A_4.5,	BH29_A_5.0,							
BH29_A_5.5,	BH29_A_6.0,							
SQC008_A,	SQC009_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-E: Acid Base Accounting								
80* dried soil (EA033)								
BH94_A_0.0,	BH94_A_0.5,	**16-Aug-2021**	**23-Aug-2021**	16-Aug-2022	✓	**27-Aug-2021**	21-Nov-2021	✓
BH94_A_1.0,	BH94_A_1.5,							
BH94_A_2.0,	BH94_A_2.5,							
BH94_A_3.0,	BH94_A_3.5,							
BH94_A_4.0,	BH94_A_4.5,							
BH94_A_5.0,	BH94_A_5.5,							
BH94_A_6.0,	BH29_A_0.0,							
BH29_A_0.5,	BH29_A_1.0,							
BH29_A_1.5,	BH29_A_2.0,							
BH29_A_2.5,	BH29_A_3.0,							
BH29_A_3.5,	BH29_A_4.0,							
BH29_A_4.5,	BH29_A_5.0,							
BH29_A_5.5,	BH29_A_6.0,							
SQC008_A,	SQC009_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH94_A_0.0,	BH94_A_0.25,	**16-Aug-2021**	**18-Aug-2021**	12-Feb-2022	✓	**18-Aug-2021**	12-Feb-2022	✓
BH94_A_0.5,	BH94_A_0.75,							
BH94_A_1.0,	BH94_A_1.25,							
BH94_A_1.5,	BH94_A_1.75,							
BH94_A_2.0,	BH94_A_2.25,							
BH94_A_2.5,	BH94_A_2.75,							
BH94_A_3.0,	BH94_A_3.25,							
BH94_A_3.5,	BH94_A_3.75,							
BH94_A_4.0,	BH94_A_4.25,							
BH94_A_4.5,	BH94_A_4.75,							
BH94_A_5.0,	BH94_A_5.25,							
BH94_A_5.5,	BH94_A_5.75,							
BH94_A_6.0,	BH29_A_0.0,							
BH29_A_0.25,	BH29_A_0.5,							
BH29_A_0.75,	BH29_A_1.0,							
BH29_A_1.25,	BH29_A_1.5,							
BH29_A_1.75,	BH29_A_2.0,							
BH29_A_2.25,	BH29_A_2.5,							
BH29_A_2.75,	BH29_A_3.0,							
BH29_A_3.25,	BH29_A_3.5,							
BH29_A_3.75,	BH29_A_4.0,							
BH29_A_4.25,	BH29_A_4.5,							
BH29_A_4.75,	BH29_A_5.0,							
BH29_A_5.25,	BH29_A_5.5,							
BH29_A_5.75,	BH29_A_6.0,							
SQC008_A,	SQC009_A							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	6	52	**11.54**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	28	**10.71**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2109377

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: GEHBI- WP4 **Client:** ARCADIS **Project Manager:** Bronwyn. van. V.

Phone: (0408 751 386)

ALS Compass COC Reference: 26422 **# Samples:** 52 **Sampler:** S. Babri

Phone: (0404 163 073)

Turnaround Requirements: Standard X Urgent

Special Instructions:	ALS Use Only			
	Custody seal intact?	(YES)	NO	N/A
	Free ice / frozen ice bricks upon receipt?	(YES)	NO	N/A
	Random sample temperature on receipt?	4.7 °C		

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
	MJ 1120		
Date / Time: 17/08/21	Date / Time: 17/08/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 26474 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 1120 17/08/21	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? (Yes) No N/A

Free ice / frozen ice bricks present upon receipt? (Yes) No N/A

Random Sample Temperature on Receipt: 9.7 °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH30_A_0.0		16/08/2021 10:42 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH30_A_0.25		16/08/2021 10:43 PM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH30_A_0.5		16/08/2021 10:43 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH30_A_0.75		16/08/2021 10:44 PM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH30_A_1.0		16/08/2021 10:45 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH30_A_1.25		16/08/2021 10:46 PM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH30_A_1.5		16/08/2021 10:45 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH30_A_1.75		16/08/2021 10:46 PM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH30_A_2.0		16/08/2021 10:46 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: **26474** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

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EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH30_A_2.25		16/08/2021 10:46 PM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH30_A_2.5		16/08/2021 10:47 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
012	BH30_A_2.75		16/08/2021 10:47 PM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH30_A_3.0		16/08/2021 10:47 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
014	BH30_A_3.25		16/08/2021 10:47 PM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH30_A_3.5		16/08/2021 10:48 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
016	BH30_A_3.75		16/08/2021 10:48 PM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH30_A_4.0		16/08/2021 10:48 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
018	BH30_A_4.25		16/08/2021 10:48 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: **26474** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH30_A_4.5		16/08/2021 10:48 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
020	BH30_A_4.75		16/08/2021 10:50 PM	Soil	ALS: 1 Non ALS: 0	No	X			
021	BH30_A_5.0		16/08/2021 10:49 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
022	BH30_A_5.25		16/08/2021 10:50 PM	Soil	ALS: 1 Non ALS: 0	No	X			
023	BH30_A_5.5		16/08/2021 10:51 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
024	BH30_A_5.75		16/08/2021 10:52 PM	Soil	ALS: 1 Non ALS: 0	No	X			
025	BH30_A_6.0		16/08/2021 10:52 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
~~026~~ SNR	SQA010_A		16/08/2021 10:52 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
027	BH31_A_0.0		16/08/2021 11:37 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

COC#: **26474** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH31_A_0.25		16/08/2021 11:37 PM	Soil	ALS: 1 Non ALS: 0	No	X			
029	BH31_A_0.5		16/08/2021 11:37 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
030	BH31_A_0.75		16/08/2021 11:38 PM	Soil	ALS: 1 Non ALS: 0	No	X			
031	BH31_A_1.0		16/08/2021 11:38 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
032	BH31_A_1.25		16/08/2021 11:38 PM	Soil	ALS: 1 Non ALS: 0	No	X			
033	BH31_A_1.5		16/08/2021 11:38 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
034	BH31_A_1.75		16/08/2021 11:39 PM	Soil	ALS: 1 Non ALS: 0	No	X			
035	BH31_A_2.0		16/08/2021 11:39 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
036	BH31_A_2.25		16/08/2021 11:39 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 26474 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

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EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
037	BH31_A_2.5		16/08/2021 11:40 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
038	BH31_A_2.75		16/08/2021 11:40 PM	Soil	ALS: 1 Non ALS: 0	No	X			
039	BH31_A_3.0		16/08/2021 11:40 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
040	BH31_A_3.25		16/08/2021 11:41 PM	Soil	ALS: 1 Non ALS: 0	No	X			
041	BH31_A_3.5		16/08/2021 11:43 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
042	BH31_A_3.75		16/08/2021 11:42 PM	Soil	ALS: 1 Non ALS: 0	No	X			
043	BH31_A_4.0		16/08/2021 11:43 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
044	BH31_A_4.25		16/08/2021 11:44 PM	Soil	ALS: 1 Non ALS: 0	No	X			
045	BH31_A_4.5		16/08/2021 11:44 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 26474 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

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EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
046	BH31_A_4.75		16/08/2021 11:51 PM	Soil	ALS: 1 Non ALS: 0	No	X			
047	BH31_A_5.0		16/08/2021 11:52 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
048	BH31_A_5.25		16/08/2021 11:52 PM	Soil	ALS: 1 Non ALS: 0	No	X			
049	BH31_A_5.5		16/08/2021 11:52 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
050	BH31_A_5.75		16/08/2021 11:52 PM	Soil	ALS: 1 Non ALS: 0	No	X			
051	BH31_A_6.0		16/08/2021 11:52 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
052	SQC011_A		16/08/2021 11:53 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

(ALS) COC#: **26474** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH30_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621070918	Green	No	
002	BH30_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621070919	Green	No	
003	BH30_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621023647	Green	No	
004	BH30_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621070920	Green	No	
005	BH30_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621070921	Green	No	
006	BH30_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621079183	Green	No	
007	BH30_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621070923	Green	No	
008	BH30_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621070924	Green	No	
009	BH30_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621070925	Green	No	
010	BH30_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621070926	Green	No	
011	BH30_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621070927	Green	No	
012	BH30_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621070928	Green	No	
013	BH30_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621070929	Green	No	
014	BH30_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621070930	Green	No	
015	BH30_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621070931	Green	No	
016	BH30_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621070932	Green	No	
017	BH30_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621070933	Green	No	
018	BH30_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621070934	Green	No	
019	BH30_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621070935	Green	No	
020	BH30_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621070936	Green	No	
021	BH30_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621070937	Green	No	
022	BH30_A_5.25	Snap Lock Bag - frozen	1 Medium	00130621070938	Green	No	
023	BH30_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621070939	Green	No	
024	BH30_A_5.75	Snap Lock Bag - frozen	1 Medium	00130621070940	Green	No	
025	BH30_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621070941	Green	No	
026	SQA010_A	Snap Lock Bag - frozen	1 Medium	00130621070942	Green	No	

CHAIN OF CUSTODY

(ALS) COC#: **26474** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

027	BH31_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621070943	Green	No	
028	BH31_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621023616	Green	No	
029	BH31_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621023652	Green	No	
030	BH31_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621023617	Green	No	
031	BH31_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621023618	Green	No	
032	BH31_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621023619	Green	No	
033	BH31_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621023620	Green	No	
034	BH31_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621023621	Green	No	
035	BH31_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621023622	Green	No	
036	BH31_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621023623	Green	No	
037	BH31_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621023624	Green	No	
038	BH31_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621023625	Green	No	
039	BH31_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621023626	Green	No	
040	BH31_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621023627	Green	No	
041	BH31_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621023628	Green	No	
042	BH31_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621023629	Green	No	
043	BH31_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621070944	Green	No	
044	BH31_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621070945	Green	No	
045	BH31_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621070946	Green	No	
046	BH31_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621070947	Green	No	
047	BH31_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621070948	Green	No	
048	BH31_A_5.25	Snap Lock Bag - frozen	1 Medium	00130621070949	Green	No	
049	BH31_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621023648	Green	No	
050	BH31_A_5.75	Snap Lock Bag - frozen	1 Medium	00130621023649	Green	No	
051	BH31_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621023650	Green	No	
052	SQC011_A	Snap Lock Bag - frozen	1 Medium	00130621023651	Green	No	

Total Bottle Count: ALS: 52, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2109377**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 26474	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP4		
Sampler	: BRONWYN VAN VALKENGOED		

Dates

Date Samples Received	: 17-Aug-2021 11:20	Issue Date	: 18-Aug-2021
Client Requested Due Date	: 01-Sep-2021	Scheduled Reporting Date	: **01-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 11	Temperature	: 11.7 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 51 / 51

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2109377-001	16-Aug-2021 22:42	BH30_A_0.0	✓	✓
EP2109377-002	16-Aug-2021 22:43	BH30_A_0.25		✓
EP2109377-003	16-Aug-2021 22:43	BH30_A_0.5	✓	✓
EP2109377-004	16-Aug-2021 22:44	BH30_A_0.75		✓
EP2109377-005	16-Aug-2021 22:45	BH30_A_1.0	✓	✓
EP2109377-006	16-Aug-2021 22:46	BH30_A_1.25		✓
EP2109377-007	16-Aug-2021 22:45	BH30_A_1.5	✓	✓
EP2109377-008	16-Aug-2021 22:46	BH30_A_1.75		✓
EP2109377-009	16-Aug-2021 22:46	BH30_A_2.0	✓	✓
EP2109377-010	16-Aug-2021 22:46	BH30_A_2.25		✓
EP2109377-011	16-Aug-2021 22:47	BH30_A_2.5	✓	✓
EP2109377-012	16-Aug-2021 22:47	BH30_A_2.75		✓
EP2109377-013	16-Aug-2021 22:47	BH30_A_3.0	✓	✓
EP2109377-014	16-Aug-2021 22:47	BH30_A_3.25		✓
EP2109377-015	16-Aug-2021 22:48	BH30_A_3.5	✓	✓
EP2109377-016	16-Aug-2021 22:48	BH30_A_3.75		✓
EP2109377-017	16-Aug-2021 22:48	BH30_A_4.0	✓	✓
EP2109377-018	16-Aug-2021 22:48	BH30_A_4.25		✓
EP2109377-019	16-Aug-2021 22:48	BH30_A_4.5	✓	✓
EP2109377-020	16-Aug-2021 22:50	BH30_A_4.75		✓
EP2109377-021	16-Aug-2021 22:49	BH30_A_5.0	✓	✓
EP2109377-022	16-Aug-2021 22:50	BH30_A_5.25		✓
EP2109377-023	16-Aug-2021 22:51	BH30_A_5.5	✓	✓
EP2109377-024	16-Aug-2021 22:52	BH30_A_5.75		✓
EP2109377-025	16-Aug-2021 22:52	BH30_A_6.0	✓	✓
EP2109377-027	16-Aug-2021 23:37	BH31_A_0.0	✓	✓
EP2109377-028	16-Aug-2021 23:37	BH31_A_0.25		✓
EP2109377-029	16-Aug-2021 23:37	BH31_A_0.5	✓	✓
EP2109377-030	16-Aug-2021 23:38	BH31_A_0.75		✓
EP2109377-031	16-Aug-2021 23:38	BH31_A_1.0	✓	✓
EP2109377-032	16-Aug-2021 23:38	BH31_A_1.25		✓
EP2109377-033	16-Aug-2021 23:38	BH31_A_1.5	✓	✓
EP2109377-034	16-Aug-2021 23:39	BH31_A_1.75		✓
EP2109377-035	16-Aug-2021 23:39	BH31_A_2.0	✓	✓
EP2109377-036	16-Aug-2021 23:39	BH31_A_2.25		✓

			SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2109377-037	16-Aug-2021 23:40	BH31_A_2.5	✓	✓
EP2109377-038	16-Aug-2021 23:40	BH31_A_2.75		✓
EP2109377-039	16-Aug-2021 23:40	BH31_A_3.0	✓	✓
EP2109377-040	16-Aug-2021 23:41	BH31_A_3.25		✓
EP2109377-041	16-Aug-2021 23:43	BH31_A_3.5	✓	✓
EP2109377-042	16-Aug-2021 23:42	BH31_A_3.75		✓
EP2109377-043	16-Aug-2021 23:43	BH31_A_4.0	✓	✓
EP2109377-044	16-Aug-2021 23:44	BH31_A_4.25		✓
EP2109377-045	16-Aug-2021 23:44	BH31_A_4.5	✓	✓
EP2109377-046	16-Aug-2021 23:51	BH31_A_4.75		✓
EP2109377-047	16-Aug-2021 23:52	BH31_A_5.0	✓	✓
EP2109377-048	16-Aug-2021 23:52	BH31_A_5.25		✓
EP2109377-049	16-Aug-2021 23:52	BH31_A_5.5	✓	✓
EP2109377-050	16-Aug-2021 23:52	BH31_A_5.75		✓
EP2109377-051	16-Aug-2021 23:52	BH31_A_6.0	✓	✓
EP2109377-052	16-Aug-2021 23:53	SQC011_A	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ARCADIS ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV) — Email — AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA) — Email — bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV) — Email — bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC) — Email — bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG) — Email — bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT) — Email — bronwyn.vanvalkengoed@arcadis.com

Carina Andersen

- A4 - AU Tax Invoice (INV) — Email — carina.andersen@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2109377**	Page	: 1 of 13
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 17-Aug-2021 11:20
Order number	: 30058301	Date Analysis Commenced	: 19-Aug-2021
C-O-C number	: 26474	Issue Date	: 01-Sep-2021 16:36
Sampler	: BRONWYN VAN VALKENGOED, Shimona Babra		
Site	: GEHBI - WP4		
Quote number	: EP/529/21_V4		
No. of samples received	: 51		
No. of samples analysed	: 51		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required for particular samples because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH30_A_0.0	BH30_A_0.25	BH30_A_0.5	BH30_A_0.75	BH30_A_1.0
			Sampling date / time	16-Aug-2021 22:42	16-Aug-2021 22:43	16-Aug-2021 22:43	16-Aug-2021 22:44	16-Aug-2021 22:45
Compound	CAS Number	LOR	Unit	EP2109377-001	EP2109377-002	EP2109377-003	EP2109377-004	EP2109377-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.2**	----	**9.0**	----	**9.0**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**11.1**	----	**0.34**	----	**0.32**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**2210**	----	**68**	----	**63**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**3.55**	----	**0.11**	----	**0.10**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	**1.5**	----	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.9**	**8.2**	**8.1**	**7.9**	**8.2**
pH (Fox)	----	0.1	pH Unit	**6.0**	**5.8**	**6.0**	**6.1**	**6.2**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Slight**	**Moderate**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH30_A_1.25	BH30_A_1.5	BH30_A_1.75	BH30_A_2.0	BH30_A_2.25
			Sampling date / time	16-Aug-2021 22:46	16-Aug-2021 22:45	16-Aug-2021 22:46	16-Aug-2021 22:46	16-Aug-2021 22:46
Compound	CAS Number	LOR	Unit	EP2109377-006	EP2109377-007	EP2109377-008	EP2109377-009	EP2109377-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	7.7	----	7.1	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	0.32	----	0.39	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	63	----	78	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.10	----	0.12	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	8.1	8.4	7.8	7.6	7.6
pH (Fox)	----	0.1	pH Unit	5.9	6.2	6.4	5.9	5.9
Reaction Rate	----	1	-	Slight	Slight	Moderate	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH30_A_2.5	BH30_A_2.75	BH30_A_3.0	BH30_A_3.25	BH30_A_3.5
			Sampling date / time	16-Aug-2021 22:47	16-Aug-2021 22:47	16-Aug-2021 22:47	16-Aug-2021 22:47	16-Aug-2021 22:48
Compound	CAS Number	LOR	Unit	EP2109377-011	EP2109377-012	EP2109377-013	EP2109377-014	EP2109377-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.7**	**----**	**6.4**	**----**	**5.5**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	**17**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	**0.03**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.24**	**----**	**----**	**----**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**49**	**----**	**----**	**----**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.08**	**----**	**----**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	**0.03**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	**18**
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	**1**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	**0.03**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	**18**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	**1**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.4**	**7.4**	**7.4**	**7.2**	**6.4**
pH (Fox)	----	0.1	pH Unit	**5.8**	**5.8**	**5.7**	**5.4**	**4.7**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH30_A_3.75	BH30_A_4.0	BH30_A_4.25	BH30_A_4.5	BH30_A_4.75
			Sampling date / time	16-Aug-2021 22:48	16-Aug-2021 22:48	16-Aug-2021 22:48	16-Aug-2021 22:48	16-Aug-2021 22:50
Compound	CAS Number	LOR	Unit	EP2109377-016	EP2109377-017	EP2109377-018	EP2109377-019	EP2109377-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.4	----	6.6	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	----	0.10	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	----	19	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	----	0.03	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.7	5.7	5.6	6.2	6.3
pH (Fox)	----	0.1	pH Unit	4.5	4.3	4.3	4.7	4.2
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH30_A_5.0	BH30_A_5.25	BH30_A_5.5	BH30_A_5.75	BH30_A_6.0
			Sampling date / time	16-Aug-2021 22:49	16-Aug-2021 22:50	16-Aug-2021 22:51	16-Aug-2021 22:52	16-Aug-2021 22:52
Compound	CAS Number	LOR	Unit	EP2109377-021	EP2109377-022	EP2109377-023	EP2109377-024	EP2109377-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.3**	**----**	**6.3**	**----**	**6.5**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.2**	**5.3**	**5.3**	**5.1**	**5.2**
pH (Fox)	----	0.1	pH Unit	**4.2**	**4.1**	**4.0**	**4.0**	**4.0**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH31_A_0.0	BH31_A_0.25	BH31_A_0.5	BH31_A_0.75	BH31_A_1.0
			Sampling date / time	16-Aug-2021 23:37	16-Aug-2021 23:37	16-Aug-2021 23:37	16-Aug-2021 23:38	16-Aug-2021 23:38
Compound	CAS Number	LOR	Unit	EP2109377-027	EP2109377-028	EP2109377-029	EP2109377-030	EP2109377-031
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.5**	**----**	**9.1**	**----**	**8.4**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	**0.005**	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**9.20**	**----**	**0.54**	**----**	**0.63**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**1840**	**----**	**107**	**----**	**126**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**2.95**	**----**	**0.17**	**----**	**0.20**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.0**	**8.0**	**8.0**	**8.1**	**8.0**
pH (Fox)	----	0.1	pH Unit	**6.0**	**6.2**	**6.2**	**6.3**	**6.4**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH31_A_1.25	BH31_A_1.5	BH31_A_1.75	BH31_A_2.0	BH31_A_2.25
			Sampling date / time	16-Aug-2021 23:38	16-Aug-2021 23:38	16-Aug-2021 23:39	16-Aug-2021 23:39	16-Aug-2021 23:39
Compound	CAS Number	LOR	Unit	EP2109377-032	EP2109377-033	EP2109377-034	EP2109377-035	EP2109377-036
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	8.5	----	6.5	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	1.07	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	214	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.34	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	8.1	8.1	7.1	7.4	5.6
pH (Fox)	----	0.1	pH Unit	6.4	6.4	5.5	5.8	4.2
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH31_A_2.5	BH31_A_2.75	BH31_A_3.0	BH31_A_3.25	BH31_A_3.5
			Sampling date / time	16-Aug-2021 23:40	16-Aug-2021 23:40	16-Aug-2021 23:40	16-Aug-2021 23:41	16-Aug-2021 23:43
Compound	CAS Number	LOR	Unit	EP2109377-037	EP2109377-038	EP2109377-039	EP2109377-040	EP2109377-041
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.7**	**----**	**6.4**	**----**	**6.3**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**14**	**----**	<2	**----**	**5**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.02**	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.02**	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	**15**	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	**1**	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.02**	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**15**	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**4.9**	**4.9**	**4.7**	**4.5**	**4.6**
pH (Fox)	----	0.1	pH Unit	**4.0**	**3.9**	**4.0**	**3.7**	**3.6**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH31_A_3.75	BH31_A_4.0	BH31_A_4.25	BH31_A_4.5	BH31_A_4.75
			Sampling date / time	16-Aug-2021 23:42	16-Aug-2021 23:43	16-Aug-2021 23:44	16-Aug-2021 23:44	16-Aug-2021 23:51
Compound	CAS Number	LOR	Unit	EP2109377-042	EP2109377-043	EP2109377-044	EP2109377-045	EP2109377-046
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.3	----	5.8	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	2	----	15	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	15	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	15	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	4.5	4.5	4.6	4.6	4.6
pH (Fox)	----	0.1	pH Unit	3.6	3.7	3.6	3.3	3.4
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH31_A_5.0	BH31_A_5.25	BH31_A_5.5	BH31_A_5.75	BH31_A_6.0
			Sampling date / time	16-Aug-2021 23:52	16-Aug-2021 23:52	16-Aug-2021 23:52	16-Aug-2021 23:52	16-Aug-2021 23:52
Compound	CAS Number	LOR	Unit	EP2109377-047	EP2109377-048	EP2109377-049	EP2109377-050	EP2109377-051
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.6**	**----**	**6.5**	**----**	**6.2**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	**4**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.15**	**----**	**0.15**	**----**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**29**	**----**	**29**	**----**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.05**	**----**	**0.05**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**4.9**	**5.0**	**5.1**	**5.1**	**5.0**
pH (Fox)	----	0.1	pH Unit	**4.1**	**3.9**	**3.9**	**3.8**	**3.9**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SQC011_A	----	----	----	----
			Sampling date / time	16-Aug-2021 23:53	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2109377-052	--------	--------	--------	--------
				Result	----	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.3**	----	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.68**	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**136**	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.22**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.5**	----	----	----	----
pH (Fox)	----	0.1	pH Unit	**6.2**	----	----	----	----
Reaction Rate	----	1	-	**Slight**	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EP2109377**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 17-Aug-2021
Order number	: 30058301	Date Analysis Commenced	: 19-Aug-2021
C-O-C number	: 26474	Issue Date	: 01-Sep-2021
Sampler	: BRONWYN VAN VALKENGOED, Shimona Babra		
Site	: GEHBI - WP4		
Quote number	: EP/529/21_V4		
No. of samples received	: 51		
No. of samples analysed	: 51		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3860877)									
EP2109377-001	BH30_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.2	9.3	0.0	0% - 20%
EP2109377-021	BH30_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.3	6.3	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 3860878)									
EP2109377-041	BH31_A_3.5	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	5	5	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.3	6.2	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3860877)									
EP2109377-001	BH30_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2109377-021	BH30_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 3860878)									
EP2109377-041	BH31_A_3.5	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3860877)									
EP2109377-001	BH30_A_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	11.1	11.0	0.6	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-C: Acid Neutralising Capacity (QC Lot: 3860877) - continued									
EP2109377-001	BH30_A_0.0	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	3.55	3.53	0.6	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	2210	2200	0.6	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 3860877)									
EP2109377-001	BH30_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2109377-021	BH30_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3860878)									
EP2109377-041	BH31_A_3.5	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3857719)									
EP2109377-001	BH30_A_0.0	EA037: pH (F)	----	0.1	pH Unit	7.9	7.9	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.0	6.1	0.0	0% - 20%
EP2109377-010	BH30_A_2.25	EA037: pH (F)	----	0.1	pH Unit	7.6	7.6	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.9	5.9	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3857720)									
EP2109377-021	BH30_A_5.0	EA037: pH (F)	----	0.1	pH Unit	5.2	5.3	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.2	4.2	0.0	0% - 20%
EP2109377-031	BH31_A_1.0	EA037: pH (F)	----	0.1	pH Unit	8.0	8.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.4	6.4	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3857721)									
EP2109377-042	BH31_A_3.75	EA037: pH (F)	----	0.1	pH Unit	4.5	4.5	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.6	3.6	0.0	0% - 20%
EP2109377-051	BH31_A_6.0	EA037: pH (F)	----	0.1	pH Unit	5.0	5.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.9	3.9	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3860877)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	91.6	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 3860878)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	92.8	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3860877)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	87.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3860878)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	87.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3860877)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3860877)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3860878)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2109377**	Page	: 1 of 7
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 17-Aug-2021
Site	: GEHBI - WP4	Issue Date	: 01-Sep-2021
Sampler	: BRONWYN VAN VALKENGOED, Shimona Babra	No. of samples received	: 51
Order number	: 30058301	No. of samples analysed	: 51

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
80* dried soil (EA033)							
BH30_A_0.0, BH30_A_0.5, BH30_A_1.0, BH30_A_1.5, BH30_A_2.0, BH30_A_2.5, BH30_A_3.0, BH30_A_3.5, BH30_A_4.0, BH30_A_4.5, BH30_A_5.0, BH30_A_5.5, BH30_A_6.0, BH31_A_0.0, BH31_A_0.5, BH31_A_1.0, BH31_A_1.5, BH31_A_2.0, BH31_A_2.5, BH31_A_3.0, BH31_A_3.5, BH31_A_4.0, BH31_A_4.5, BH31_A_5.0, BH31_A_5.5, BH31_A_6.0, SQC011_A	**16-Aug-2021**	**25-Aug-2021**	16-Aug-2022	✓	**27-Aug-2021**	23-Nov-2021	✓
EA033-B: Potential Acidity							
80* dried soil (EA033)							
BH30_A_0.0, BH30_A_0.5, BH30_A_1.0, BH30_A_1.5, BH30_A_2.0, BH30_A_2.5, BH30_A_3.0, BH30_A_3.5, BH30_A_4.0, BH30_A_4.5, BH30_A_5.0, BH30_A_5.5, BH30_A_6.0, BH31_A_0.0, BH31_A_0.5, BH31_A_1.0, BH31_A_1.5, BH31_A_2.0, BH31_A_2.5, BH31_A_3.0, BH31_A_3.5, BH31_A_4.0, BH31_A_4.5, BH31_A_5.0, BH31_A_5.5, BH31_A_6.0, SQC011_A	**16-Aug-2021**	**25-Aug-2021**	16-Aug-2022	✓	**27-Aug-2021**	23-Nov-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
80* dried soil (EA033)							
BH30_A_0.0, BH30_A_0.5, BH30_A_1.0, BH30_A_1.5, BH30_A_2.0, BH30_A_2.5, BH30_A_3.0, BH30_A_3.5, BH30_A_4.0, BH30_A_4.5, BH30_A_5.0, BH30_A_5.5, BH30_A_6.0, BH31_A_0.0, BH31_A_0.5, BH31_A_1.0, BH31_A_1.5, BH31_A_2.0, BH31_A_2.5, BH31_A_3.0, BH31_A_3.5, BH31_A_4.0, BH31_A_4.5, BH31_A_5.0, BH31_A_5.5, BH31_A_6.0, SQC011_A	**16-Aug-2021**	**25-Aug-2021**	16-Aug-2022	✓	**27-Aug-2021**	23-Nov-2021	✓
EA033-D: Retained Acidity							
80* dried soil (EA033)							
BH30_A_0.0, BH30_A_0.5, BH30_A_1.0, BH30_A_1.5, BH30_A_2.0, BH30_A_2.5, BH30_A_3.0, BH30_A_3.5, BH30_A_4.0, BH30_A_4.5, BH30_A_5.0, BH30_A_5.5, BH30_A_6.0, BH31_A_0.0, BH31_A_0.5, BH31_A_1.0, BH31_A_1.5, BH31_A_2.0, BH31_A_2.5, BH31_A_3.0, BH31_A_3.5, BH31_A_4.0, BH31_A_4.5, BH31_A_5.0, BH31_A_5.5, BH31_A_6.0, SQC011_A	**16-Aug-2021**	**25-Aug-2021**	16-Aug-2022	✓	**27-Aug-2021**	23-Nov-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-E: Acid Base Accounting							
80* dried soil (EA033)							
BH30_A_0.0, BH30_A_0.5, BH30_A_1.0, BH30_A_1.5, BH30_A_2.0, BH30_A_2.5, BH30_A_3.0, BH30_A_3.5, BH30_A_4.0, BH30_A_4.5, BH30_A_5.0, BH30_A_5.5, BH30_A_6.0, BH31_A_0.0, BH31_A_0.5, BH31_A_1.0, BH31_A_1.5, BH31_A_2.0, BH31_A_2.5, BH31_A_3.0, BH31_A_3.5, BH31_A_4.0, BH31_A_4.5, BH31_A_5.0, BH31_A_5.5, BH31_A_6.0, SQC011_A	**16-Aug-2021**	**25-Aug-2021**	16-Aug-2022	✓	**27-Aug-2021**	23-Nov-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH30_A_0.0,	BH30_A_0.25,	**16-Aug-2021**	**19-Aug-2021**	12-Feb-2022	✓	**19-Aug-2021**	12-Feb-2022	✓
BH30_A_0.5,	BH30_A_0.75,							
BH30_A_1.0,	BH30_A_1.25,							
BH30_A_1.5,	BH30_A_1.75,							
BH30_A_2.0,	BH30_A_2.25,							
BH30_A_2.5,	BH30_A_2.75,							
BH30_A_3.0,	BH30_A_3.25,							
BH30_A_3.5,	BH30_A_3.75,							
BH30_A_4.0,	BH30_A_4.25,							
BH30_A_4.5,	BH30_A_4.75,							
BH30_A_5.0,	BH30_A_5.25,							
BH30_A_5.5,	BH30_A_5.75,							
BH30_A_6.0,	BH31_A_0.0,							
BH31_A_0.25,	BH31_A_0.5,							
BH31_A_0.75,	BH31_A_1.0,							
BH31_A_1.25,	BH31_A_1.5,							
BH31_A_1.75,	BH31_A_2.0,							
BH31_A_2.25,	BH31_A_2.5,							
BH31_A_2.75,	BH31_A_3.0,							
BH31_A_3.25,	BH31_A_3.5,							
BH31_A_3.75,	BH31_A_4.0,							
BH31_A_4.25,	BH31_A_4.5,							
BH31_A_4.75,	BH31_A_5.0,							
BH31_A_5.25,	BH31_A_5.5,							
BH31_A_5.75,	BH31_A_6.0,							
SQC011_A								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	6	51	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	27	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

ALSCompass
SAMPLING *Intelligence*

Environmental Division
Perth
Work Order Reference
EP2110218

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: GEHBI-WP2.2 **Client:** Arcadis **Project Manager:** Bronwyn Van Valkengoed
Phone: (0408 751 386)

ALS Compass COC Reference: 27123 **# Samples:** 34 **Sampler:** Jaimon Hollett
Phone: (0420 838 328)

Turnaround Requirements: Standard ____ Urgent ____

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	N/A
	Free ice / frozen ice bricks upon receipt?	YES	NO	N/A
	Random sample temperature on receipt?		°C	

Custody:

Relinquished by: JH	**Received by:** EG	**Relinquished by:**	**Received by:**
Date / Time: 2/9/21 1530	**Date / Time:** 2/9/21 @1720	**Date / Time:**	**Date / Time:**

CHAIN OF CUSTODY

(ALS) COC#: 27123 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.2

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH17_A_0.0		02/09/2021 07:36 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH17_A_0.25		02/09/2021 07:37 AM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH17_A_0.5		02/09/2021 07:37 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH17_A_0.75		02/09/2021 07:37 AM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH17_A_1.0		02/09/2021 07:38 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH17_A_1.25		02/09/2021 07:38 AM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH17_A_1.5		02/09/2021 07:39 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH17_A_1.75		02/09/2021 07:39 AM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH17_A_2.0		02/09/2021 07:39 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27123 ALS Laboratory: EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.2

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH17_A_2.25		02/09/2021 07:50 AM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH17_A_2.5		02/09/2021 07:40 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
012	BH17_A_2.75		02/09/2021 07:40 AM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH17_A_3.0		02/09/2021 07:41 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
014	BH17_A_3.25		02/09/2021 07:41 AM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH17_A_3.5		02/09/2021 07:41 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
016	BH17_A_3.75		02/09/2021 07:42 AM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH17_A_4.0		02/09/2021 07:42 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
018	BH17_A_4.25		02/09/2021 07:43 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

(ALS) COC#: 27123 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.2

ORDER NO: 30058301

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH17_A_4.5		02/09/2021 07:43 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
020	BH17_A_4.75		02/09/2021 07:43 AM	Soil	ALS: 1 Non ALS: 0	No	X			
021	BH17_A_5.0		02/09/2021 07:44 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
022	SQC019_A		02/09/2021 07:51 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
023	BH17_A_5.25		02/09/2021 07:44 AM	Soil	ALS: 1 Non ALS: 0	No	X			
024	BH17_A_5.5		02/09/2021 07:44 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
025	BH17_A_5.75		02/09/2021 07:45 AM	Soil	ALS: 1 Non ALS: 0	No	X			
026	BH17_A_6.0		02/09/2021 07:45 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
027	BH17_A_6.25		02/09/2021 07:45 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

(ALS) COC#: **27123** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.2

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH17_A_6.5		02/09/2021 07:46 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
029	BH17_A_6.75		02/09/2021 07:47 AM	Soil	ALS: 1 Non ALS: 0	No	X			
030	BH17_A_7.0		02/09/2021 07:47 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
031	BH17_A_7.25		02/09/2021 07:48 AM	Soil	ALS: 1 Non ALS: 0	No	X			
032	BH17_A_7.5		02/09/2021 07:48 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
033	BH17_A_7.75		02/09/2021 07:49 AM	Soil	ALS: 1 Non ALS: 0	No	X			
034	BH17_A_8.0		02/09/2021 07:49 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

(ALS) COC#: 27123 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.2

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH17_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071809	Green	No	
002	BH17_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071810	Green	No	
003	BH17_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071796	Green	No	
004	BH17_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071797	Green	No	
005	BH17_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071798	Green	No	
006	BH17_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071799	Green	No	
007	BH17_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071800	Green	No	
008	BH17_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071801	Green	No	
009	BH17_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071802	Green	No	
010	BH17_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071454	Green	No	
011	BH17_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071803	Green	No	
012	BH17_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071804	Green	No	
013	BH17_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071805	Green	No	
014	BH17_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071806	Green	No	
015	BH17_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071807	Green	No	
016	BH17_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071808	Green	No	
017	BH17_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071752	Green	No	
018	BH17_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071753	Green	No	
019	BH17_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071757	Green	No	
020	BH17_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071755	Green	No	
021	BH17_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071756	Green	No	
022	SQC019_A	Snap Lock Bag - frozen	1 Medium	00130621071845	Green	No	
023	BH17_A_5.25	Snap Lock Bag - frozen	1 Medium	00130621071758	Green	No	
024	BH17_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621071759	Green	No	
025	BH17_A_5.75	Snap Lock Bag - frozen	1 Medium	00130621071760	Green	No	
026	BH17_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621071761	Green	No	

CHAIN OF CUSTODY

ALS COC#: 27123 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.2

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

027	BH17_A_6.25	Snap Lock Bag - frozen	1 Medium	00130621071762	Green	No	
028	BH17_A_6.5	Snap Lock Bag - frozen	1 Medium	00130621071763	Green	No	
029	BH17_A_6.75	Snap Lock Bag - frozen	1 Medium	00130621071764	Green	No	
030	BH17_A_7.0	Snap Lock Bag - frozen	1 Medium	00130621071765	Green	No	
031	BH17_A_7.25	Snap Lock Bag - frozen	1 Medium	00130621071766	Green	No	
032	BH17_A_7.5	Snap Lock Bag - frozen	1 Medium	00130621071767	Green	No	
033	BH17_A_7.75	Snap Lock Bag - frozen	1 Medium	00130621071768	Green	No	
034	BH17_A_8.0	Snap Lock Bag - frozen	1 Medium	00130621071769	Green	No	

Total Bottle Count: ALS: 34, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2110218**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 27123	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP2.2		
Sampler	: BRONWYN VAN VALKENGOED, Jaimon Hollett		

Dates

Date Samples Received	: 02-Sep-2021 17:20	Issue Date	: 02-Sep-2021
Client Requested Due Date	: 17-Sep-2021	Scheduled Reporting Date	: **17-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 12	Temperature	: 11.5 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 34 / 34

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110218-001	02-Sep-2021 07:36	BH17_A_0.0	✓	✓
EP2110218-002	02-Sep-2021 07:37	BH17_A_0.25		✓
EP2110218-003	02-Sep-2021 07:37	BH17_A_0.5	✓	✓
EP2110218-004	02-Sep-2021 07:37	BH17_A_0.75		✓
EP2110218-005	02-Sep-2021 07:38	BH17_A_1.0	✓	✓
EP2110218-006	02-Sep-2021 07:38	BH17_A_1.25		✓
EP2110218-007	02-Sep-2021 07:39	BH17_A_1.5	✓	✓
EP2110218-008	02-Sep-2021 07:39	BH17_A_1.75		✓
EP2110218-009	02-Sep-2021 07:39	BH17_A_2.0	✓	✓
EP2110218-010	02-Sep-2021 07:50	BH17_A_2.25		✓
EP2110218-011	02-Sep-2021 07:40	BH17_A_2.5	✓	✓
EP2110218-012	02-Sep-2021 07:40	BH17_A_2.75		✓
EP2110218-013	02-Sep-2021 07:41	BH17_A_3.0	✓	✓
EP2110218-014	02-Sep-2021 07:41	BH17_A_3.25		✓
EP2110218-015	02-Sep-2021 07:41	BH17_A_3.5	✓	✓
EP2110218-016	02-Sep-2021 07:42	BH17_A_3.75		✓
EP2110218-017	02-Sep-2021 07:42	BH17_A_4.0	✓	✓
EP2110218-018	02-Sep-2021 07:43	BH17_A_4.25		✓
EP2110218-019	02-Sep-2021 07:43	BH17_A_4.5	✓	✓
EP2110218-020	02-Sep-2021 07:43	BH17_A_4.75		✓
EP2110218-021	02-Sep-2021 07:44	BH17_A_5.0	✓	✓
EP2110218-022	02-Sep-2021 07:51	SQC019_A	✓	✓
EP2110218-023	02-Sep-2021 07:44	BH17_A_5.25		✓
EP2110218-024	02-Sep-2021 07:44	BH17_A_5.5	✓	✓
EP2110218-025	02-Sep-2021 07:45	BH17_A_5.75		✓
EP2110218-026	02-Sep-2021 07:45	BH17_A_6.0	✓	✓
EP2110218-027	02-Sep-2021 07:45	BH17_A_6.25		✓
EP2110218-028	02-Sep-2021 07:46	BH17_A_6.5	✓	✓
EP2110218-029	02-Sep-2021 07:47	BH17_A_6.75		✓
EP2110218-030	02-Sep-2021 07:47	BH17_A_7.0	✓	✓
EP2110218-031	02-Sep-2021 07:48	BH17_A_7.25		✓
EP2110218-032	02-Sep-2021 07:48	BH17_A_7.5	✓	✓
EP2110218-033	02-Sep-2021 07:49	BH17_A_7.75		✓
EP2110218-034	02-Sep-2021 07:49	BH17_A_8.0	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Carina Andersen

- A4 - AU Tax Invoice (INV)	Email	carina.andersen@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110218**	Page	: 1 of 9
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 02-Sep-2021 17:20
Order number	: 30058301	Date Analysis Commenced	: 06-Sep-2021
C-O-C number	: 27123	Issue Date	: 17-Sep-2021 12:40
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP2.2		
Quote number	: EP/529/21_V4		
No. of samples received	: 34		
No. of samples analysed	: 34		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required for particular samples because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH17_A_0.0	BH17_A_0.25	BH17_A_0.5	BH17_A_0.75	BH17_A_1.0
			Sampling date / time	02-Sep-2021 07:36	02-Sep-2021 07:37	02-Sep-2021 07:37	02-Sep-2021 07:37	02-Sep-2021 07:38
Compound	CAS Number	LOR	Unit	EP2110218-001	EP2110218-002	EP2110218-003	EP2110218-004	EP2110218-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.9**	**----**	**9.0**	**----**	**6.2**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.009**	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**4.67**	**----**	**5.18**	**----**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**934**	**----**	**1040**	**----**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**1.50**	**----**	**1.66**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.0**	**8.2**	**8.1**	**8.0**	**7.1**
pH (Fox)	----	0.1	pH Unit	**5.3**	**5.3**	**5.6**	**5.7**	**5.4**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH17_A_1.25	BH17_A_1.5	BH17_A_1.75	BH17_A_2.0	BH17_A_2.25
			Sampling date / time	02-Sep-2021 07:38	02-Sep-2021 07:39	02-Sep-2021 07:39	02-Sep-2021 07:39	02-Sep-2021 07:50
Compound	CAS Number	LOR	Unit	EP2110218-006	EP2110218-007	EP2110218-008	EP2110218-009	EP2110218-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	7.4	----	6.8	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	0.02	----	0.02	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	<10	----	<10	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.01	----	0.01	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.9	7.0	7.2	6.7	6.4
pH (Fox)	----	0.1	pH Unit	5.2	4.9	5.0	5.0	4.8
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH17_A_2.5	BH17_A_2.75	BH17_A_3.0	BH17_A_3.25	BH17_A_3.5
			Sampling date / time	02-Sep-2021 07:40	02-Sep-2021 07:40	02-Sep-2021 07:41	02-Sep-2021 07:41	02-Sep-2021 07:41
Compound	CAS Number	LOR	Unit	EP2110218-011	EP2110218-012	EP2110218-013	EP2110218-014	EP2110218-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.0**	**----**	**6.2**	**----**	**6.6**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**----**	**----**	**----**	**----**	**0.05**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**----**	**----**	**----**	**----**	<10
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**----**	**----**	**----**	**----**	**0.02**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.2**	**6.3**	**6.1**	**6.3**	**6.3**
pH (Fox)	----	0.1	pH Unit	**4.6**	**4.6**	**4.5**	**4.5**	**4.8**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH17_A_3.75	BH17_A_4.0	BH17_A_4.25	BH17_A_4.5	BH17_A_4.75
			Sampling date / time	02-Sep-2021 07:42	02-Sep-2021 07:42	02-Sep-2021 07:43	02-Sep-2021 07:43	02-Sep-2021 07:43
Compound	CAS Number	LOR	Unit	EP2110218-016	EP2110218-017	EP2110218-018	EP2110218-019	EP2110218-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.0	----	5.8	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	4	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.2	6.3	6.2	6.1	6.2
pH (Fox)	----	0.1	pH Unit	4.6	4.7	4.6	4.7	4.1
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH17_A_5.0	SQC019_A	BH17_A_5.25	BH17_A_5.5	BH17_A_5.75
			Sampling date / time	02-Sep-2021 07:44	02-Sep-2021 07:51	02-Sep-2021 07:44	02-Sep-2021 07:44	02-Sep-2021 07:45
Compound	CAS Number	LOR	Unit	EP2110218-021	EP2110218-022	EP2110218-023	EP2110218-024	EP2110218-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.7**	**8.9**	**----**	**5.7**	**----**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**6**	<2	**----**	**7**	**----**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	**----**	<0.02	**----**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**0.005**	**----**	<0.005	**----**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**----**	**0.80**	**----**	**----**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**----**	**159**	**----**	**----**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**----**	**0.26**	**----**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**----**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	**----**	<0.02	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
Liming Rate	----	1	kg CaCO3/t	**1**	<1	**----**	**1**	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	**----**	<0.02	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	<1	**----**	**1**	**----**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.2**	**7.6**	**5.8**	**5.6**	**5.5**
pH (Fox)	----	0.1	pH Unit	**4.2**	**5.6**	**4.2**	**4.4**	**4.3**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH17_A_6.0	BH17_A_6.25	BH17_A_6.5	BH17_A_6.75	BH17_A_7.0
			Sampling date / time	02-Sep-2021 07:45	02-Sep-2021 07:45	02-Sep-2021 07:46	02-Sep-2021 07:47	02-Sep-2021 07:47
Compound	CAS Number	LOR	Unit	EP2110218-026	EP2110218-027	EP2110218-028	EP2110218-029	EP2110218-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.7**	**----**	**5.7**	**----**	**5.6**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**9**	**----**	**7**	**----**	**7**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.02**	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	**10**	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	**1**	**----**	**1**	**----**	**1**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.02**	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**10**	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	**----**	**1**	**----**	**1**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.3**	**5.5**	**5.8**	**5.6**	**5.8**
pH (Fox)	----	0.1	pH Unit	**4.2**	**4.3**	**4.3**	**4.4**	**4.4**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH17_A_7.25	BH17_A_7.5	BH17_A_7.75	BH17_A_8.0	----
			Sampling date / time	02-Sep-2021 07:48	02-Sep-2021 07:48	02-Sep-2021 07:49	02-Sep-2021 07:49	----
Compound	CAS Number	LOR	Unit	EP2110218-031	EP2110218-032	EP2110218-033	EP2110218-034	--------
				Result	Result	Result	Result	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.7	----	5.7	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	5	----	8	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.8	5.7	6.0	5.8	----
pH (Fox)	----	0.1	pH Unit	4.2	4.3	4.6	4.2	----
Reaction Rate	----	1	-	Slight	Slight	Moderate	Moderate	----

QUALITY CONTROL REPORT

Work Order	: **EP2110218**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 02-Sep-2021
Order number	: 30058301	Date Analysis Commenced	: 06-Sep-2021
C-O-C number	: 27123	Issue Date	: 17-Sep-2021
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP2.2		
Quote number	: EP/529/21_V4		
No. of samples received	: 34		
No. of samples analysed	: 34		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3899397)									
EP2110218-001	BH17_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.9	8.9	0.0	0% - 20%
EP2110218-021	BH17_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	6	6	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.7	5.7	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3899397)									
EP2110218-001	BH17_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.009	0.008	11.8	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110218-021	BH17_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3899397)									
EP2110218-001	BH17_A_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	4.67	4.66	0.2	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.50	1.49	0.7	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	934	932	0.2	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 3899397)									
EP2110218-001	BH17_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-E: Acid Base Accounting (QC Lot: 3899397) - continued									
EP2110218-001	BH17_A_0.0	EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110218-021	BH17_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3885621)									
EP2110218-001	BH17_A_0.0	EA037: pH (F)	----	0.1	pH Unit	8.0	7.9	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.3	5.3	0.0	0% - 20%
EP2110218-010	BH17_A_2.25	EA037: pH (F)	----	0.1	pH Unit	6.4	6.4	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.8	4.8	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3885622)									
EP2110218-021	BH17_A_5.0	EA037: pH (F)	----	0.1	pH Unit	5.2	5.1	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.2	4.1	0.0	0% - 20%
EP2110218-030	BH17_A_7.0	EA037: pH (F)	----	0.1	pH Unit	5.8	5.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.4	4.4	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3899397)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	101	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3899397)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	90.6	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3899397)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3899397)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110218**	Page	: 1 of 6
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 02-Sep-2021
Site	: GEHBI - WP2.2	Issue Date	: 17-Sep-2021
Sampler	: Jaimon Hollett	No. of samples received	: 34
Order number	: 30058301	No. of samples analysed	: 34

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
BH17_A_0.0,	BH17_A_0.5,	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
BH17_A_1.0,	BH17_A_1.5,							
BH17_A_2.0,	BH17_A_2.5,							
BH17_A_3.0,	BH17_A_3.5,							
BH17_A_4.0,	BH17_A_4.5,							
BH17_A_5.0,	SQC019_A,							
BH17_A_5.5,	BH17_A_6.0,							
BH17_A_6.5,	BH17_A_7.0,							
BH17_A_7.5,	BH17_A_8.0							
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
BH17_A_0.0,	BH17_A_0.5,	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
BH17_A_1.0,	BH17_A_1.5,							
BH17_A_2.0,	BH17_A_2.5,							
BH17_A_3.0,	BH17_A_3.5,							
BH17_A_4.0,	BH17_A_4.5,							
BH17_A_5.0,	SQC019_A,							
BH17_A_5.5,	BH17_A_6.0,							
BH17_A_6.5,	BH17_A_7.0,							
BH17_A_7.5,	BH17_A_8.0							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033)								
BH17_A_0.0,	BH17_A_0.5,	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
BH17_A_1.0,	BH17_A_1.5,							
BH17_A_2.0,	BH17_A_2.5,							
BH17_A_3.0,	BH17_A_3.5,							
BH17_A_4.0,	BH17_A_4.5,							
BH17_A_5.0,	SQC019_A,							
BH17_A_5.5,	BH17_A_6.0,							
BH17_A_6.5,	BH17_A_7.0,							
BH17_A_7.5,	BH17_A_8.0							
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033)								
BH17_A_0.0,	BH17_A_0.5,	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
BH17_A_1.0,	BH17_A_1.5,							
BH17_A_2.0,	BH17_A_2.5,							
BH17_A_3.0,	BH17_A_3.5,							
BH17_A_4.0,	BH17_A_4.5,							
BH17_A_5.0,	SQC019_A,							
BH17_A_5.5,	BH17_A_6.0,							
BH17_A_6.5,	BH17_A_7.0,							
BH17_A_7.5,	BH17_A_8.0							
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033)								
BH17_A_0.0,	BH17_A_0.5,	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
BH17_A_1.0,	BH17_A_1.5,							
BH17_A_2.0,	BH17_A_2.5,							
BH17_A_3.0,	BH17_A_3.5,							
BH17_A_4.0,	BH17_A_4.5,							
BH17_A_5.0,	SQC019_A,							
BH17_A_5.5,	BH17_A_6.0,							
BH17_A_6.5,	BH17_A_7.0,							
BH17_A_7.5,	BH17_A_8.0							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH17_A_0.0,	BH17_A_0.25,	**02-Sep-2021**	**06-Sep-2021**	01-Mar-2022	✓	**06-Sep-2021**	01-Mar-2022	✓
BH17_A_0.5,	BH17_A_0.75,							
BH17_A_1.0,	BH17_A_1.25,							
BH17_A_1.5,	BH17_A_1.75,							
BH17_A_2.0,	BH17_A_2.25,							
BH17_A_2.5,	BH17_A_2.75,							
BH17_A_3.0,	BH17_A_3.25,							
BH17_A_3.5,	BH17_A_3.75,							
BH17_A_4.0,	BH17_A_4.25,							
BH17_A_4.5,	BH17_A_4.75,							
BH17_A_5.0,	SQC019_A,							
BH17_A_5.25,	BH17_A_5.5,							
BH17_A_5.75,	BH17_A_6.0,							
BH17_A_6.25,	BH17_A_6.5,							
BH17_A_6.75,	BH17_A_7.0,							
BH17_A_7.25,	BH17_A_7.5,							
BH17_A_7.75,	BH17_A_8.0							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Environmental Division
Perth
Work Order Reference
EP2110345

Telephone : -- 61-8-9406 1301

ALSCompass SAMPLING Intelligence

Custody Document for Submissions via ALS Compass App

Project: CLEHBI_WP2_3 **Client:** Arcadis **Project Manager:** Bronwyn Van Valkengoed
Phone: (0408 751 386)

ALS Compass COC Reference: 27210 **# Samples:** 27 **Sampler:** Jamon Hollett
Phone: (0408 838 328)

Turnaround Requirements: Standard _____ Urgent _____

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	N/A
	Free ice / frozen ice bricks upon receipt?	YES	NO	N/A
	Random sample temperature on receipt?		°C	

Custody:

Relinquished by:	**Received by:**	**Relinquished by:**	**Received by:**
DA	EG		
Date / Time: 3/9/21 1400	**Date / Time:** 3/9 @1535	**Date / Time:**	**Date / Time:**

CHAIN OF CUSTODY

ALS COC#: 27180 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.1

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH21_A_0.0		03/09/2021 07:41 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH21_A_0.25		03/09/2021 07:42 AM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH21_A_0.5		03/09/2021 07:43 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH21_A_0.75		03/09/2021 07:43 AM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH21_A_1.0		03/09/2021 07:44 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH21_A_1.25		03/09/2021 07:44 AM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH21_A_1.5		03/09/2021 07:44 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH21_A_1.75		03/09/2021 07:45 AM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH21_A_2.0		03/09/2021 07:45 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27180 *ALS Laboratory:* EP Perth

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH21_A_2.25		03/09/2021 07:46 AM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH21_A_2.5		03/09/2021 07:46 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
012	BH21_A_2.75		03/09/2021 07:46 AM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH21_A_3.0		03/09/2021 07:47 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
014	BH21_A_3.25		03/09/2021 07:47 AM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH21_A_3.5		03/09/2021 07:47 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
016	BH21_A_3.75		03/09/2021 07:48 AM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH21_A_4.0		03/09/2021 07:48 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
018	BH22_A_0.0		03/09/2021 08:26 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27180 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

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CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH22_A_0.25		03/09/2021 08:26 AM	Soil	ALS: 1 Non ALS: 0	No	X			
020	BH22_A_0.5		03/09/2021 08:27 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
021	BH22_A_0.75		03/09/2021 08:27 AM	Soil	ALS: 1 Non ALS: 0	No	X			
022	BH22_A_1.0		03/09/2021 08:28 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
023	BH22_A_1.25		03/09/2021 08:28 AM	Soil	ALS: 1 Non ALS: 0	No	X			
024	BH22_A_1.5		03/09/2021 08:28 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
025	BH22_A_1.75		03/09/2021 08:29 AM	Soil	ALS: 1 Non ALS: 0	No	X			
026	BH22_A_2.0		03/09/2021 08:29 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
027	BH22_A_2.25		03/09/2021 08:29 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 27180 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.1

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

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SAMPLER MOBILE:

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH22_A_2.5		03/09/2021 08:30 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
029	BH22_A_2.75		03/09/2021 08:30 AM	Soil	ALS: 1 Non ALS: 0	No	X			
030	BH22_A_3.0		03/09/2021 08:30 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
031	BH22_A_3.25		03/09/2021 08:31 AM	Soil	ALS: 1 Non ALS: 0	No	X			
032	BH22_A_3.5		03/09/2021 08:31 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
033	BH22_A_3.75		03/09/2021 08:31 AM	Soil	ALS: 1 Non ALS: 0	No	X			
034	BH22_A_4.0		03/09/2021 08:32 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
035	SQC026_A		03/09/2021 08:32 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 27180 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.1

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH21_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621070798	Green	No	
002	BH21_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621070799	Green	No	
003	BH21_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621070800	Green	No	
004	BH21_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621070801	Green	No	
005	BH21_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621070802	Green	No	
006	BH21_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621070803	Green	No	
007	BH21_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621070811	Green	No	
008	BH21_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621070812	Green	No	
009	BH21_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621070813	Green	No	
010	BH21_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621070814	Green	No	
011	BH21_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621070815	Green	No	
012	BH21_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621070816	Green	No	
013	BH21_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621070817	Green	No	
014	BH21_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621070818	Green	No	
015	BH21_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621070819	Green	No	
016	BH21_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621070820	Green	No	
017	BH21_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621070821	Green	No	
018	BH22_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071501	Green	No	
019	BH22_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071502	Green	No	
020	BH22_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071503	Green	No	
021	BH22_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071504	Green	No	
022	BH22_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071505	Green	No	
023	BH22_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071506	Green	No	
024	BH22_A_1.5	Snap Lock Bag - frozen	1 Small	00130621071507	Green	No	
025	BH22_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071508	Green	No	
026	BH22_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071509	Green	No	

CHAIN OF CUSTODY

(ALS) COC#: 27180 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.1

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

027	BH22_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071510	Green	No	
028	BH22_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071511	Green	No	
029	BH22_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071512	Green	No	
030	BH22_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071500	Green	No	
031	BH22_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071499	Green	No	
032	BH22_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071498	Green	No	
033	BH22_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071497	Green	No	
034	BH22_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071514	Green	No	
035	SQC026_A	Snap Lock Bag - frozen	1 Medium	00130621071513	Green	No	

Total Bottle Count: ALS: 35, Non ALS: 0

CHAIN OF CUSTODY

COC#: 27210 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.3

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH27_A_0.0		03/09/2021 12:23 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH27_A_0.25		03/09/2021 12:24 PM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH27_A_0.5		03/09/2021 12:25 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH27_A_0.75		03/09/2021 12:25 PM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH27_A_1.0		03/09/2021 12:26 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH27_A_1.25		03/09/2021 12:26 PM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH27_A_1.5		03/09/2021 12:27 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH27_A_1.75		03/09/2021 12:27 PM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH27_A_2.0		03/09/2021 12:28 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2110345**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 27210	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP2.3		
Sampler	: BRONWYN VAN VALKENGOED, Jaimon Hollett		

Dates

Date Samples Received	: 03-Sep-2021 15:35	Issue Date	: 06-Sep-2021
Client Requested Due Date	: 20-Sep-2021	Scheduled Reporting Date	: **13-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 9	Temperature	: 11.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 27 / 27

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110345-001	03-Sep-2021 12:23	BH27_A_0.0	✓	✓
EP2110345-002	03-Sep-2021 12:24	BH27_A_0.25		✓
EP2110345-003	03-Sep-2021 12:25	BH27_A_0.5	✓	✓
EP2110345-004	03-Sep-2021 12:25	BH27_A_0.75		✓
EP2110345-005	03-Sep-2021 12:26	BH27_A_1.0	✓	✓
EP2110345-006	03-Sep-2021 12:26	BH27_A_1.25		✓
EP2110345-007	03-Sep-2021 12:27	BH27_A_1.5	✓	✓
EP2110345-008	03-Sep-2021 12:27	BH27_A_1.75		✓
EP2110345-009	03-Sep-2021 12:28	BH27_A_2.0	✓	✓
EP2110345-010	03-Sep-2021 12:28	BH27_A_2.25		✓
EP2110345-011	03-Sep-2021 12:28	BH27_A_2.5	✓	✓
EP2110345-012	03-Sep-2021 12:29	BH27_A_2.75		✓
EP2110345-013	03-Sep-2021 12:29	BH27_A_3.0	✓	✓
EP2110345-014	03-Sep-2021 12:30	BH27_A_3.25		✓
EP2110345-015	03-Sep-2021 12:30	BH27_A_3.5	✓	✓
EP2110345-016	03-Sep-2021 12:30	BH27_A_3.75		✓
EP2110345-017	03-Sep-2021 12:31	BH27_A_4.0	✓	✓
EP2110345-018	03-Sep-2021 12:31	BH27_A_4.25		✓
EP2110345-019	03-Sep-2021 12:31	BH27_A_4.5	✓	✓
EP2110345-020	03-Sep-2021 12:32	BH27_A_4.75		✓
EP2110345-021	03-Sep-2021 12:32	BH27_A_5.0	✓	✓
EP2110345-022	03-Sep-2021 12:33	BH27_A_5.25		✓
EP2110345-023	03-Sep-2021 12:33	BH27_A_5.5	✓	✓
EP2110345-024	03-Sep-2021 12:33	BH27_A_5.75		✓
EP2110345-025	03-Sep-2021 12:34	BH27_A_6.0	✓	✓
EP2110345-026	03-Sep-2021 12:34	SQC029_A		✓
EP2110345-027	03-Sep-2021 12:35	SQC039_A		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Carina Andersen

- A4 - AU Tax Invoice (INV)	Email	carina.andersen@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110345**	Page	: 1 of 8
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 03-Sep-2021 15:35
Order number	: 30058301	Date Analysis Commenced	: 08-Sep-2021
C-O-C number	: 27210	Issue Date	: 20-Sep-2021 17:34
Sampler	: BRONWYN VAN VALKENGOED, Jaimon Hollett		
Site	: GEHBI - WP2.3		
Quote number	: EP/529/21_V4		
No. of samples received	: 27		
No. of samples analysed	: 27		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH27_A_0.0	BH27_A_0.25	BH27_A_0.5	BH27_A_0.75	BH27_A_1.0
			Sampling date / time	03-Sep-2021 12:23	03-Sep-2021 12:24	03-Sep-2021 12:25	03-Sep-2021 12:25	03-Sep-2021 12:26
Compound	CAS Number	LOR	Unit	EP2110345-001	EP2110345-002	EP2110345-003	EP2110345-004	EP2110345-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.3	----	5.7	----	5.8
Titratable Actual Acidity (23F)	----	2	mole H+ / t	8	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.5	5.6	5.6	5.8	6.1
pH (Fox)	----	0.1	pH Unit	3.6	3.8	4.2	4.3	4.2
Reaction Rate	----	1	-	Moderate	Moderate	Moderate	Moderate	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH27_A_1.25	BH27_A_1.5	BH27_A_1.75	BH27_A_2.0	BH27_A_2.25
			Sampling date / time	03-Sep-2021 12:26	03-Sep-2021 12:27	03-Sep-2021 12:27	03-Sep-2021 12:28	03-Sep-2021 12:28
Compound	CAS Number	LOR	Unit	EP2110345-006	EP2110345-007	EP2110345-008	EP2110345-009	EP2110345-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.0	----	6.0	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	5	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.0	6.0	5.9	6.2	6.3
pH (Fox)	----	0.1	pH Unit	4.3	4.4	4.2	4.4	4.5
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH27_A_2.5	BH27_A_2.75	BH27_A_3.0	BH27_A_3.25	BH27_A_3.5
			Sampling date / time	03-Sep-2021 12:28	03-Sep-2021 12:29	03-Sep-2021 12:29	03-Sep-2021 12:30	03-Sep-2021 12:30
Compound	CAS Number	LOR	Unit	EP2110345-011	EP2110345-012	EP2110345-013	EP2110345-014	EP2110345-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.1	----	6.0	----	6.1
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	2	----	7
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.2	6.1	6.1	5.9	5.9
pH (Fox)	----	0.1	pH Unit	4.6	4.4	4.2	4.2	4.2
Reaction Rate	----	1	-	Slight	Slight	Slight	Moderate	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH27_A_3.75	BH27_A_4.0	BH27_A_4.25	BH27_A_4.5	BH27_A_4.75
			Sampling date / time	03-Sep-2021 12:30	03-Sep-2021 12:31	03-Sep-2021 12:31	03-Sep-2021 12:31	03-Sep-2021 12:32
Compound	CAS Number	LOR	Unit	EP2110345-016	EP2110345-017	EP2110345-018	EP2110345-019	EP2110345-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.3	----	5.8	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	7	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.0	5.9	5.8	4.9	4.6
pH (Fox)	----	0.1	pH Unit	4.2	4.4	4.6	3.9	3.5
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH27_A_5.0	BH27_A_5.25	BH27_A_5.5	BH27_A_5.75	BH27_A_6.0
			Sampling date / time	03-Sep-2021 12:32	03-Sep-2021 12:33	03-Sep-2021 12:33	03-Sep-2021 12:33	03-Sep-2021 12:34
Compound	CAS Number	LOR	Unit	EP2110345-021	EP2110345-022	EP2110345-023	EP2110345-024	EP2110345-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.6	----	5.7	----	5.7
Titratable Actual Acidity (23F)	----	2	mole H+ / t	7	----	9	----	7
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	11	----	<10
Liming Rate	----	1	kg CaCO3/t	1	----	1	----	1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	11	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	----	1	----	1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	4.4	4.4	4.4	4.4	4.6
pH (Fox)	----	0.1	pH Unit	3.5	3.3	3.3	3.5	3.6
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Sample ID	**SQC029_A**	**SQC039_A**	**----**	**----**	**----**
			Sampling date / time	03-Sep-2021 12:34	03-Sep-2021 12:35	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EP2110345-026**	**EP2110345-027**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.4**	**5.6**	**----**	**----**	**----**
pH (Fox)	----	0.1	pH Unit	**3.7**	**4.3**	**----**	**----**	**----**
Reaction Rate	----	1	-	**Moderate**	**Slight**	**----**	**----**	**----**

QUALITY CONTROL REPORT

Work Order	: **EP2110345**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 03-Sep-2021
Order number	: 30058301	Date Analysis Commenced	: 08-Sep-2021
C-O-C number	: 27210	Issue Date	: 20-Sep-2021
Sampler	: BRONWYN VAN VALKENGOED, Jaimon Hollett		
Site	: GEHBI - WP2.3		
Quote number	: EP/529/21_V4		
No. of samples received	: 27		
No. of samples analysed	: 27		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3899406)									
EP2110345-001	BH27_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	8	8	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.3	5.3	0.0	0% - 20%
EP2110345-021	BH27_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	7	7	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.6	5.6	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3899406)									
EP2110345-001	BH27_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110345-021	BH27_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3899406)									
EP2110345-001	BH27_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	10	0.0	No Limit
EP2110345-021	BH27_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-E: Acid Base Accounting (QC Lot: 3899406) - continued									
EP2110345-021	BH27_A_5.0	EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3896503)									
EP2110345-001	BH27_A_0.0	EA037: pH (F)	----	0.1	pH Unit	5.5	5.6	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.6	3.6	0.0	0% - 20%
EP2110345-010	BH27_A_2.25	EA037: pH (F)	----	0.1	pH Unit	6.3	6.3	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.5	4.5	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3896504)									
EP2110345-021	BH27_A_5.0	EA037: pH (F)	----	0.1	pH Unit	4.4	4.4	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.5	3.4	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3899406)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	99.3	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3899406)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	96.0	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3899406)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110345**	Page	: 1 of 5
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 03-Sep-2021
Site	: GEHBI - WP2.3	Issue Date	: 20-Sep-2021
Sampler	: BRONWYN VAN VALKENGOED, Jaimon Hollett	No. of samples received	: 27
Order number	: 30058301	No. of samples analysed	: 27

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
BH27_A_0.0,	BH27_A_0.5,	**03-Sep-2021**	**14-Sep-2021**	03-Sep-2022	✓	**20-Sep-2021**	13-Dec-2021	✓
BH27_A_1.0,	BH27_A_1.5,							
BH27_A_2.0,	BH27_A_2.5,							
BH27_A_3.0,	BH27_A_3.5,							
BH27_A_4.0,	BH27_A_4.5,							
BH27_A_5.0,	BH27_A_5.5,							
BH27_A_6.0								
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
BH27_A_0.0,	BH27_A_0.5,	**03-Sep-2021**	**14-Sep-2021**	03-Sep-2022	✓	**20-Sep-2021**	13-Dec-2021	✓
BH27_A_1.0,	BH27_A_1.5,							
BH27_A_2.0,	BH27_A_2.5,							
BH27_A_3.0,	BH27_A_3.5,							
BH27_A_4.0,	BH27_A_4.5,							
BH27_A_5.0,	BH27_A_5.5,							
BH27_A_6.0								
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033)								
BH27_A_0.0,	BH27_A_0.5,	**03-Sep-2021**	**14-Sep-2021**	03-Sep-2022	✓	**20-Sep-2021**	13-Dec-2021	✓
BH27_A_1.0,	BH27_A_1.5,							
BH27_A_2.0,	BH27_A_2.5,							
BH27_A_3.0,	BH27_A_3.5,							
BH27_A_4.0,	BH27_A_4.5,							
BH27_A_5.0,	BH27_A_5.5,							
BH27_A_6.0								

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033)								
BH27_A_0.0,	BH27_A_0.5,	**03-Sep-2021**	**14-Sep-2021**	03-Sep-2022	✓	**20-Sep-2021**	13-Dec-2021	✓
BH27_A_1.0,	BH27_A_1.5,							
BH27_A_2.0,	BH27_A_2.5,							
BH27_A_3.0,	BH27_A_3.5,							
BH27_A_4.0,	BH27_A_4.5,							
BH27_A_5.0,	BH27_A_5.5,							
BH27_A_6.0								
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033)								
BH27_A_0.0,	BH27_A_0.5,	**03-Sep-2021**	**14-Sep-2021**	03-Sep-2022	✓	**20-Sep-2021**	13-Dec-2021	✓
BH27_A_1.0,	BH27_A_1.5,							
BH27_A_2.0,	BH27_A_2.5,							
BH27_A_3.0,	BH27_A_3.5,							
BH27_A_4.0,	BH27_A_4.5,							
BH27_A_5.0,	BH27_A_5.5,							
BH27_A_6.0								
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH27_A_0.0,	BH27_A_0.25,	**03-Sep-2021**	**08-Sep-2021**	02-Mar-2022	✓	**08-Sep-2021**	02-Mar-2022	✓
BH27_A_0.5,	BH27_A_0.75,							
BH27_A_1.0,	BH27_A_1.25,							
BH27_A_1.5,	BH27_A_1.75,							
BH27_A_2.0,	BH27_A_2.25,							
BH27_A_2.5,	BH27_A_2.75,							
BH27_A_3.0,	BH27_A_3.25,							
BH27_A_3.5,	BH27_A_3.75,							
BH27_A_4.0,	BH27_A_4.25,							
BH27_A_4.5,	BH27_A_4.75,							
BH27_A_5.0,	BH27_A_5.25,							
BH27_A_5.5,	BH27_A_5.75,							
BH27_A_6.0,	SQC029_A,							
SQC039_A								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	3	27	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

ALSCompass SAMPLING *Intelligence*

Environmental Division Perth
Work Order Reference
EP2110220

Telephone : -- 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: GEHBI_WP2.4 **Client:** Arcadis

Project Manager: Bronwyn Van Valkengoed
Phone: (0408 751 386)

ALS Compass COC Reference: 27146 **# Samples:** 39

Sampler: Jarmon Hollett
Phone: (0420 838 328)

Turnaround Requirements: Standard _____ Urgent _____

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	N/A
	Free ice / frozen ice bricks upon receipt?	YES	NO	N/A
	Random sample temperature on receipt?		°C	

Custody:

Relinquished by:	**Received by:**	**Relinquished by:**	**Received by:**
JH	EG		
Date / Time: 2/9/21 1530	**Date / Time:** 2/9/21 @1720.	**Date / Time:**	**Date / Time:**

CHAIN OF CUSTODY

ALS COC#: 27146 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH19_A_0.0		02/09/2021 12:28 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH19_A_0.25		02/09/2021 12:29 PM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH19_A_0.5		02/09/2021 12:29 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH19_A_0.75		02/09/2021 12:30 PM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH19_A_1.0		02/09/2021 12:30 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH19_A_1.25		02/09/2021 12:31 PM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH19_A_1.5		02/09/2021 12:31 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH19_A_1.75		02/09/2021 12:31 PM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH19_A_2.0		02/09/2021 12:32 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27146 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH19_A_2.25		02/09/2021 12:32 PM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH19_A_2.5		02/09/2021 12:32 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
012	BH19_A_2.75		02/09/2021 12:33 PM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH19_A_3.0		02/09/2021 12:33 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
014	BH19_A_3.25		02/09/2021 12:34 PM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH19_A_3.5		02/09/2021 12:34 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
016	BH19_A_3.75		02/09/2021 12:35 PM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH19_A_4.0		02/09/2021 12:35 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
018	BH19_A_4.25		02/09/2021 12:36 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

(ALS) COC#: 27146 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Bronwyn Vanvalkengoed

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH19_A_4.5		02/09/2021 12:38 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
020	BH19_A_4.75		02/09/2021 12:39 PM	Soil	ALS: 1 Non ALS: 0	No	X			
021	BH19_A_5.0		02/09/2021 12:39 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
022	SQC022_A		02/09/2021 12:51 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
023	BH19_A_5.25		02/09/2021 12:40 PM	Soil	ALS: 1 Non ALS: 0	No	X			
024	BH19_A_5.5		02/09/2021 12:41 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
025	BH19_A_5.75		02/09/2021 12:41 PM	Soil	ALS: 1 Non ALS: 0	No	X			
026	BH19_A_6.0		02/09/2021 12:41 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
027	BH19_A_6.25		02/09/2021 12:42 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 27146 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH19_A_6.5		02/09/2021 12:42 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
029	BH19_A_6.75		02/09/2021 12:43 PM	Soil	ALS: 1 Non ALS: 0	No	X			
030	BH19_A_7.0		02/09/2021 12:43 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
031	BH19_A_7.25		02/09/2021 12:43 PM	Soil	ALS: 1 Non ALS: 0	No	X			
032	BH17_A_7.5		02/09/2021 12:44 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
033	BH19_A_7.75		02/09/2021 12:44 PM	Soil	ALS: 1 Non ALS: 0	No	X			
034	BH19_A_8.0		02/09/2021 12:44 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
035	BH19_A_8.25		02/09/2021 12:45 PM	Soil	ALS: 1 Non ALS: 0	No	X			
036	BH19_A_8.5		02/09/2021 12:45 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27146 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
037	BH19_A_8.75		02/09/2021 12:45 PM	Soil	ALS: 1 Non ALS: 0	No	X			
038	BH19_A_9.0		02/09/2021 12:46 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
039	SQC023_A		02/09/2021 12:52 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27146 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH19_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071522	Green	No	
002	BH19_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071523	Green	No	
003	BH19_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071524	Green	No	
004	BH19_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071525	Green	No	
005	BH19_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071526	Green	No	
006	BH19_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071527	Green	No	
007	BH19_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071528	Green	No	
008	BH19_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071459	Green	No	
009	BH19_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071473	Green	No	
010	BH19_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071474	Green	No	
011	BH19_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071475	Green	No	
012	BH19_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071476	Green	No	
013	BH19_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071477	Green	No	
014	BH19_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071478	Green	No	
015	BH19_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071479	Green	No	
016	BH19_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071480	Green	No	
017	BH19_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071481	Green	No	
018	BH19_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071482	Green	No	
019	BH19_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071483	Green	No	
020	BH19_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071484	Green	No	
021	BH19_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071485	Green	No	
022	SQC022_A	Snap Lock Bag - frozen	1 Medium	00130621071842	Green	No	
023	BH19_A_5.25	Snap Lock Bag - frozen	1 Medium	00130621071486	Green	No	
024	BH19_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621071487	Green	No	
025	BH19_A_5.75	Snap Lock Bag - frozen	1 Medium	00130621071488	Green	No	
026	BH19_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621071489	Green	No	

CHAIN OF CUSTODY

ALS COC#: 27146 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.4

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

027	BH19_A_6.25	Snap Lock Bag - frozen	1 Medium	00130621071490	Green	No	
028	BH19_A_6.5	Snap Lock Bag - frozen	1 Medium	00130621071491	Green	No	
029	BH19_A_6.75	Snap Lock Bag - frozen	1 Medium	00130621071492	Green	No	
030	BH19_A_7.0	Snap Lock Bag - frozen	1 Medium	00130621071493	Green	No	
031	BH19_A_7.25	Snap Lock Bag - frozen	1 Medium	00130621071494	Green	No	
032	BH17_A_7.5	Snap Lock Bag - frozen	1 Medium	00130621071472	Green	No	
033	BH19_A_7.75	Snap Lock Bag - frozen	1 Medium	00130621071471	Green	No	
034	BH19_A_8.0	Snap Lock Bag - frozen	1 Medium	00130621071470	Green	No	
035	BH19_A_8.25	Snap Lock Bag - frozen	1 Medium	00130621071469	Green	No	
036	BH19_A_8.5	Snap Lock Bag - frozen	1 Medium	00130621071468	Green	No	
037	BH19_A_8.75	Snap Lock Bag - frozen	1 Medium	00130621071467	Green	No	
038	BH19_A_9.0	Snap Lock Bag - frozen	1 Medium	00130621071466	Green	No	
039	SQC023_A	Snap Lock Bag - frozen	1 Medium	00130621071843	Green	No	

Total Bottle Count: ALS: 39, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2110220**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 27146	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP2.4		
Sampler	: BRONWYN VAN VALKENGOED, Jaimon Hollett		

Dates

Date Samples Received	: 02-Sep-2021 17:20	Issue Date	: 02-Sep-2021
Client Requested Due Date	: 17-Sep-2021	Scheduled Reporting Date	: **17-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 12	Temperature	: 11.5 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 39 / 39

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110220-001	02-Sep-2021 12:28	BH19_A_0.0	✓	✓
EP2110220-002	02-Sep-2021 12:29	BH19_A_0.25		✓
EP2110220-003	02-Sep-2021 12:29	BH19_A_0.5	✓	✓
EP2110220-004	02-Sep-2021 12:30	BH19_A_0.75		✓
EP2110220-005	02-Sep-2021 12:30	BH19_A_1.0	✓	✓
EP2110220-006	02-Sep-2021 12:31	BH19_A_1.25		✓
EP2110220-007	02-Sep-2021 12:31	BH19_A_1.5	✓	✓
EP2110220-008	02-Sep-2021 12:31	BH19_A_1.75		✓
EP2110220-009	02-Sep-2021 12:32	BH19_A_2.0	✓	✓
EP2110220-010	02-Sep-2021 12:32	BH19_A_2.25		✓
EP2110220-011	02-Sep-2021 12:32	BH19_A_2.5	✓	✓
EP2110220-012	02-Sep-2021 12:33	BH19_A_2.75		✓
EP2110220-013	02-Sep-2021 12:33	BH19_A_3.0	✓	✓
EP2110220-014	02-Sep-2021 12:34	BH19_A_3.25		✓
EP2110220-015	02-Sep-2021 12:34	BH19_A_3.5	✓	✓
EP2110220-016	02-Sep-2021 12:35	BH19_A_3.75		✓
EP2110220-017	02-Sep-2021 12:35	BH19_A_4.0	✓	✓
EP2110220-018	02-Sep-2021 12:36	BH19_A_4.25		✓
EP2110220-019	02-Sep-2021 12:38	BH19_A_4.5	✓	✓
EP2110220-020	02-Sep-2021 12:39	BH19_A_4.75		✓
EP2110220-021	02-Sep-2021 12:39	BH19_A_5.0	✓	✓
EP2110220-022	02-Sep-2021 12:51	SQC022_A	✓	✓
EP2110220-023	02-Sep-2021 12:40	BH19_A_5.25		✓
EP2110220-024	02-Sep-2021 12:41	BH19_A_5.5	✓	✓
EP2110220-025	02-Sep-2021 12:41	BH19_A_5.75		✓
EP2110220-026	02-Sep-2021 12:41	BH19_A_6.0	✓	✓
EP2110220-027	02-Sep-2021 12:42	BH19_A_6.25		✓
EP2110220-028	02-Sep-2021 12:42	BH19_A_6.5	✓	✓
EP2110220-029	02-Sep-2021 12:43	BH19_A_6.75		✓
EP2110220-030	02-Sep-2021 12:43	BH19_A_7.0	✓	✓
EP2110220-031	02-Sep-2021 12:43	BH19_A_7.25		✓
EP2110220-032	02-Sep-2021 12:44	BH17_A_7.5	✓	✓
EP2110220-033	02-Sep-2021 12:44	BH19_A_7.75		✓
EP2110220-034	02-Sep-2021 12:44	BH19_A_8.0	✓	✓
EP2110220-035	02-Sep-2021 12:45	BH19_A_8.25		✓

			SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110220-036	02-Sep-2021 12:45	BH19_A_8.5	✓	✓
EP2110220-037	02-Sep-2021 12:45	BH19_A_8.75		✓
EP2110220-038	02-Sep-2021 12:46	BH19_A_9.0	✓	✓
EP2110220-039	02-Sep-2021 12:52	SQC023_A	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Carina Andersen

- A4 - AU Tax Invoice (INV)	Email	carina.andersen@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110220**	Page	: 1 of 10
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 02-Sep-2021 17:20
Order number	: 30058301	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27146	Issue Date	: 17-Sep-2021 15:29
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP2.4		
Quote number	: EP/529/21_V4		
No. of samples received	: 39		
No. of samples analysed	: 39		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required for particular samples because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH19_A_0.0	BH19_A_0.25	BH19_A_0.5	BH19_A_0.75	BH19_A_1.0
			Sampling date / time	02-Sep-2021 12:28	02-Sep-2021 12:29	02-Sep-2021 12:29	02-Sep-2021 12:30	02-Sep-2021 12:30
Compound	CAS Number	LOR	Unit	EP2110220-001	EP2110220-002	EP2110220-003	EP2110220-004	EP2110220-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.2	----	9.3	----	9.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	5.72	----	7.29	----	1.84
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1140	----	1460	----	368
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.83	----	2.33	----	0.59
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	8.4	8.2	8.6	8.6	9.0
pH (Fox)	----	0.1	pH Unit	5.7	6.1	6.1	6.2	6.2
Reaction Rate	----	1	-	Moderate	Moderate	Moderate	Moderate	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH19_A_1.25	BH19_A_1.5	BH19_A_1.75	BH19_A_2.0	BH19_A_2.25
			Sampling date / time	02-Sep-2021 12:31	02-Sep-2021 12:31	02-Sep-2021 12:31	02-Sep-2021 12:32	02-Sep-2021 12:32
Compound	CAS Number	LOR	Unit	EP2110220-006	EP2110220-007	EP2110220-008	EP2110220-009	EP2110220-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	8.3	----	7.0	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	1.21	----	0.12	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	242	----	25	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.39	----	0.04	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	8.4	7.6	7.2	7.6	7.4
pH (Fox)	----	0.1	pH Unit	6.2	5.8	5.1	5.4	5.5
Reaction Rate	----	1	-	Moderate	Moderate	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH19_A_2.5	BH19_A_2.75	BH19_A_3.0	BH19_A_3.25	BH19_A_3.5
			Sampling date / time	02-Sep-2021 12:32	02-Sep-2021 12:33	02-Sep-2021 12:33	02-Sep-2021 12:34	02-Sep-2021 12:34
Compound	CAS Number	LOR	Unit	EP2110220-011	EP2110220-012	EP2110220-013	EP2110220-014	EP2110220-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.1**	**----**	**6.7**	**----**	**6.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	**2**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	**0.005**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.10**	**----**	**0.10**	**----**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**20**	**----**	**20**	**----**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.03**	**----**	**0.03**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.5**	**8.0**	**7.4**	**6.1**	**5.2**
pH (Fox)	----	0.1	pH Unit	**5.4**	**5.8**	**5.4**	**4.2**	**3.7**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH19_A_3.75	BH19_A_4.0	BH19_A_4.25	BH19_A_4.5	BH19_A_4.75
			Sampling date / time	02-Sep-2021 12:35	02-Sep-2021 12:35	02-Sep-2021 12:36	02-Sep-2021 12:38	02-Sep-2021 12:39
Compound	CAS Number	LOR	Unit	EP2110220-016	EP2110220-017	EP2110220-018	EP2110220-019	EP2110220-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.1	----	5.9	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	2	----	5	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.0	4.6	5.1	5.6	5.7
pH (Fox)	----	0.1	pH Unit	3.6	3.4	3.4	3.8	3.5
Reaction Rate	----	1	-	Slight	Slight	Slight	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH19_A_5.0	SQC022_A	BH19_A_5.25	BH19_A_5.5	BH19_A_5.75
			Sampling date / time	02-Sep-2021 12:39	02-Sep-2021 12:51	02-Sep-2021 12:40	02-Sep-2021 12:41	02-Sep-2021 12:41
Compound	CAS Number	LOR	Unit	EP2110220-021	EP2110220-022	EP2110220-023	EP2110220-024	EP2110220-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.9	9.3	----	5.7	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	6	<2	----	6	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.005	0.005	----	0.006	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	7.28	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	1450	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	2.33	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	0.02	<0.02	----	0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	10	<10	----	10	----
Liming Rate	----	1	kg CaCO3/t	1	<1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.02	<0.02	----	0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	10	<10	----	10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	<1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.0	8.1	6.2	6.0	6.0
pH (Fox)	----	0.1	pH Unit	3.4	6.0	4.3	4.2	4.3
Reaction Rate	----	1	-	Strong	Moderate	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH19_A_6.0	BH19_A_6.25	BH19_A_6.5	BH19_A_6.75	BH19_A_7.0
			Sampling date / time	02-Sep-2021 12:41	02-Sep-2021 12:42	02-Sep-2021 12:42	02-Sep-2021 12:43	02-Sep-2021 12:43
Compound	CAS Number	LOR	Unit	EP2110220-026	EP2110220-027	EP2110220-028	EP2110220-029	EP2110220-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.0**	**----**	**6.6**	**----**	**5.8**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	**2**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**----**	**----**	**0.10**	**----**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**----**	**----**	**20**	**----**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**----**	**----**	**0.03**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.3**	**6.2**	**6.2**	**5.9**	**6.2**
pH (Fox)	----	0.1	pH Unit	**3.7**	**4.2**	**4.5**	**4.0**	**4.0**
Reaction Rate	----	1	-	**Strong**	**Strong**	**Strong**	**Strong**	**Strong**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH19_A_7.25	BH17_A_7.5	BH19_A_7.75	BH19_A_8.0	BH19_A_8.25
			Sampling date / time	02-Sep-2021 12:43	02-Sep-2021 12:44	02-Sep-2021 12:44	02-Sep-2021 12:44	02-Sep-2021 12:45
Compound	CAS Number	LOR	Unit	EP2110220-031	EP2110220-032	EP2110220-033	EP2110220-034	EP2110220-035
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.1	----	6.3	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.1	6.1	5.9	5.9	5.9
pH (Fox)	----	0.1	pH Unit	3.6	4.0	3.9	3.8	3.9
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH19_A_8.5	BH19_A_8.75	BH19_A_9.0	SQC023_A	----
			Sampling date / time	02-Sep-2021 12:45	02-Sep-2021 12:45	02-Sep-2021 12:46	02-Sep-2021 12:52	----
Compound	CAS Number	LOR	Unit	EP2110220-036	EP2110220-037	EP2110220-038	EP2110220-039	--------
				Result	Result	Result	Result	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.0**	**----**	**6.2**	**9.6**	**----**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	<2	**----**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	<0.02	**----**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.006**	**----**	<0.005	<0.005	**----**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	<10	**----**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**----**	**----**	**----**	**2.43**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**----**	**----**	**----**	**486**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**----**	**----**	**----**	**0.78**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	<0.02	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	<10	**----**
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	<1	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	<0.02	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	<10	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	<1	**----**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.9**	**5.8**	**5.7**	**8.4**	**----**
pH (Fox)	----	0.1	pH Unit	**3.9**	**4.1**	**4.0**	**6.2**	**----**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Moderate**	**Slight**	**----**

QUALITY CONTROL REPORT

Work Order	: **EP2110220**	Page	: 1 of 5
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 02-Sep-2021
Order number	: 30058301	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27146	Issue Date	: 17-Sep-2021
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP2.4		
Quote number	: EP/529/21_V4		
No. of samples received	: 39		
No. of samples analysed	: 39		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3899400)									
EP2110220-001	BH19_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.2	9.2	0.0	0% - 20%
EP2110220-021	BH19_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	6	6	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.9	5.9	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 3899401)									
EP2110220-039	SQC023_A	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.6	9.6	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3899400)									
EP2110220-001	BH19_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110220-021	BH19_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 3899401)									
EP2110220-039	SQC023_A	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3899400)									
EP2110220-001	BH19_A_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	5.72	5.72	0.0	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-C: Acid Neutralising Capacity (QC Lot: 3899400) - continued									
EP2110220-001	BH19_A_0.0	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.83	1.83	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1140	1140	0.1	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 3899401)									
EP2110220-039	SQC023_A	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	2.43	2.43	0.0	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.78	0.78	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	486	485	0.0	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 3899400)									
EP2110220-001	BH19_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110220-021	BH19_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3899401)									
EP2110220-039	SQC023_A	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3885625)									
EP2110220-001	BH19_A_0.0	EA037: pH (F)	----	0.1	pH Unit	8.4	8.4	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.7	5.8	0.0	0% - 20%
EP2110220-010	BH19_A_2.25	EA037: pH (F)	----	0.1	pH Unit	7.4	7.4	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.5	5.5	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3885626)									
EP2110220-021	BH19_A_5.0	EA037: pH (F)	----	0.1	pH Unit	6.0	5.9	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.4	3.4	0.0	0% - 20%
EP2110220-030	BH19_A_7.0	EA037: pH (F)	----	0.1	pH Unit	6.2	6.1	0.0	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA037: Ass Field Screening Analysis (QC Lot: 3885626) - continued									
EP2110220-030	BH19_A_7.0	EA037: pH (Fox)	----	0.1	pH Unit	4.0	4.0	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3899400)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	101	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 3899401)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	95.6	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3899400)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	95.0	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3899401)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	90.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3899400)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3899400)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3899401)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110220**	Page	: 1 of 6
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 02-Sep-2021
Site	: GEHBI - WP2.4	Issue Date	: 17-Sep-2021
Sampler	: Jaimon Hollett	No. of samples received	: 39
Order number	: 30058301	No. of samples analysed	: 39

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
BH19_A_0.0,	BH19_A_0.5,	**02-Sep-2021**	**13-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	12-Dec-2021	✓
BH19_A_1.0,	BH19_A_1.5,							
BH19_A_2.0,	BH19_A_2.5,							
BH19_A_3.0,	BH19_A_3.5,							
BH19_A_4.0,	BH19_A_4.5,							
BH19_A_5.0,	SQC022_A,							
BH19_A_5.5,	BH19_A_6.0,							
BH19_A_6.5,	BH19_A_7.0,							
BH17_A_7.5,	BH19_A_8.0,							
BH19_A_8.5,	BH19_A_9.0,							
SQC023_A								
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
BH19_A_0.0,	BH19_A_0.5,	**02-Sep-2021**	**13-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	12-Dec-2021	✓
BH19_A_1.0,	BH19_A_1.5,							
BH19_A_2.0,	BH19_A_2.5,							
BH19_A_3.0,	BH19_A_3.5,							
BH19_A_4.0,	BH19_A_4.5,							
BH19_A_5.0,	SQC022_A,							
BH19_A_5.5,	BH19_A_6.0,							
BH19_A_6.5,	BH19_A_7.0,							
BH17_A_7.5,	BH19_A_8.0,							
BH19_A_8.5,	BH19_A_9.0,							
SQC023_A								

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033)								
BH19_A_0.0,	BH19_A_0.5,	**02-Sep-2021**	**13-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	12-Dec-2021	✓
BH19_A_1.0,	BH19_A_1.5,							
BH19_A_2.0,	BH19_A_2.5,							
BH19_A_3.0,	BH19_A_3.5,							
BH19_A_4.0,	BH19_A_4.5,							
BH19_A_5.0,	SQC022_A,							
BH19_A_5.5,	BH19_A_6.0,							
BH19_A_6.5,	BH19_A_7.0,							
BH17_A_7.5,	BH19_A_8.0,							
BH19_A_8.5,	BH19_A_9.0,							
SQC023_A								
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033)								
BH19_A_0.0,	BH19_A_0.5,	**02-Sep-2021**	**13-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	12-Dec-2021	✓
BH19_A_1.0,	BH19_A_1.5,							
BH19_A_2.0,	BH19_A_2.5,							
BH19_A_3.0,	BH19_A_3.5,							
BH19_A_4.0,	BH19_A_4.5,							
BH19_A_5.0,	SQC022_A,							
BH19_A_5.5,	BH19_A_6.0,							
BH19_A_6.5,	BH19_A_7.0,							
BH17_A_7.5,	BH19_A_8.0,							
BH19_A_8.5,	BH19_A_9.0,							
SQC023_A								
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033)								
BH19_A_0.0,	BH19_A_0.5,	**02-Sep-2021**	**13-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	12-Dec-2021	✓
BH19_A_1.0,	BH19_A_1.5,							
BH19_A_2.0,	BH19_A_2.5,							
BH19_A_3.0,	BH19_A_3.5,							
BH19_A_4.0,	BH19_A_4.5,							
BH19_A_5.0,	SQC022_A,							
BH19_A_5.5,	BH19_A_6.0,							
BH19_A_6.5,	BH19_A_7.0,							
BH17_A_7.5,	BH19_A_8.0,							
BH19_A_8.5,	BH19_A_9.0,							
SQC023_A								

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis							
Snap Lock Bag - frozen (EA037)							
BH19_A_0.0, BH19_A_0.25, BH19_A_0.5, BH19_A_0.75, BH19_A_1.0, BH19_A_1.25, BH19_A_1.5, BH19_A_1.75, BH19_A_2.0, BH19_A_2.25, BH19_A_2.5, BH19_A_2.75, BH19_A_3.0, BH19_A_3.25, BH19_A_3.5, BH19_A_3.75, BH19_A_4.0, BH19_A_4.25, BH19_A_4.5, BH19_A_4.75, BH19_A_5.0, SQC022_A, BH19_A_5.25, BH19_A_5.5, BH19_A_5.75, BH19_A_6.0, BH19_A_6.25, BH19_A_6.5, BH19_A_6.75, BH19_A_7.0, BH19_A_7.25, BH17_A_7.5, BH19_A_7.75, BH19_A_8.0, BH19_A_8.25, BH19_A_8.5, BH19_A_8.75, BH19_A_9.0, SQC023_A	**02-Sep-2021**	**07-Sep-2021**	01-Mar-2022	✓	**07-Sep-2021**	01-Mar-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Environmental Division
Perth
Work Order Reference
EP2110216

Telephone : +61-8-9406 1301

ALSCompass SAMPLING Intelligence

Custody Document for Submissions via ALS Compass App

Project: GEHTBL_WP2.1 **Client:** Arcadis **Project Manager:** Bronwyn Van Valkengoed
Phone: (0408 751 386)

ALS Compass COC Reference: 27122 **# Samples:** 22 **Sampler:** Jaimon Hollett
Phone: (0420 838 328)

Turnaround Requirements: Standard _____ Urgent _____

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	N/A
	Free ice / frozen ice bricks upon receipt?	YES	NO	N/A
	Random sample temperature on receipt?		°C	

Custody:

Relinquished by:	**Received by:**	**Relinquished by:**	**Received by:**
JH			
Date / Time: 2/9/21 1530	**Date / Time:** 2/9/21 1720	**Date / Time:**	**Date / Time:**

CHAIN OF CUSTODY

ALS COC#: 27122 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.1

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH16_A_0.0		02/09/2021 07:26 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH16_A_0.25		02/09/2021 07:26 AM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH16_A_0.5		02/09/2021 07:26 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH16_A_0.75		02/09/2021 07:27 AM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH16_A_1.0		02/09/2021 07:27 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH16_A_1.25		02/09/2021 07:28 AM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH16_A_1.5		02/09/2021 07:28 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH16_A_1.75		02/09/2021 07:28 AM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH16_A_2.0		02/09/2021 07:29 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27122 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.1

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Bronwyn Vanvalkengoed QUOTE NO: EP/529/21 / EP2021HYDCON0003

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EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH16_A_2.25		02/09/2021 07:29 AM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH16_A_2.5		02/09/2021 07:30 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
012	BH16_A_2.75		02/09/2021 07:30 AM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH16_A_3.0		02/09/2021 07:30 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
014	BH16_A_3.25		02/09/2021 07:31 AM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH16_A_3.5		02/09/2021 07:31 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
016	BH16_A_3.75		02/09/2021 07:32 AM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH16_A_4.0		02/09/2021 07:33 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
018	BH16_A_4.25		02/09/2021 07:33 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 27122 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.1

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH16_A_4.5		02/09/2021 07:33 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
020	BH16_A_4.75		02/09/2021 07:34 AM	Soil	ALS: 1 Non ALS: 0	No	X			
021	BH16_A_5.0		02/09/2021 02:40 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
022	SQC018_A		02/09/2021 02:40 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27122 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.1

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH16_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071776	Green	No	
002	BH16_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071775	Green	No	
003	BH16_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071777	Green	No	
004	BH16_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071778	Green	No	
005	BH16_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071779	Green	No	
006	BH16_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071780	Green	No	
007	BH16_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071781	Green	No	
008	BH16_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071782	Green	No	
009	BH16_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071783	Green	No	
010	BH16_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071784	Green	No	
011	BH16_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071785	Green	No	
012	BH16_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071786	Green	No	
013	BH16_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071787	Green	No	
014	BH16_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071788	Green	No	
015	BH16_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071789	Green	No	
016	BH16_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071790	Green	No	
017	BH16_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071791	Green	No	
018	BH16_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071792	Green	No	
019	BH16_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071793	Green	No	
020	BH16_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071794	Green	No	
021	BH16_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071795	Green	No	
022	SQC018_A	Snap Lock Bag - frozen	1 Small	00130621071774	Green	No	

Total Bottle Count: ALS: 22, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2110216**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 27122	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP2.1		
Sampler	: BRONWYN VAN VALKENGOED, Jaimon Hollett		

Dates

Date Samples Received	: 02-Sep-2021 17:20	Issue Date	: 02-Sep-2021
Client Requested Due Date	: 17-Sep-2021	Scheduled Reporting Date	: **17-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 12	Temperature	: 11.5 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 22 / 22

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110216-001	02-Sep-2021 07:26	BH16_A_0.0	✓	✓
EP2110216-002	02-Sep-2021 07:26	BH16_A_0.25		✓
EP2110216-003	02-Sep-2021 07:26	BH16_A_0.5	✓	✓
EP2110216-004	02-Sep-2021 07:27	BH16_A_0.75		✓
EP2110216-005	02-Sep-2021 07:27	BH16_A_1.0	✓	✓
EP2110216-006	02-Sep-2021 07:28	BH16_A_1.25		✓
EP2110216-007	02-Sep-2021 07:28	BH16_A_1.5	✓	✓
EP2110216-008	02-Sep-2021 07:28	BH16_A_1.75		✓
EP2110216-009	02-Sep-2021 07:29	BH16_A_2.0	✓	✓
EP2110216-010	02-Sep-2021 07:29	BH16_A_2.25		✓
EP2110216-011	02-Sep-2021 07:30	BH16_A_2.5	✓	✓
EP2110216-012	02-Sep-2021 07:30	BH16_A_2.75		✓
EP2110216-013	02-Sep-2021 07:30	BH16_A_3.0	✓	✓
EP2110216-014	02-Sep-2021 07:31	BH16_A_3.25		✓
EP2110216-015	02-Sep-2021 07:31	BH16_A_3.5	✓	✓
EP2110216-016	02-Sep-2021 07:32	BH16_A_3.75		✓
EP2110216-017	02-Sep-2021 07:33	BH16_A_4.0	✓	✓
EP2110216-018	02-Sep-2021 07:33	BH16_A_4.25		✓
EP2110216-019	02-Sep-2021 07:33	BH16_A_4.5	✓	✓
EP2110216-020	02-Sep-2021 07:34	BH16_A_4.75		✓
EP2110216-021	02-Sep-2021 14:40	BH16_A_5.0	✓	✓
EP2110216-022	02-Sep-2021 14:40	SQC018_A	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ARCADIS ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Carina Andersen

- A4 - AU Tax Invoice (INV)	Email	carina.andersen@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110216**	Page	: 1 of 7
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 02-Sep-2021 17:20
Order number	: 30058301	Date Analysis Commenced	: 06-Sep-2021
C-O-C number	: 27122	Issue Date	: 17-Sep-2021 11:42
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP2.1		
Quote number	: EP/529/21_V4		
No. of samples received	: 22		
No. of samples analysed	: 22		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required for particular samples because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH16_A_0.0	BH16_A_0.25	BH16_A_0.5	BH16_A_0.75	BH16_A_1.0
			Sampling date / time	02-Sep-2021 07:26	02-Sep-2021 07:26	02-Sep-2021 07:26	02-Sep-2021 07:27	02-Sep-2021 07:27
Compound	CAS Number	LOR	Unit	EP2110216-001	EP2110216-002	EP2110216-003	EP2110216-004	EP2110216-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.8**	**----**	**7.8**	**----**	**6.4**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.006**	**----**	**0.008**	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.59**	**----**	**0.67**	**----**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**119**	**----**	**133**	**----**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.19**	**----**	**0.21**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.6**	**7.6**	**8.2**	**8.0**	**7.9**
pH (Fox)	----	0.1	pH Unit	**5.1**	**5.2**	**5.1**	**5.4**	**4.6**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Slight**	**Slight**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH16_A_1.25	BH16_A_1.5	BH16_A_1.75	BH16_A_2.0	BH16_A_2.25
			Sampling date / time	02-Sep-2021 07:28	02-Sep-2021 07:28	02-Sep-2021 07:28	02-Sep-2021 07:29	02-Sep-2021 07:29
Compound	CAS Number	LOR	Unit	EP2110216-006	EP2110216-007	EP2110216-008	EP2110216-009	EP2110216-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.6	----	6.1	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.006	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	0.07	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	15	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.02	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.8	7.6	7.6	7.5	7.2
pH (Fox)	----	0.1	pH Unit	5.1	5.3	5.4	5.8	5.7
Reaction Rate	----	1	-	Moderate	Moderate	Moderate	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH16_A_2.5	BH16_A_2.75	BH16_A_3.0	BH16_A_3.25	BH16_A_3.5
			Sampling date / time	02-Sep-2021 07:30	02-Sep-2021 07:30	02-Sep-2021 07:30	02-Sep-2021 07:31	02-Sep-2021 07:31
Compound	CAS Number	LOR	Unit	EP2110216-011	EP2110216-012	EP2110216-013	EP2110216-014	EP2110216-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.4	----	5.5	----	5.7
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	11	----	9
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	0.02	----	0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	14	----	12
Liming Rate	----	1	kg CaCO3/t	<1	----	1	----	1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	0.02	----	0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	14	----	12
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	1	----	1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.1	6.7	6.6	6.4	6.2
pH (Fox)	----	0.1	pH Unit	5.7	5.1	5.2	4.8	4.7
Reaction Rate	----	1	-	Strong	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH16_A_3.75	BH16_A_4.0	BH16_A_4.25	BH16_A_4.5	BH16_A_4.75
			Sampling date / time	02-Sep-2021 07:32	02-Sep-2021 07:33	02-Sep-2021 07:33	02-Sep-2021 07:33	02-Sep-2021 07:34
Compound	CAS Number	LOR	Unit	EP2110216-016	EP2110216-017	EP2110216-018	EP2110216-019	EP2110216-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.3	----	5.1	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	16	----	14	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.03	----	0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.03	----	0.03	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	19	----	17	----
Liming Rate	----	1	kg CaCO3/t	----	1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.03	----	0.03	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	19	----	17	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.2	6.2	6.3	6.9	7.0
pH (Fox)	----	0.1	pH Unit	4.7	5.1	5.2	5.3	4.8
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH16_A_5.0	SQC018_A	----	----	----
			Sampling date / time	02-Sep-2021 14:40	02-Sep-2021 14:40	----	----	----
Compound	CAS Number	LOR	Unit	EP2110216-021	EP2110216-022	--------	--------	--------
				Result	Result	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.3**	**5.0**	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**22**	**14**	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.04**	**0.02**	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**0.005**	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	**0.04**	**0.03**	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	**23**	**17**	----	----	----
Liming Rate	----	1	kg CaCO3/t	**2**	**1**	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.04**	**0.03**	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**23**	**17**	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	**2**	**1**	----	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.3**	**6.1**	----	----	----
pH (Fox)	----	0.1	pH Unit	**4.6**	**5.4**	----	----	----
Reaction Rate	----	1	-	**Slight**	**Slight**	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EP2110216**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 02-Sep-2021
Order number	: 30058301	Date Analysis Commenced	: 06-Sep-2021
C-O-C number	: 27122	Issue Date	: 17-Sep-2021
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP2.1		
Quote number	: EP/529/21_V4		
No. of samples received	: 22		
No. of samples analysed	: 22		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3899396)									
EP2110216-001	BH16_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.8	6.8	0.0	0% - 20%
EP2110216-021	BH16_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.04	0.04	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	22	24	5.2	0% - 50%
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.3	5.3	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3899396)									
EP2110216-001	BH16_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	0.009	40.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110216-021	BH16_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3899396)									
EP2110216-001	BH16_A_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.59	0.59	0.0	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.19	0.19	0.0	0% - 50%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	119	118	0.0	0% - 50%
EA033-E: Acid Base Accounting (QC Lot: 3899396)									
EP2110216-001	BH16_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-E: Acid Base Accounting (QC Lot: 3899396) - continued									
EP2110216-001	BH16_A_0.0	EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110216-021	BH16_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.04	0.04	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.04	0.04	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	2	2	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	2	2	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	23	24	4.3	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	23	24	4.3	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3885619)									
EP2110216-001	BH16_A_0.0	EA037: pH (F)	----	0.1	pH Unit	7.6	7.6	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.1	5.1	0.0	0% - 20%
EP2110216-010	BH16_A_2.25	EA037: pH (F)	----	0.1	pH Unit	7.2	7.2	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.7	5.8	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3885620)									
EP2110216-021	BH16_A_5.0	EA037: pH (F)	----	0.1	pH Unit	6.3	6.2	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.6	4.7	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3899396)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	95.3	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3899396)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	93.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3899396)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3899396)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110216**	Page	: 1 of 5
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 02-Sep-2021
Site	: GEHBI - WP2.1	Issue Date	: 17-Sep-2021
Sampler	: Jaimon Hollett	No. of samples received	: 22
Order number	: 30058301	No. of samples analysed	: 22

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
BH16_A_0.0,	BH16_A_0.5,	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
BH16_A_1.0,	BH16_A_1.5,							
BH16_A_2.0,	BH16_A_2.5,							
BH16_A_3.0,	BH16_A_3.5,							
BH16_A_4.0,	BH16_A_4.5,							
BH16_A_5.0,	SQC018_A							
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
BH16_A_0.0,	BH16_A_0.5,	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
BH16_A_1.0,	BH16_A_1.5,							
BH16_A_2.0,	BH16_A_2.5,							
BH16_A_3.0,	BH16_A_3.5,							
BH16_A_4.0,	BH16_A_4.5,							
BH16_A_5.0,	SQC018_A							
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033)								
BH16_A_0.0,	BH16_A_0.5,	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
BH16_A_1.0,	BH16_A_1.5,							
BH16_A_2.0,	BH16_A_2.5,							
BH16_A_3.0,	BH16_A_3.5,							
BH16_A_4.0,	BH16_A_4.5,							
BH16_A_5.0,	SQC018_A							
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033)								
BH16_A_0.0,	BH16_A_0.5,	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
BH16_A_1.0,	BH16_A_1.5,							
BH16_A_2.0,	BH16_A_2.5,							
BH16_A_3.0,	BH16_A_3.5,							
BH16_A_4.0,	BH16_A_4.5,							
BH16_A_5.0,	SQC018_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033)								
BH16_A_0.0,	BH16_A_0.5,	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
BH16_A_1.0,	BH16_A_1.5,							
BH16_A_2.0,	BH16_A_2.5,							
BH16_A_3.0,	BH16_A_3.5,							
BH16_A_4.0,	BH16_A_4.5,							
BH16_A_5.0,	SQC018_A							
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH16_A_0.0,	BH16_A_0.25,	**02-Sep-2021**	**06-Sep-2021**	01-Mar-2022	✓	**06-Sep-2021**	01-Mar-2022	✓
BH16_A_0.5,	BH16_A_0.75,							
BH16_A_1.0,	BH16_A_1.25,							
BH16_A_1.5,	BH16_A_1.75,							
BH16_A_2.0,	BH16_A_2.25,							
BH16_A_2.5,	BH16_A_2.75,							
BH16_A_3.0,	BH16_A_3.25,							
BH16_A_3.5,	BH16_A_3.75,							
BH16_A_4.0,	BH16_A_4.25,							
BH16_A_4.5,	BH16_A_4.75,							
BH16_A_5.0,	SQC018_A							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	3	22	**13.64**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

ALSCompass SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110219

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: GEHBL_WP2.3 **Client:** Arcadis **Project Manager:** Bronwyn Van Valkenaard
Phone: (0408 451 386)

ALS Compass COC Reference: 27126 **# Samples:** 36 **Sampler:** Jamon Hollett
Phone: (0420 838 328)

Turnaround Requirements: (Standard) _____ Urgent _____

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	N/A
	Free ice / frozen ice bricks upon receipt?	YES	NO	N/A
	Random sample temperature on receipt?		°C	

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
Date / Time: 2/9/21 1530	Date / Time: 2/9/21 @ 1720	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 27126 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.3

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH18_A_0.0		02/09/2021 07:52 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH18_A_0.25		02/09/2021 07:55 AM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH18_A_0.5		02/09/2021 07:55 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH18_A_0.75		02/09/2021 07:56 AM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH18_A_1.0		02/09/2021 07:56 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH18_A_1.25		02/09/2021 07:57 AM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH18_A_1.5		02/09/2021 07:57 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH18_A_1.75		02/09/2021 07:57 AM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH18_A_2.0		02/09/2021 07:58 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

(ALS) COC#: **27126** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.3

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH18_A_2.25		02/09/2021 07:58 AM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH18_A_2.5		02/09/2021 07:58 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
012	BH18_A_2.75		02/09/2021 07:58 AM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH18_A_3.0		02/09/2021 07:59 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
014	BH18_A_3.25		02/09/2021 07:59 AM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH18_A_3.5		02/09/2021 07:59 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
016	BH18_A_3.75		02/09/2021 08:00 AM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH18_A_4.0		02/09/2021 08:00 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
018	BH18_A_4.25		02/09/2021 08:00 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 27126 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.3

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH18_A_4.5		02/09/2021 08:00 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
020	BH18_A_4.75		02/09/2021 08:01 AM	Soil	ALS: 1 Non ALS: 0	No	X			
021	BH18_A_5.0		02/09/2021 08:01 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
022	SQC020_A		02/09/2021 08:02 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
023	BH18_A_5.25		02/09/2021 08:02 AM	Soil	ALS: 1 Non ALS: 0	No	X			
024	BH18_A_5.5		02/09/2021 08:02 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
025	BH18_A_5.75		02/09/2021 08:03 AM	Soil	ALS: 1 Non ALS: 0	No	X			
026	BH18_A_6.0		02/09/2021 08:03 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
027	BH18_A_6.25		02/09/2021 08:03 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

(ALS) COC#: **27126** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.3

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP2A- Suite 2A ACID SULPHATES SOIL	WP2B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH17_A_6.5		02/09/2021 08:03 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
029	BH18_A_6.75		02/09/2021 08:04 AM	Soil	ALS: 1 Non ALS: 0	No	X			
030	BH18_A_7.0		02/09/2021 08:04 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
031	BH18_A_7.25		02/09/2021 08:04 AM	Soil	ALS: 1 Non ALS: 0	No	X			
032	BH18_A_7.5		02/09/2021 08:05 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
033	BH18_A_8.0		02/09/2021 08:05 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
034	BH18_A_8.5		02/09/2021 08:06 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
035	BH18_A_9.0		02/09/2021 08:07 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
036	SQC021_A		02/09/2021 08:07 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

(ALS) COC#: **27126** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.3

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
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CONTACT PH:
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SAMPLER MOBILE:
/ EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen Ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH18_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071770	Green	No	
002	BH18_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071771	Green	No	
003	BH18_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071772	Green	No	
004	BH18_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071773	Green	No	
005	BH18_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071734	Green	No	
006	BH18_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071735	Green	No	
007	BH18_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071736	Green	No	
008	BH18_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071852	Green	No	
009	BH18_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071811	Green	No	
010	BH18_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071812	Green	No	
011	BH18_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071813	Green	No	
012	BH18_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071814	Green	No	
013	BH18_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071815	Green	No	
014	BH18_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071816	Green	No	
015	BH18_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071817	Green	No	
016	BH18_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071818	Green	No	
017	BH18_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071819	Green	No	
018	BH18_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071820	Green	No	
019	BH18_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071821	Green	No	
020	BH18_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071822	Green	No	
021	BH18_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071823	Green	No	
022	SQC020_A	Snap Lock Bag - frozen	1 Medium	00130621071844	Green	No	
023	BH18_A_5.25	Snap Lock Bag - frozen	1 Medium	00130621071824	Green	No	
024	BH18_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621071825	Green	No	
025	BH18_A_5.75	Snap Lock Bag - frozen	1 Medium	00130621071826	Green	No	
026	BH18_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621071827	Green	No	

CHAIN OF CUSTODY

ALS COC#: 27126 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP2.3

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Bronwyn Vanvalkengoed

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

027	BH18_A_6.25	Snap Lock Bag - frozen	1 Small	00130621071828	Green	No	
028	BH17_A_6.5	Snap Lock Bag - frozen	1 Medium	00130621071829	Green	No	
029	BH18_A_6.75	Snap Lock Bag - frozen	1 Medium	00130621071830	Green	No	
030	BH18_A_7.0	Snap Lock Bag - frozen	1 Medium	00130621071831	Green	No	
031	BH18_A_7.25	Snap Lock Bag - frozen	1 Medium	00130621071832	Green	No	
032	BH18_A_7.5	Snap Lock Bag - frozen	1 Medium	00130621071833	Green	No	
033	BH18_A_8.0	Snap Lock Bag - frozen	1 Medium	00130621071835	Green	No	
034	BH18_A_8.5	Snap Lock Bag - frozen	1 Medium	00130621071848	Green	No	
035	BH18_A_9.0	Snap Lock Bag - frozen	1 Medium	00130621071850	Green	No	
036	SQC021_A	Snap Lock Bag - frozen	1 Medium	00130621071841	Green	No	

Total Bottle Count: ALS: 36, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2110219**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 27126	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP2.3		
Sampler	: BRONWYN VAN VALKENGOED, Jaimon Hollett		

Dates

Date Samples Received	: 02-Sep-2021 17:20	Issue Date	: 02-Sep-2021
Client Requested Due Date	: 17-Sep-2021	Scheduled Reporting Date	: **17-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 12	Temperature	: 11.5 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 36 / 36

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110219-001	02-Sep-2021 07:52	BH18_A_0.0	✓	✓
EP2110219-002	02-Sep-2021 07:55	BH18_A_0.25		✓
EP2110219-003	02-Sep-2021 07:55	BH18_A_0.5	✓	✓
EP2110219-004	02-Sep-2021 07:56	BH18_A_0.75		✓
EP2110219-005	02-Sep-2021 07:56	BH18_A_1.0	✓	✓
EP2110219-006	02-Sep-2021 07:57	BH18_A_1.25		✓
EP2110219-007	02-Sep-2021 07:57	BH18_A_1.5	✓	✓
EP2110219-008	02-Sep-2021 07:57	BH18_A_1.75		✓
EP2110219-009	02-Sep-2021 07:58	BH18_A_2.0	✓	✓
EP2110219-010	02-Sep-2021 07:58	BH18_A_2.25		✓
EP2110219-011	02-Sep-2021 07:58	BH18_A_2.5	✓	✓
EP2110219-012	02-Sep-2021 07:58	BH18_A_2.75		✓
EP2110219-013	02-Sep-2021 07:59	BH18_A_3.0	✓	✓
EP2110219-014	02-Sep-2021 07:59	BH18_A_3.25		✓
EP2110219-015	02-Sep-2021 07:59	BH18_A_3.5	✓	✓
EP2110219-016	02-Sep-2021 08:00	BH18_A_3.75		✓
EP2110219-017	02-Sep-2021 08:00	BH18_A_4.0	✓	✓
EP2110219-018	02-Sep-2021 08:00	BH18_A_4.25		✓
EP2110219-019	02-Sep-2021 08:00	BH18_A_4.5	✓	✓
EP2110219-020	02-Sep-2021 08:01	BH18_A_4.75		✓
EP2110219-021	02-Sep-2021 08:01	BH18_A_5.0	✓	✓
EP2110219-022	02-Sep-2021 08:02	SQC020_A	✓	✓
EP2110219-023	02-Sep-2021 08:02	BH18_A_5.25		✓
EP2110219-024	02-Sep-2021 08:02	BH18_A_5.5	✓	✓
EP2110219-025	02-Sep-2021 08:03	BH18_A_5.75		✓
EP2110219-026	02-Sep-2021 08:03	BH18_A_6.0	✓	✓
EP2110219-027	02-Sep-2021 08:03	BH18_A_6.25		✓
EP2110219-028	02-Sep-2021 08:03	BH17_A_6.5	✓	✓
EP2110219-029	02-Sep-2021 08:04	BH18_A_6.75		✓
EP2110219-030	02-Sep-2021 08:04	BH18_A_7.0	✓	✓
EP2110219-031	02-Sep-2021 08:04	BH18_A_7.25		✓
EP2110219-032	02-Sep-2021 08:05	BH18_A_7.5	✓	✓
EP2110219-033	02-Sep-2021 08:05	BH18_A_8.0	✓	✓
EP2110219-034	02-Sep-2021 08:06	BH18_A_8.5	✓	✓
EP2110219-035	02-Sep-2021 08:07	BH18_A_9.0	✓	✓

			SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110219-036	02-Sep-2021 08:07	SQC021_A	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ARCADIS ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Carina Andersen

- A4 - AU Tax Invoice (INV)	Email	carina.andersen@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110219**	Page	: 1 of 10
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 02-Sep-2021 17:20
Order number	: 30058301	Date Analysis Commenced	: 06-Sep-2021
C-O-C number	: 27126	Issue Date	: 17-Sep-2021 14:24
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP2.3		
Quote number	: EP/529/21_V4		
No. of samples received	: 36		
No. of samples analysed	: 36		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required for particular samples because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH18_A_0.0	BH18_A_0.25	BH18_A_0.5	BH18_A_0.75	BH18_A_1.0
			Sampling date / time	02-Sep-2021 07:52	02-Sep-2021 07:55	02-Sep-2021 07:55	02-Sep-2021 07:56	02-Sep-2021 07:56
Compound	CAS Number	LOR	Unit	EP2110219-001	EP2110219-002	EP2110219-003	EP2110219-004	EP2110219-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.4**	----	**6.6**	----	**6.3**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.30**	----	**0.07**	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**59**	----	**15**	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.10**	----	**0.02**	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	**1.5**	----	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.3**	**7.6**	**7.6**	**7.7**	**7.4**
pH (Fox)	----	0.1	pH Unit	**5.9**	**6.0**	**5.6**	**5.8**	**5.6**
Reaction Rate	----	1	-	**Moderate**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH18_A_1.25	BH18_A_1.5	BH18_A_1.75	BH18_A_2.0	BH18_A_2.25
			Sampling date / time	02-Sep-2021 07:57	02-Sep-2021 07:57	02-Sep-2021 07:57	02-Sep-2021 07:58	02-Sep-2021 07:58
Compound	CAS Number	LOR	Unit	EP2110219-006	EP2110219-007	EP2110219-008	EP2110219-009	EP2110219-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.9	----	7.7	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	0.07	----	0.10	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	15	----	20	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.02	----	0.03	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.6	7.8	7.6	8.2	7.9
pH (Fox)	----	0.1	pH Unit	5.6	6.1	5.8	5.9	5.7
Reaction Rate	----	1	-	Slight	Slight	Moderate	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH18_A_2.5	BH18_A_2.75	BH18_A_3.0	BH18_A_3.25	BH18_A_3.5
			Sampling date / time	02-Sep-2021 07:58	02-Sep-2021 07:58	02-Sep-2021 07:59	02-Sep-2021 07:59	02-Sep-2021 07:59
Compound	CAS Number	LOR	Unit	EP2110219-011	EP2110219-012	EP2110219-013	EP2110219-014	EP2110219-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.2**	**----**	**6.4**	**----**	**6.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.7**	**7.8**	**7.7**	**7.7**	**7.6**
pH (Fox)	----	0.1	pH Unit	**5.5**	**5.4**	**5.5**	**5.6**	**5.8**
Reaction Rate	----	1	-	**Slight**	**Moderate**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH18_A_3.75	BH18_A_4.0	BH18_A_4.25	BH18_A_4.5	BH18_A_4.75
			Sampling date / time	02-Sep-2021 08:00	02-Sep-2021 08:00	02-Sep-2021 08:00	02-Sep-2021 08:00	02-Sep-2021 08:01
Compound	CAS Number	LOR	Unit	EP2110219-016	EP2110219-017	EP2110219-018	EP2110219-019	EP2110219-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.2	----	6.1	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.5	7.4	7.6	7.6	7.7
pH (Fox)	----	0.1	pH Unit	5.6	5.6	5.6	5.6	5.6
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH18_A_5.0	SQC020_A	BH18_A_5.25	BH18_A_5.5	BH18_A_5.75
			Sampling date / time	02-Sep-2021 08:01	02-Sep-2021 08:02	02-Sep-2021 08:02	02-Sep-2021 08:02	02-Sep-2021 08:03
Compound	CAS Number	LOR	Unit	EP2110219-021	EP2110219-022	EP2110219-023	EP2110219-024	EP2110219-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.1**	**6.4**	**----**	**6.0**	**----**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	**----**	**2**	**----**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	**----**	<0.02	**----**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	**----**	**0.009**	**----**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**----**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	**----**	<0.02	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
Liming Rate	----	1	kg CaCO3/t	<1	<1	**----**	**1**	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	**----**	<0.02	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	**----**	**1**	**----**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.6**	**7.5**	**7.4**	**7.0**	**6.9**
pH (Fox)	----	0.1	pH Unit	**5.7**	**5.6**	**5.5**	**5.4**	**5.3**
Reaction Rate	----	1	-	**Slight**	**Moderate**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH18_A_6.0	BH18_A_6.25	BH17_A_6.5	BH18_A_6.75	BH18_A_7.0
			Sampling date / time	02-Sep-2021 08:03	02-Sep-2021 08:03	02-Sep-2021 08:03	02-Sep-2021 08:04	02-Sep-2021 08:04
Compound	CAS Number	LOR	Unit	EP2110219-026	EP2110219-027	EP2110219-028	EP2110219-029	EP2110219-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.0**	**----**	**6.2**	**----**	**6.0**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	**2**	**----**	**2**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.6**	**6.0**	**5.7**	**6.2**	**6.1**
pH (Fox)	----	0.1	pH Unit	**4.8**	**4.3**	**4.1**	**4.6**	**4.9**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Strong**	**Strong**	**Strong**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH18_A_7.25	BH18_A_7.5	BH18_A_8.0	BH18_A_8.5	BH18_A_9.0
			Sampling date / time	02-Sep-2021 08:04	02-Sep-2021 08:05	02-Sep-2021 08:05	02-Sep-2021 08:06	02-Sep-2021 08:07
Compound	CAS Number	LOR	Unit	EP2110219-031	EP2110219-032	EP2110219-033	EP2110219-034	EP2110219-035
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.7	5.8	5.7	5.7
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	7	4	4	2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	<0.005	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	<10	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	----	1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	<1	<1	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.8	5.8	6.1	6.1	5.9
pH (Fox)	----	0.1	pH Unit	4.5	3.8	4.5	4.5	4.0
Reaction Rate	----	1	-	Strong	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SQC021_A	----	----	----	----
			Sampling date / time	02-Sep-2021 08:07	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2110219-036	--------	--------	--------	--------
				Result	----	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.1**	----	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.6**	----	----	----	----
pH (Fox)	----	0.1	pH Unit	**5.2**	----	----	----	----
Reaction Rate	----	1	-	**Moderate**	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EP2110219**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 02-Sep-2021
Order number	: 30058301	Date Analysis Commenced	: 06-Sep-2021
C-O-C number	: 27126	Issue Date	: 17-Sep-2021
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP2.3		
Quote number	: EP/529/21_V4		
No. of samples received	: 36		
No. of samples analysed	: 36		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3899398)									
EP2110219-001	BH18_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.4	8.4	0.0	0% - 20%
EP2110219-021	BH18_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.1	6.1	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 3899399)									
EP2110219-036	SQC021_A	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.1	6.2	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3899398)									
EP2110219-001	BH18_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110219-021	BH18_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 3899399)									
EP2110219-036	SQC021_A	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3899398)									
EP2110219-001	BH18_A_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.30	0.30	0.0	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-C: Acid Neutralising Capacity (QC Lot: 3899398) - continued									
EP2110219-001	BH18_A_0.0	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.10	0.10	0.0	0% - 50%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	59	59	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3899398)									
EP2110219-001	BH18_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110219-021	BH18_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3899399)									
EP2110219-036	SQC021_A	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3885623)									
EP2110219-001	BH18_A_0.0	EA037: pH (F)	----	0.1	pH Unit	7.3	7.3	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.9	5.9	0.0	0% - 20%
EP2110219-010	BH18_A_2.25	EA037: pH (F)	----	0.1	pH Unit	7.9	7.9	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.7	5.7	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3885624)									
EP2110219-021	BH18_A_5.0	EA037: pH (F)	----	0.1	pH Unit	7.6	7.6	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.7	5.7	0.0	0% - 20%
EP2110219-030	BH18_A_7.0	EA037: pH (F)	----	0.1	pH Unit	6.1	6.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.9	5.0	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3899398)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	95.1	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 3899399)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	95.3	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3899398)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	90.6	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3899399)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	94.6	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3899398)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3899398)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3899399)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110219**	Page	: 1 of 6
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 02-Sep-2021
Site	: GEHBI - WP2.3	Issue Date	: 17-Sep-2021
Sampler	: Jaimon Hollett	No. of samples received	: 36
Order number	: 30058301	No. of samples analysed	: 36

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
BH18_A_0.0,	BH18_A_0.5,	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
BH18_A_1.0,	BH18_A_1.5,							
BH18_A_2.0,	BH18_A_2.5,							
BH18_A_3.0,	BH18_A_3.5,							
BH18_A_4.0,	BH18_A_4.5,							
BH18_A_5.0,	SQC020_A,							
BH18_A_5.5,	BH18_A_6.0,							
BH17_A_6.5,	BH18_A_7.0,							
BH18_A_7.5,	BH18_A_8.0,							
BH18_A_8.5,	BH18_A_9.0,							
SQC021_A								
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
BH18_A_0.0,	BH18_A_0.5,	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
BH18_A_1.0,	BH18_A_1.5,							
BH18_A_2.0,	BH18_A_2.5,							
BH18_A_3.0,	BH18_A_3.5,							
BH18_A_4.0,	BH18_A_4.5,							
BH18_A_5.0,	SQC020_A,							
BH18_A_5.5,	BH18_A_6.0,							
BH17_A_6.5,	BH18_A_7.0,							
BH18_A_7.5,	BH18_A_8.0,							
BH18_A_8.5,	BH18_A_9.0,							
SQC021_A								

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA033)							
BH18_A_0.0, BH18_A_0.5, BH18_A_1.0, BH18_A_1.5, BH18_A_2.0, BH18_A_2.5, BH18_A_3.0, BH18_A_3.5, BH18_A_4.0, BH18_A_4.5, BH18_A_5.0, SQC020_A, BH18_A_5.5, BH18_A_6.0, BH17_A_6.5, BH18_A_7.0, BH18_A_7.5, BH18_A_8.0, BH18_A_8.5, BH18_A_9.0, SQC021_A	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen (EA033)							
BH18_A_0.0, BH18_A_0.5, BH18_A_1.0, BH18_A_1.5, BH18_A_2.0, BH18_A_2.5, BH18_A_3.0, BH18_A_3.5, BH18_A_4.0, BH18_A_4.5, BH18_A_5.0, SQC020_A, BH18_A_5.5, BH18_A_6.0, BH17_A_6.5, BH18_A_7.0, BH18_A_7.5, BH18_A_8.0, BH18_A_8.5, BH18_A_9.0, SQC021_A	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen (EA033)							
BH18_A_0.0, BH18_A_0.5, BH18_A_1.0, BH18_A_1.5, BH18_A_2.0, BH18_A_2.5, BH18_A_3.0, BH18_A_3.5, BH18_A_4.0, BH18_A_4.5, BH18_A_5.0, SQC020_A, BH18_A_5.5, BH18_A_6.0, BH17_A_6.5, BH18_A_7.0, BH18_A_7.5, BH18_A_8.0, BH18_A_8.5, BH18_A_9.0, SQC021_A	**02-Sep-2021**	**09-Sep-2021**	02-Sep-2022	✓	**13-Sep-2021**	08-Dec-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH18_A_0.0,	BH18_A_0.25,	**02-Sep-2021**	**06-Sep-2021**	01-Mar-2022	✓	**06-Sep-2021**	01-Mar-2022	✓
BH18_A_0.5,	BH18_A_0.75,							
BH18_A_1.0,	BH18_A_1.25,							
BH18_A_1.5,	BH18_A_1.75,							
BH18_A_2.0,	BH18_A_2.25,							
BH18_A_2.5,	BH18_A_2.75,							
BH18_A_3.0,	BH18_A_3.25,							
BH18_A_3.5,	BH18_A_3.75,							
BH18_A_4.0,	BH18_A_4.25,							
BH18_A_4.5,	BH18_A_4.75,							
BH18_A_5.0,	SQC020_A,							
BH18_A_5.25,	BH18_A_5.5,							
BH18_A_5.75,	BH18_A_6.0,							
BH18_A_6.25,	BH17_A_6.5,							
BH18_A_6.75,	BH18_A_7.0,							
BH18_A_7.25,	BH18_A_7.5,							
BH18_A_8.0,	BH18_A_8.5,							
BH18_A_9.0,	SQC021_A							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110726

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: GBHBI_WP4.1_A **Client:** Arcadis **Project Manager:** Bronwyn Van Valkengoed
Phone: (0408 751 386)

ALS Compass COC Reference: 27512 **# Samples:** 44 **Sampler:** Jamon Hollett
Phone: (0420 888 328)

Turnaround Requirements: (Standard) _____ Urgent _____

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
JH	MD		
Date / Time: 13/9/21 1530	Date / Time: 13-09-21 1645	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: **27512** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

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EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH95_A_0.0		13/09/2021 07:45 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH95_A_0.25		13/09/2021 07:46 AM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH95_A_0.5		13/09/2021 07:46 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH95_A_0.75		13/09/2021 07:47 AM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH95_A_1.0		13/09/2021 07:47 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH95_A_1.25		13/09/2021 07:48 AM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH95_A_1.5		13/09/2021 07:48 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH95_A_1.75		13/09/2021 07:49 AM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH95_A_2.0		13/09/2021 07:49 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27512 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH95_A_2.25		13/09/2021 07:53 AM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH95_A_2.5		13/09/2021 07:53 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
012	BH95_A_2.75		13/09/2021 07:54 AM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH95_A_3.0		13/09/2021 07:54 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
014	BH95_A_3.25		13/09/2021 07:55 AM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH95_A_3.5		13/09/2021 07:56 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
016	BH95_A_3.75		13/09/2021 07:56 AM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH95_A_4.0		13/09/2021 07:56 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
018	BH95_A_4.25		13/09/2021 07:57 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

COC#: **27512** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH95_A_4.5		13/09/2021 07:57 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
020	BH95_A_4.75		13/09/2021 07:57 AM	Soil	ALS: 1 Non ALS: 0	No	X			
021	BH95_A_5.0		13/09/2021 07:58 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
022	BH95_A_5.25		13/09/2021 07:58 AM	Soil	ALS: 1 Non ALS: 0	No	X			
023	BH95_A_5.5		13/09/2021 07:58 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
024	BH95_A_5.75		13/09/2021 07:59 AM	Soil	ALS: 1 Non ALS: 0	No	X			
025	BH95_A_6.0		13/09/2021 07:59 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
026	SQC031_A		13/09/2021 08:00 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
027	BH112_A_0.0		13/09/2021 09:25 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

COC#: 27512 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH112_A_0.25		13/09/2021 09:26 AM	Soil	ALS: 1 Non ALS: 0	No	X			
029	BH112_A_0.5		13/09/2021 09:26 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
030	BH112_A_0.75		13/09/2021 09:27 AM	Soil	ALS: 1 Non ALS: 0	No	X			
031	BH112_A_1.0		13/09/2021 09:27 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
032	BH112_A_1.25		13/09/2021 09:28 AM	Soil	ALS: 1 Non ALS: 0	No	X			
033	BH112_A_1.5		13/09/2021 09:28 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
034	BH112_A_1.75		13/09/2021 09:29 AM	Soil	ALS: 1 Non ALS: 0	No	X			
035	BH112_A_2.0		13/09/2021 09:29 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
036	BH112_A_2.25		13/09/2021 09:29 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 27512 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
037	BH112_A_2.5		13/09/2021 09:30 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
038	BH112_A_2.75		13/09/2021 09:30 AM	Soil	ALS: 1 Non ALS: 0	No	X			
039	BH112_A_3.0		13/09/2021 09:31 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
040	BH112_A_3.25		13/09/2021 09:31 AM	Soil	ALS: 1 Non ALS: 0	No	X			
041	BH112_A_3.5		13/09/2021 09:31 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
042	BH112_A_3.75		13/09/2021 09:32 AM	Soil	ALS: 1 Non ALS: 0	No	X			
043	BH112_A_4.0		13/09/2021 09:32 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
044	SQC032_A		13/09/2021 09:33 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27512 ALS Laboratory: EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH95_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071447	Green	No	
002	BH95_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071446	Green	No	
003	BH95_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071445	Green	No	
004	BH95_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071444	Green	No	
005	BH95_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071443	Green	No	
006	BH95_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071442	Green	No	
007	BH95_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071441	Green	No	
008	BH95_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071386	Green	No	
009	BH95_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071385	Green	No	
010	BH95_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071384	Green	No	
011	BH95_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071383	Green	No	
012	BH95_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071382	Green	No	
013	BH95_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071381	Green	No	
014	BH95_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071380	Green	No	
015	BH95_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071379	Green	No	
016	BH95_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071378	Green	No	
017	BH95_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071377	Green	No	
018	BH95_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071349	Green	No	
019	BH95_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071348	Green	No	
020	BH95_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071402	Green	No	
021	BH95_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071401	Green	No	
022	BH95_A_5.25	Snap Lock Bag - frozen	1 Medium	00130621071400	Green	No	
023	BH95_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621071399	Green	No	
024	BH95_A_5.75	Snap Lock Bag - frozen	1 Medium	00130621071398	Green	No	
025	BH95_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621071397	Green	No	
026	SQC031_A	Snap Lock Bag - frozen	1 Medium	00130621071396	Green	No	

CHAIN OF CUSTODY

ALS COC#: 27512 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

027	BH112_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071867	Green	No	
028	BH112_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071868	Green	No	
029	BH112_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071869	Green	No	
030	BH112_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071870	Green	No	
031	BH112_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071871	Green	No	
032	BH112_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071872	Green	No	
033	BH112_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071873	Green	No	
034	BH112_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071874	Green	No	
035	BH112_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071875	Green	No	
036	BH112_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071876	Green	No	
037	BH112_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071877	Green	No	
038	BH112_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071878	Green	No	
039	BH112_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071879	Green	No	
040	BH112_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071880	Green	No	
041	BH112_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071881	Green	No	
042	BH112_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071882	Green	No	
043	BH112_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071883	Green	No	
044	SQC032_A	Snap Lock Bag - frozen	1 Medium	00130621071885	Green	No	

Total Bottle Count: ALS: 44, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2110726**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 27512	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP4.1_A		
Sampler	: Jaimon Hollett		

Dates

Date Samples Received	: 13-Sep-2021 16:45	Issue Date	: 13-Sep-2021
Client Requested Due Date	: 28-Sep-2021	Scheduled Reporting Date	: **28-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 7	Temperature	: 3.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 44 / 44

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110726-001	13-Sep-2021 07:45	BH95_A_0.0	✓	✓
EP2110726-002	13-Sep-2021 07:46	BH95_A_0.25		✓
EP2110726-003	13-Sep-2021 07:46	BH95_A_0.5	✓	✓
EP2110726-004	13-Sep-2021 07:47	BH95_A_0.75		✓
EP2110726-005	13-Sep-2021 07:47	BH95_A_1.0	✓	✓
EP2110726-006	13-Sep-2021 07:48	BH95_A_1.25		✓
EP2110726-007	13-Sep-2021 07:48	BH95_A_1.5	✓	✓
EP2110726-008	13-Sep-2021 07:49	BH95_A_1.75		✓
EP2110726-009	13-Sep-2021 07:49	BH95_A_2.0	✓	✓
EP2110726-010	13-Sep-2021 07:53	BH95_A_2.25		✓
EP2110726-011	13-Sep-2021 07:53	BH95_A_2.5	✓	✓
EP2110726-012	13-Sep-2021 07:54	BH95_A_2.75		✓
EP2110726-013	13-Sep-2021 07:54	BH95_A_3.0	✓	✓
EP2110726-014	13-Sep-2021 07:55	BH95_A_3.25		✓
EP2110726-015	13-Sep-2021 07:56	BH95_A_3.5	✓	✓
EP2110726-016	13-Sep-2021 07:56	BH95_A_3.75		✓
EP2110726-017	13-Sep-2021 07:56	BH95_A_4.0	✓	✓
EP2110726-018	13-Sep-2021 07:57	BH95_A_4.25		✓
EP2110726-019	13-Sep-2021 07:57	BH95_A_4.5	✓	✓
EP2110726-020	13-Sep-2021 07:57	BH95_A_4.75		✓
EP2110726-021	13-Sep-2021 07:58	BH95_A_5.0	✓	✓
EP2110726-022	13-Sep-2021 07:58	BH95_A_5.25		✓
EP2110726-023	13-Sep-2021 07:58	BH95_A_5.5	✓	✓
EP2110726-024	13-Sep-2021 07:59	BH95_A_5.75		✓
EP2110726-025	13-Sep-2021 07:59	BH95_A_6.0	✓	✓
EP2110726-026	13-Sep-2021 08:00	SQC031_A	✓	✓
EP2110726-027	13-Sep-2021 09:25	BH112_A_0.0	✓	✓
EP2110726-028	13-Sep-2021 09:26	BH112_A_0.25		✓
EP2110726-029	13-Sep-2021 09:26	BH112_A_0.5	✓	✓
EP2110726-030	13-Sep-2021 09:27	BH112_A_0.75		✓
EP2110726-031	13-Sep-2021 09:27	BH112_A_1.0	✓	✓
EP2110726-032	13-Sep-2021 09:28	BH112_A_1.25		✓
EP2110726-033	13-Sep-2021 09:28	BH112_A_1.5	✓	✓
EP2110726-034	13-Sep-2021 09:29	BH112_A_1.75		✓
EP2110726-035	13-Sep-2021 09:29	BH112_A_2.0	✓	✓

			SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110726-036	13-Sep-2021 09:29	BH112_A_2.25		✓
EP2110726-037	13-Sep-2021 09:30	BH112_A_2.5	✓	✓
EP2110726-038	13-Sep-2021 09:30	BH112_A_2.75		✓
EP2110726-039	13-Sep-2021 09:31	BH112_A_3.0	✓	✓
EP2110726-040	13-Sep-2021 09:31	BH112_A_3.25		✓
EP2110726-041	13-Sep-2021 09:31	BH112_A_3.5	✓	✓
EP2110726-042	13-Sep-2021 09:32	BH112_A_3.75		✓
EP2110726-043	13-Sep-2021 09:32	BH112_A_4.0	✓	✓
EP2110726-044	13-Sep-2021 09:33	SQC032_A	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Carina Andersen

- A4 - AU Tax Invoice (INV)	Email	carina.andersen@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110726**	Page	: 1 of 11
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 13-Sep-2021 16:45
Order number	: 30058301	Date Analysis Commenced	: 17-Sep-2021
C-O-C number	: 27512	Issue Date	: 24-Sep-2021 16:29
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP4.1_A		
Quote number	: EP/529/21_V4		
No. of samples received	: 44		
No. of samples analysed	: 44		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH95_A_0.0	BH95_A_0.25	BH95_A_0.5	BH95_A_0.75	BH95_A_1.0
			Sampling date / time	13-Sep-2021 07:45	13-Sep-2021 07:46	13-Sep-2021 07:46	13-Sep-2021 07:47	13-Sep-2021 07:47
Compound	CAS Number	LOR	Unit	EP2110726-001	EP2110726-002	EP2110726-003	EP2110726-004	EP2110726-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.8**	**----**	**6.6**	**----**	**6.6**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**4**	**----**	<2	**----**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**----**	**----**	**0.15**	**----**	<0.01
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**----**	**----**	**29**	**----**	<10
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**----**	**----**	**0.05**	**----**	<0.01
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.6**	**5.7**	**6.0**	**5.9**	**5.9**
pH (Fox)	----	0.1	pH Unit	**3.9**	**3.8**	**4.0**	**3.9**	**4.2**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH95_A_1.25	BH95_A_1.5	BH95_A_1.75	BH95_A_2.0	BH95_A_2.25
			Sampling date / time	13-Sep-2021 07:48	13-Sep-2021 07:48	13-Sep-2021 07:49	13-Sep-2021 07:49	13-Sep-2021 07:53
Compound	CAS Number	LOR	Unit	EP2110726-006	EP2110726-007	EP2110726-008	EP2110726-009	EP2110726-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.5	----	6.2	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.9	6.0	5.9	5.6	5.8
pH (Fox)	----	0.1	pH Unit	3.8	3.8	3.7	4.3	4.5
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH95_A_2.5	BH95_A_2.75	BH95_A_3.0	BH95_A_3.25	BH95_A_3.5
			Sampling date / time	13-Sep-2021 07:53	13-Sep-2021 07:54	13-Sep-2021 07:54	13-Sep-2021 07:55	13-Sep-2021 07:56
Compound	CAS Number	LOR	Unit	EP2110726-011	EP2110726-012	EP2110726-013	EP2110726-014	EP2110726-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.2**	**----**	**6.3**	**----**	**6.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.9**	**5.7**	**6.2**	**8.0**	**6.7**
pH (Fox)	----	0.1	pH Unit	**4.1**	**4.3**	**4.6**	**5.5**	**4.6**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH95_A_3.75	BH95_A_4.0	BH95_A_4.25	BH95_A_4.5	BH95_A_4.75
			Sampling date / time	13-Sep-2021 07:56	13-Sep-2021 07:56	13-Sep-2021 07:57	13-Sep-2021 07:57	13-Sep-2021 07:57
Compound	CAS Number	LOR	Unit	EP2110726-016	EP2110726-017	EP2110726-018	EP2110726-019	EP2110726-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.2	----	6.1	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.0	6.4	6.3	5.8	6.4
pH (Fox)	----	0.1	pH Unit	4.4	4.8	4.6	4.4	4.7
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH95_A_5.0	BH95_A_5.25	BH95_A_5.5	BH95_A_5.75	BH95_A_6.0
			Sampling date / time	13-Sep-2021 07:58	13-Sep-2021 07:58	13-Sep-2021 07:58	13-Sep-2021 07:59	13-Sep-2021 07:59
Compound	CAS Number	LOR	Unit	EP2110726-021	EP2110726-022	EP2110726-023	EP2110726-024	EP2110726-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.2**	**----**	**5.8**	**----**	**5.9**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	**5**	**----**	**6**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.8**	**6.2**	**6.2**	**6.3**	**6.2**
pH (Fox)	----	0.1	pH Unit	**4.4**	**4.5**	**4.6**	**4.7**	**4.8**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SQC031_A	BH112_A_0.0	BH112_A_0.25	BH112_A_0.5	BH112_A_0.75
			Sampling date / time	13-Sep-2021 08:00	13-Sep-2021 09:25	13-Sep-2021 09:26	13-Sep-2021 09:26	13-Sep-2021 09:27
Compound	CAS Number	LOR	Unit	EP2110726-026	EP2110726-027	EP2110726-028	EP2110726-029	EP2110726-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.8**	**7.4**	**----**	**6.2**	**----**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	**----**	<2	**----**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	**----**	<0.02	**----**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	**----**	<0.005	**----**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.15**	**0.35**	**----**	**----**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**29**	**69**	**----**	**----**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.05**	**0.11**	**----**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**----**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	**----**	<0.02	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
Liming Rate	----	1	kg CaCO3/t	<1	<1	**----**	<1	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	**----**	<0.02	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	**----**	<1	**----**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.2**	**7.0**	**7.0**	**7.2**	**7.0**
pH (Fox)	----	0.1	pH Unit	**3.8**	**5.0**	**4.9**	**4.8**	**5.0**
Reaction Rate	----	1	-	**Slight**	**Moderate**	**Moderate**	**Slight**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH112_A_1.0	BH112_A_1.25	BH112_A_1.5	BH112_A_1.75	BH112_A_2.0
			Sampling date / time	13-Sep-2021 09:27	13-Sep-2021 09:28	13-Sep-2021 09:28	13-Sep-2021 09:29	13-Sep-2021 09:29
Compound	CAS Number	LOR	Unit	EP2110726-031	EP2110726-032	EP2110726-033	EP2110726-034	EP2110726-035
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.2**	**----**	**5.2**	**----**	**4.6**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	**25**	**----**	**53**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	**0.04**	**----**	**0.08**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	**0.04**	**----**	**0.09**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	**26**	**----**	**54**
Liming Rate	----	1	kg CaCO3/t	<1	**----**	**2**	**----**	**4**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	**0.04**	**----**	**0.09**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	**26**	**----**	**54**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	**2**	**----**	**4**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.8**	**6.6**	**5.8**	**5.6**	**5.4**
pH (Fox)	----	0.1	pH Unit	**4.7**	**4.6**	**4.3**	**4.1**	**4.1**
Reaction Rate	----	1	-	**Moderate**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH112_A_2.25	BH112_A_2.5	BH112_A_2.75	BH112_A_3.0	BH112_A_3.25
			Sampling date / time	13-Sep-2021 09:29	13-Sep-2021 09:30	13-Sep-2021 09:30	13-Sep-2021 09:31	13-Sep-2021 09:31
Compound	CAS Number	LOR	Unit	EP2110726-036	EP2110726-037	EP2110726-038	EP2110726-039	EP2110726-040
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	4.6	----	5.3	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	65	----	22	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.10	----	0.04	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.11	----	0.04	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	67	----	22	----
Liming Rate	----	1	kg CaCO3/t	----	5	----	2	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.11	----	0.04	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	67	----	22	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	5	----	2	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.3	5.3	5.3	5.2	5.1
pH (Fox)	----	0.1	pH Unit	4.0	3.9	3.9	3.9	3.8
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH112_A_3.5	BH112_A_3.75	BH112_A_4.0	SQC032_A	----
			Sampling date / time	13-Sep-2021 09:31	13-Sep-2021 09:32	13-Sep-2021 09:32	13-Sep-2021 09:33	----
Compound	CAS Number	LOR	Unit	EP2110726-041	EP2110726-042	EP2110726-043	EP2110726-044	--------
				Result	Result	Result	Result	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**4.7**	**----**	**5.0**	**6.4**	**----**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**33**	**----**	**27**	<2	**----**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.05**	**----**	**0.04**	<0.02	**----**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	<0.005	**----**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	<10	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S	**0.05**	**----**	**0.04**	<0.02	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	**33**	**----**	**27**	<10	**----**
Liming Rate	----	1	kg CaCO3/t	**2**	**----**	**2**	<1	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.05**	**----**	**0.04**	<0.02	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**33**	**----**	**27**	<10	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**2**	**----**	**2**	<1	**----**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.1**	**5.1**	**5.0**	**6.1**	**----**
pH (Fox)	----	0.1	pH Unit	**3.8**	**3.8**	**3.8**	**5.2**	**----**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**----**

QUALITY CONTROL REPORT

Work Order	: **EP2110726**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 13-Sep-2021
Order number	: 30058301	Date Analysis Commenced	: 17-Sep-2021
C-O-C number	: 27512	Issue Date	: 24-Sep-2021
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP4.1_A		
Quote number	: EP/529/21_V4		
No. of samples received	: 44		
No. of samples analysed	: 44		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3921248)									
EP2110726-001	BH95_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	4	4	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.8	5.8	0.0	0% - 20%
EP2110726-021	BH95_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.2	6.2	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 3921249)									
EP2110726-039	BH112_A_3.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.04	0.04	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	22	22	0.0	0% - 50%
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.3	5.3	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3921248)									
EP2110726-001	BH95_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110726-021	BH95_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 3921249)									
EP2110726-039	BH112_A_3.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3921248)									
EP2110726-001	BH95_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-E: Acid Base Accounting (QC Lot: 3921248) - continued									
EP2110726-001	BH95_A_0.0	EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110726-021	BH95_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3921249)									
EP2110726-039	BH112_A_3.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.04	0.04	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.04	0.04	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	2	2	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	2	2	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	22	22	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	22	22	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3911545)									
EP2110726-001	BH95_A_0.0	EA037: pH (F)	----	0.1	pH Unit	5.6	5.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.9	3.9	0.0	0% - 20%
EP2110726-010	BH95_A_2.25	EA037: pH (F)	----	0.1	pH Unit	5.8	5.9	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.5	4.4	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3911546)									
EP2110726-021	BH95_A_5.0	EA037: pH (F)	----	0.1	pH Unit	5.8	5.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.4	4.5	0.0	0% - 20%
EP2110726-030	BH112_A_0.75	EA037: pH (F)	----	0.1	pH Unit	7.0	6.9	1.6	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.0	4.9	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3911547)									
EP2110726-041	BH112_A_3.5	EA037: pH (F)	----	0.1	pH Unit	5.1	5.2	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.8	3.8	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3921248)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	94.1	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 3921249)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	94.4	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3921248)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	98.5	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3921249)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	93.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3921248)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3921248)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3921249)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110726**	Page	: 1 of 6
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 13-Sep-2021
Site	: GEHBI - WP4.1_A	Issue Date	: 24-Sep-2021
Sampler	: Jaimon Hollett	No. of samples received	: 44
Order number	: 30058301	No. of samples analysed	: 44

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
BH95_A_0.0,	BH95_A_0.5,	**13-Sep-2021**	**17-Sep-2021**	13-Sep-2022	✓	**24-Sep-2021**	16-Dec-2021	✓
BH95_A_1.0,	BH95_A_1.5,							
BH95_A_2.0,	BH95_A_2.5,							
BH95_A_3.0,	BH95_A_3.5,							
BH95_A_4.0,	BH95_A_4.5,							
BH95_A_5.0,	BH95_A_5.5,							
BH95_A_6.0,	SQC031_A,							
BH112_A_0.0,	BH112_A_0.5,							
BH112_A_1.0,	BH112_A_1.5,							
BH112_A_2.0,	BH112_A_2.5,							
BH112_A_3.0,	BH112_A_3.5,							
BH112_A_4.0,	SQC032_A							
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
BH95_A_0.0,	BH95_A_0.5,	**13-Sep-2021**	**17-Sep-2021**	13-Sep-2022	✓	**24-Sep-2021**	16-Dec-2021	✓
BH95_A_1.0,	BH95_A_1.5,							
BH95_A_2.0,	BH95_A_2.5,							
BH95_A_3.0,	BH95_A_3.5,							
BH95_A_4.0,	BH95_A_4.5,							
BH95_A_5.0,	BH95_A_5.5,							
BH95_A_6.0,	SQC031_A,							
BH112_A_0.0,	BH112_A_0.5,							
BH112_A_1.0,	BH112_A_1.5,							
BH112_A_2.0,	BH112_A_2.5,							
BH112_A_3.0,	BH112_A_3.5,							
BH112_A_4.0,	SQC032_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033)								
BH95_A_0.0,	BH95_A_0.5,	**13-Sep-2021**	**17-Sep-2021**	13-Sep-2022	✓	**24-Sep-2021**	16-Dec-2021	✓
BH95_A_1.0,	BH95_A_1.5,							
BH95_A_2.0,	BH95_A_2.5,							
BH95_A_3.0,	BH95_A_3.5,							
BH95_A_4.0,	BH95_A_4.5,							
BH95_A_5.0,	BH95_A_5.5,							
BH95_A_6.0,	SQC031_A,							
BH112_A_0.0,	BH112_A_0.5,							
BH112_A_1.0,	BH112_A_1.5,							
BH112_A_2.0,	BH112_A_2.5,							
BH112_A_3.0,	BH112_A_3.5,							
BH112_A_4.0,	SQC032_A							
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033)								
BH95_A_0.0,	BH95_A_0.5,	**13-Sep-2021**	**17-Sep-2021**	13-Sep-2022	✓	**24-Sep-2021**	16-Dec-2021	✓
BH95_A_1.0,	BH95_A_1.5,							
BH95_A_2.0,	BH95_A_2.5,							
BH95_A_3.0,	BH95_A_3.5,							
BH95_A_4.0,	BH95_A_4.5,							
BH95_A_5.0,	BH95_A_5.5,							
BH95_A_6.0,	SQC031_A,							
BH112_A_0.0,	BH112_A_0.5,							
BH112_A_1.0,	BH112_A_1.5,							
BH112_A_2.0,	BH112_A_2.5,							
BH112_A_3.0,	BH112_A_3.5,							
BH112_A_4.0,	SQC032_A							
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033)								
BH95_A_0.0,	BH95_A_0.5,	**13-Sep-2021**	**17-Sep-2021**	13-Sep-2022	✓	**24-Sep-2021**	16-Dec-2021	✓
BH95_A_1.0,	BH95_A_1.5,							
BH95_A_2.0,	BH95_A_2.5,							
BH95_A_3.0,	BH95_A_3.5,							
BH95_A_4.0,	BH95_A_4.5,							
BH95_A_5.0,	BH95_A_5.5,							
BH95_A_6.0,	SQC031_A,							
BH112_A_0.0,	BH112_A_0.5,							
BH112_A_1.0,	BH112_A_1.5,							
BH112_A_2.0,	BH112_A_2.5,							
BH112_A_3.0,	BH112_A_3.5,							
BH112_A_4.0,	SQC032_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH95_A_0.0,	BH95_A_0.25,	**13-Sep-2021**	**17-Sep-2021**	12-Mar-2022	✓	**17-Sep-2021**	12-Mar-2022	✓
BH95_A_0.5,	BH95_A_0.75,							
BH95_A_1.0,	BH95_A_1.25,							
BH95_A_1.5,	BH95_A_1.75,							
BH95_A_2.0,	BH95_A_2.25,							
BH95_A_2.5,	BH95_A_2.75,							
BH95_A_3.0,	BH95_A_3.25,							
BH95_A_3.5,	BH95_A_3.75,							
BH95_A_4.0,	BH95_A_4.25,							
BH95_A_4.5,	BH95_A_4.75,							
BH95_A_5.0,	BH95_A_5.25,							
BH95_A_5.5,	BH95_A_5.75,							
BH95_A_6.0,	SQC031_A,							
BH112_A_0.0,	BH112_A_0.25,							
BH112_A_0.5,	BH112_A_0.75,							
BH112_A_1.0,	BH112_A_1.25,							
BH112_A_1.5,	BH112_A_1.75,							
BH112_A_2.0,	BH112_A_2.25,							
BH112_A_2.5,	BH112_A_2.75,							
BH112_A_3.0,	BH112_A_3.25,							
BH112_A_3.5,	BH112_A_3.75,							
BH112_A_4.0,	SQC032_A							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	5	44	**11.36**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	24	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Environmental Division
Perth
Work Order Reference
EP2110727

Telephone : -- 61-8-9406 1301

ALSCompass SAMPLING Intelligence

Custody Document for Submissions via ALS Compass App

Project: GEHB1_WP4.2_A **Client:** Arcadis **Project Manager:** Bronwyn Van Valkengoed
Phone: (0408 751 386)

ALS Compass COC Reference: 27533 **# Samples:** 53 **Sampler:** Jenson Hallett
Phone: (0420 838 328)

Turnaround Requirements: (Standard) _____ Urgent _____

Special Instructions:	ALS Use Only			
	Custody seal intact?	(YES)	NO	(N/A)
	Free ice / frozen ice bricks upon receipt?	(YES)	NO	N/A
	Random sample temperature on receipt?		°C	

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
Date / Time: 13/9/21 1530	Date / Time: 1645 13/9/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: 27533 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH148_A_0.0		13/09/2021 12:47 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH148_A_0.25		13/09/2021 12:49 PM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH148_A_0.5		13/09/2021 12:49 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH148_A_0.75		13/09/2021 12:50 PM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH148_A_1.0		13/09/2021 12:50 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH148_A_1.25		13/09/2021 12:50 PM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH148_A_1.5		13/09/2021 12:51 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH148_A_1.75		13/09/2021 12:51 PM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH148_A_2.0		13/09/2021 12:52 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

COC#: 27533 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH08_A_0.0		13/09/2021 01:43 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
011	BH08_A_0.25		13/09/2021 01:44 PM	Soil	ALS: 1 Non ALS: 0	No	X			
012	BH08_A_0.5		13/09/2021 01:44 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
013	BH08_A_0.75		13/09/2021 01:45 PM	Soil	ALS: 1 Non ALS: 0	No	X			
014	BH08_A_1.0		13/09/2021 01:45 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
015	BH08_A_1.25		13/09/2021 01:48 PM	Soil	ALS: 1 Non ALS: 0	No	X			
016	BH08_A_1.5		13/09/2021 01:49 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
017	BH08_A_1.75		13/09/2021 01:49 PM	Soil	ALS: 1 Non ALS: 0	No	X			
018	BH08_A_2.0		13/09/2021 01:50 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

COC#: 27533 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free Ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH08_A_2.25		13/09/2021 01:50 PM	Soil	ALS: 1 Non ALS: 0	No	X			
020	BH08_A_2.5		13/09/2021 01:50 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
021	BH08_A_2.75		13/09/2021 01:51 PM	Soil	ALS: 1 Non ALS: 0	No	X			
022	BH08_A_3.0		13/09/2021 01:51 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
023	BH08_A_3.25		13/09/2021 01:52 PM	Soil	ALS: 1 Non ALS: 0	No	X			
024	BH08_A_3.5		13/09/2021 01:52 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
025	BH08_A_3.75		13/09/2021 01:52 PM	Soil	ALS: 1 Non ALS: 0	No	X			
026	BH08_A_4.0		13/09/2021 01:53 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
027	BH08_A_4.25		13/09/2021 01:53 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

COC#: **27533** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

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PRIMARY SAMPLER: Jaimon Hollett

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QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH08_A_4.5		13/09/2021 01:54 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
029	BH08_A_4.75		13/09/2021 01:54 PM	Soil	ALS: 1 Non ALS: 0	No	X			
030	BH08_A_5.0		13/09/2021 01:54 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
031	SQC033_A		13/09/2021 01:55 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
032	BH99_A_0.0		13/09/2021 01:56 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
033	BH99_A_0.25		13/09/2021 01:57 PM	Soil	ALS: 1 Non ALS: 0	No	X			
034	BH99_A_0.5		13/09/2021 01:57 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
035	BH99_A_0.75		13/09/2021 01:57 PM	Soil	ALS: 1 Non ALS: 0	No	X			
036	BH99_A_1.0		13/09/2021 01:58 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27533 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
037	BH99_A_1.25		13/09/2021 01:58 PM	Soil	ALS: 1 Non ALS: 0	No	X			
038	BH99_A_1.5		13/09/2021 01:58 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
039	BH99_A_1.75		13/09/2021 01:59 PM	Soil	ALS: 1 Non ALS: 0	No	X			
040	BH99_A_2.0		13/09/2021 01:59 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
041	BH99_A_2.25		13/09/2021 02:00 PM	Soil	ALS: 1 Non ALS: 0	No	X			
042	BH99_A_2.5		13/09/2021 02:00 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
043	BH99_A_2.75		13/09/2021 02:00 PM	Soil	ALS: 1 Non ALS: 0	No	X			
044	BH99_A_3.0		13/09/2021 02:01 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
045	BH99_A_3.25		13/09/2021 02:01 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

COC#: 27533 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

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QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
046	BH99_A_3.5		13/09/2021 02:01 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
047	BH99_A_3.75		13/09/2021 02:02 PM	Soil	ALS: 1 Non ALS: 0	No	X			
048	BH99_A_4.0		13/09/2021 02:02 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
049	BH99_A_4.25		13/09/2021 02:02 PM	Soil	ALS: 1 Non ALS: 0	No	X			
050	BH99_A_4.5		13/09/2021 02:03 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
051	BH99_A_4.75		13/09/2021 02:03 PM	Soil	ALS: 1 Non ALS: 0	No	X			
052	BH99_A_5.0		13/09/2021 02:04 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		
053	SQC034_A		13/09/2021 02:05 PM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

(ALS) COC#: 27533 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
/ EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH148_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071716	Green	No	
002	BH148_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071717	Green	No	
003	BH148_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071718	Green	No	
004	BH148_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071719	Green	No	
005	BH148_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071720	Green	No	
006	BH148_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071721	Green	No	
007	BH148_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071722	Green	No	
008	BH148_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071723	Green	No	
009	BH148_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071724	Green	No	
010	BH08_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071886	Green	No	
011	BH08_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071887	Green	No	
012	BH08_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071888	Green	No	
013	BH08_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071889	Green	No	
014	BH08_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071890	Green	No	
015	BH08_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071891	Green	No	
016	BH08_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071892	Green	No	
017	BH08_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071893	Green	No	
018	BH08_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071894	Green	No	
019	BH08_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071895	Green	No	
020	BH08_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071896	Green	No	
021	BH08_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071897	Green	No	
022	BH08_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071898	Green	No	
023	BH08_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071899	Green	No	
024	BH08_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071900	Green	No	
025	BH08_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071901	Green	No	
026	BH08_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071902	Green	No	

CHAIN OF CUSTODY

(ALS) COC#: 27533 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

027	BH08_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071853	Green	No	
028	BH08_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071854	Green	No	
029	BH08_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071855	Green	No	
030	BH08_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071856	Green	No	
031	SQC033_A	Snap Lock Bag - frozen	1 Medium	00130621071915	Green	No	
032	BH99_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071906	Green	No	
033	BH99_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071907	Green	No	
034	BH99_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071908	Green	No	
035	BH99_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071909	Green	No	
036	BH99_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071910	Green	No	
037	BH99_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071911	Green	No	
038	BH99_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071912	Green	No	
039	BH99_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071913	Green	No	
040	BH99_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071914	Green	No	
041	BH99_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071916	Green	No	
042	BH99_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071917	Green	No	
043	BH99_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071918	Green	No	
044	BH99_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071919	Green	No	
045	BH99_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071920	Green	No	
046	BH99_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071921	Green	No	
047	BH99_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071922	Green	No	
048	BH99_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071923	Green	No	
049	BH99_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071924	Green	No	
050	BH99_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071925	Green	No	
051	BH99_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071926	Green	No	
052	BH99_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071927	Green	No	
053	SQC034_A	Snap Lock Bag - frozen	1 Medium	00130621071935	Green	No	

CHAIN OF CUSTODY

(ALS) COC#: **27533** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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Total Bottle Count: ALS: 53, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2110727**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 27533	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP4.2_A		
Sampler	: Jaimon Hollett		

Dates

Date Samples Received	: 13-Sep-2021 16:45	Issue Date	: 13-Sep-2021
Client Requested Due Date	: 28-Sep-2021	Scheduled Reporting Date	: **28-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 7	Temperature	: 3.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 53 / 53

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110727-001	13-Sep-2021 12:47	BH148_A_0.0	✓	✓
EP2110727-002	13-Sep-2021 12:49	BH148_A_0.25		✓
EP2110727-003	13-Sep-2021 12:49	BH148_A_0.5	✓	✓
EP2110727-004	13-Sep-2021 12:50	BH148_A_0.75		✓
EP2110727-005	13-Sep-2021 12:50	BH148_A_1.0	✓	✓
EP2110727-006	13-Sep-2021 12:50	BH148_A_1.25		✓
EP2110727-007	13-Sep-2021 12:51	BH148_A_1.5	✓	✓
EP2110727-008	13-Sep-2021 12:51	BH148_A_1.75		✓
EP2110727-009	13-Sep-2021 12:52	BH148_A_2.0	✓	✓
EP2110727-010	13-Sep-2021 13:43	BH08_A_0.0	✓	✓
EP2110727-011	13-Sep-2021 13:44	BH08_A_0.25		✓
EP2110727-012	13-Sep-2021 13:44	BH08_A_0.5	✓	✓
EP2110727-013	13-Sep-2021 13:45	BH08_A_0.75		✓
EP2110727-014	13-Sep-2021 13:45	BH08_A_1.0	✓	✓
EP2110727-015	13-Sep-2021 13:48	BH08_A_1.25		✓
EP2110727-016	13-Sep-2021 13:49	BH08_A_1.5	✓	✓
EP2110727-017	13-Sep-2021 13:49	BH08_A_1.75		✓
EP2110727-018	13-Sep-2021 13:50	BH08_A_2.0	✓	✓
EP2110727-019	13-Sep-2021 13:50	BH08_A_2.25		✓
EP2110727-020	13-Sep-2021 13:50	BH08_A_2.5	✓	✓
EP2110727-021	13-Sep-2021 13:51	BH08_A_2.75		✓
EP2110727-022	13-Sep-2021 13:51	BH08_A_3.0	✓	✓
EP2110727-023	13-Sep-2021 13:52	BH08_A_3.25		✓
EP2110727-024	13-Sep-2021 13:52	BH08_A_3.5	✓	✓
EP2110727-025	13-Sep-2021 13:52	BH08_A_3.75		✓
EP2110727-026	13-Sep-2021 13:53	BH08_A_4.0	✓	✓
EP2110727-027	13-Sep-2021 13:53	BH08_A_4.25		✓
EP2110727-028	13-Sep-2021 13:54	BH08_A_4.5	✓	✓
EP2110727-029	13-Sep-2021 13:54	BH08_A_4.75		✓
EP2110727-030	13-Sep-2021 13:54	BH08_A_5.0	✓	✓
EP2110727-031	13-Sep-2021 13:55	SQC033_A	✓	✓
EP2110727-032	13-Sep-2021 13:56	BH99_A_0.0	✓	✓
EP2110727-033	13-Sep-2021 13:57	BH99_A_0.25		✓
EP2110727-034	13-Sep-2021 13:57	BH99_A_0.5	✓	✓
EP2110727-035	13-Sep-2021 13:57	BH99_A_0.75		✓

			SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110727-036	13-Sep-2021 13:58	BH99_A_1.0	✓	✓
EP2110727-037	13-Sep-2021 13:58	BH99_A_1.25		✓
EP2110727-038	13-Sep-2021 13:58	BH99_A_1.5	✓	✓
EP2110727-039	13-Sep-2021 13:59	BH99_A_1.75		✓
EP2110727-040	13-Sep-2021 13:59	BH99_A_2.0	✓	✓
EP2110727-041	13-Sep-2021 14:00	BH99_A_2.25		✓
EP2110727-042	13-Sep-2021 14:00	BH99_A_2.5	✓	✓
EP2110727-043	13-Sep-2021 14:00	BH99_A_2.75		✓
EP2110727-044	13-Sep-2021 14:01	BH99_A_3.0	✓	✓
EP2110727-045	13-Sep-2021 14:01	BH99_A_3.25		✓
EP2110727-046	13-Sep-2021 14:01	BH99_A_3.5	✓	✓
EP2110727-047	13-Sep-2021 14:02	BH99_A_3.75		✓
EP2110727-048	13-Sep-2021 14:02	BH99_A_4.0	✓	✓
EP2110727-049	13-Sep-2021 14:02	BH99_A_4.25		✓
EP2110727-050	13-Sep-2021 14:03	BH99_A_4.5	✓	✓
EP2110727-051	13-Sep-2021 14:03	BH99_A_4.75		✓
EP2110727-052	13-Sep-2021 14:04	BH99_A_5.0	✓	✓
EP2110727-053	13-Sep-2021 14:05	SQC034_A	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Carina Andersen

- A4 - AU Tax Invoice (INV)	Email	carina.andersen@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110727**	Page	: 1 of 13
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 13-Sep-2021 16:45
Order number	: 30058301	Date Analysis Commenced	: 17-Sep-2021
C-O-C number	: 27533	Issue Date	: 28-Sep-2021 16:41
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP4.2_A		
Quote number	: EP/529/21_V4		
No. of samples received	: 53		
No. of samples analysed	: 53		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required for particular samples because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH148_A_0.0	BH148_A_0.25	BH148_A_0.5	BH148_A_0.75	BH148_A_1.0
			Sampling date / time	13-Sep-2021 12:47	13-Sep-2021 12:49	13-Sep-2021 12:49	13-Sep-2021 12:50	13-Sep-2021 12:50
Compound	CAS Number	LOR	Unit	EP2110727-001	EP2110727-002	EP2110727-003	EP2110727-004	EP2110727-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.1**	**----**	**6.0**	**----**	**6.0**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.20**	**----**	**----**	**----**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**40**	**----**	**----**	**----**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.06**	**----**	**----**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.8**	**6.8**	**6.8**	**7.1**	**6.9**
pH (Fox)	----	0.1	pH Unit	**4.4**	**4.8**	**4.8**	**4.8**	**4.9**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH148_A_1.25	BH148_A_1.5	BH148_A_1.75	BH148_A_2.0	BH08_A_0.0
			Sampling date / time	13-Sep-2021 12:50	13-Sep-2021 12:51	13-Sep-2021 12:51	13-Sep-2021 12:52	13-Sep-2021 13:43
Compound	CAS Number	LOR	Unit	EP2110727-006	EP2110727-007	EP2110727-008	EP2110727-009	EP2110727-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.2	----	6.1	6.3
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	<10
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.5	6.2	5.9	6.1	6.8
pH (Fox)	----	0.1	pH Unit	4.8	4.8	4.6	4.7	4.4
Reaction Rate	----	1	-	Moderate	Moderate	Slight	Slight	Moderate

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH08_A_0.25	BH08_A_0.5	BH08_A_0.75	BH08_A_1.0	BH08_A_1.25
			Sampling date / time	13-Sep-2021 13:44	13-Sep-2021 13:44	13-Sep-2021 13:45	13-Sep-2021 13:45	13-Sep-2021 13:48
Compound	CAS Number	LOR	Unit	EP2110727-011	EP2110727-012	EP2110727-013	EP2110727-014	EP2110727-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.4	----	6.2	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.9	7.2	7.3	7.0	7.1
pH (Fox)	----	0.1	pH Unit	4.3	5.1	5.9	6.1	6.2
Reaction Rate	----	1	-	Moderate	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH08_A_1.5	BH08_A_1.75	BH08_A_2.0	BH08_A_2.25	BH08_A_2.5
			Sampling date / time	13-Sep-2021 13:49	13-Sep-2021 13:49	13-Sep-2021 13:50	13-Sep-2021 13:50	13-Sep-2021 13:50
Compound	CAS Number	LOR	Unit	EP2110727-016	EP2110727-017	EP2110727-018	EP2110727-019	EP2110727-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.3**	**----**	**6.2**	**----**	**6.2**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.2**	**7.1**	**7.3**	**7.3**	**7.3**
pH (Fox)	----	0.1	pH Unit	**6.2**	**5.0**	**6.1**	**6.3**	**6.0**
Reaction Rate	----	1	-	**Strong**	**Strong**	**Strong**	**Strong**	**Strong**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH08_A_2.75	BH08_A_3.0	BH08_A_3.25	BH08_A_3.5	BH08_A_3.75
			Sampling date / time	13-Sep-2021 13:51	13-Sep-2021 13:51	13-Sep-2021 13:52	13-Sep-2021 13:52	13-Sep-2021 13:52
Compound	CAS Number	LOR	Unit	EP2110727-021	EP2110727-022	EP2110727-023	EP2110727-024	EP2110727-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.6	----	6.4	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	0.12	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	25	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.04	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.5	7.7	7.3	7.0	6.9
pH (Fox)	----	0.1	pH Unit	6.0	5.8	5.6	5.5	5.6
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH08_A_4.0	BH08_A_4.25	BH08_A_4.5	BH08_A_4.75	BH08_A_5.0
			Sampling date / time	13-Sep-2021 13:53	13-Sep-2021 13:53	13-Sep-2021 13:54	13-Sep-2021 13:54	13-Sep-2021 13:54
Compound	CAS Number	LOR	Unit	EP2110727-026	EP2110727-027	EP2110727-028	EP2110727-029	EP2110727-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.1	----	5.4	----	5.1
Titratable Actual Acidity (23F)	----	2	mole H+ / t	25	----	24	----	24
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.04	----	0.04	----	0.04
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.04	----	0.04	----	0.04
Net Acidity (acidity units)	----	10	mole H+ / t	27	----	24	----	27
Liming Rate	----	1	kg CaCO3/t	2	----	2	----	2
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.04	----	0.04	----	0.04
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	27	----	24	----	27
Liming Rate excluding ANC	----	1	kg CaCO3/t	2	----	2	----	2
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.7	6.9	6.6	6.5	6.8
pH (Fox)	----	0.1	pH Unit	5.4	5.4	5.0	5.8	6.2
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SQC033_A	BH99_A_0.0	BH99_A_0.25	BH99_A_0.5	BH99_A_0.75
			Sampling date / time	13-Sep-2021 13:55	13-Sep-2021 13:56	13-Sep-2021 13:57	13-Sep-2021 13:57	13-Sep-2021 13:57
Compound	CAS Number	LOR	Unit	EP2110727-031	EP2110727-032	EP2110727-033	EP2110727-034	EP2110727-035
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.3	6.0	----	6.0	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	4	----	4	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	----	0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.9	6.9	7.2	7.2	7.2
pH (Fox)	----	0.1	pH Unit	5.1	4.2	5.1	5.3	5.4
Reaction Rate	----	1	-	Strong	Moderate	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH99_A_1.0	BH99_A_1.25	BH99_A_1.5	BH99_A_1.75	BH99_A_2.0
			Sampling date / time	13-Sep-2021 13:58	13-Sep-2021 13:58	13-Sep-2021 13:58	13-Sep-2021 13:59	13-Sep-2021 13:59
Compound	CAS Number	LOR	Unit	EP2110727-036	EP2110727-037	EP2110727-038	EP2110727-039	EP2110727-040
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.7	----	5.3	----	5.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t	7	----	14	----	9
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	0.02	----	0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	14	----	10
Liming Rate	----	1	kg CaCO3/t	1	----	1	----	1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	0.02	----	0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	14	----	10
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	----	1	----	1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.0	6.1	6.0	6.0	5.9
pH (Fox)	----	0.1	pH Unit	6.1	5.7	5.6	4.8	4.4
Reaction Rate	----	1	-	Strong	Strong	Strong	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH99_A_2.25	BH99_A_2.5	BH99_A_2.75	BH99_A_3.0	BH99_A_3.25
			Sampling date / time	13-Sep-2021 14:00	13-Sep-2021 14:00	13-Sep-2021 14:00	13-Sep-2021 14:01	13-Sep-2021 14:01
Compound	CAS Number	LOR	Unit	EP2110727-041	EP2110727-042	EP2110727-043	EP2110727-044	EP2110727-045
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.3	----	5.6	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	11	----	5	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	11	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	11	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.8	5.2	5.3	6.6	6.7
pH (Fox)	----	0.1	pH Unit	4.4	5.0	3.7	4.8	5.3
Reaction Rate	----	1	-	Slight	Strong	Slight	Strong	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH99_A_3.5	BH99_A_3.75	BH99_A_4.0	BH99_A_4.25	BH99_A_4.5
			Sampling date / time	13-Sep-2021 14:01	13-Sep-2021 14:02	13-Sep-2021 14:02	13-Sep-2021 14:02	13-Sep-2021 14:03
Compound	CAS Number	LOR	Unit	EP2110727-046	EP2110727-047	EP2110727-048	EP2110727-049	EP2110727-050
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.9	----	6.3	----	6.6
Titratable Actual Acidity (23F)	----	2	mole H+ / t	2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	----	----	0.12
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	----	----	25
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	----	----	0.04
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.8	6.8	7.0	7.1	7.0
pH (Fox)	----	0.1	pH Unit	5.3	5.4	5.4	5.9	5.7
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH99_A_4.75	BH99_A_5.0	SQC034_A	----	----
			Sampling date / time	13-Sep-2021 14:03	13-Sep-2021 14:04	13-Sep-2021 14:05	----	----
Compound	CAS Number	LOR	Unit	EP2110727-051	EP2110727-052	EP2110727-053	--------	--------
				Result	Result	Result	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.1	5.8	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	11	5	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.02	<0.02	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	<0.005	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	<10	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	1.5	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.02	<0.02	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	13	<10	----	----
Liming Rate	----	1	kg CaCO3/t	----	1	<1	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.02	<0.02	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	13	<10	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	<1	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.8	6.4	6.9	----	----
pH (Fox)	----	0.1	pH Unit	6.6	5.4	5.4	----	----
Reaction Rate	----	1	-	Strong	Strong	Strong	----	----

QUALITY CONTROL REPORT

Work Order	: **EP2110727**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 13-Sep-2021
Order number	: 30058301	Date Analysis Commenced	: 17-Sep-2021
C-O-C number	: 27533	Issue Date	: 28-Sep-2021
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP4.2_A		
Quote number	: EP/529/21_V4		
No. of samples received	: 53		
No. of samples analysed	: 53		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3921251)									
EP2110727-001	BH148_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	7.1	7.1	0.0	0% - 20%
EP2110727-020	BH08_A_2.5	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.2	6.2	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 3921252)									
EP2110727-038	BH99_A_1.5	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.02	0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	14	12	9.5	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.3	5.4	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3921251)									
EP2110727-001	BH148_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110727-020	BH08_A_2.5	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 3921252)									
EP2110727-038	BH99_A_1.5	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3921251)									
EP2110727-001	BH148_A_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.20	0.20	0.0	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-C: Acid Neutralising Capacity (QC Lot: 3921251) - continued									
EP2110727-001	BH148_A_0.0	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.06	0.06	0.0	No Limit
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	40	40	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3921251)									
EP2110727-001	BH148_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110727-020	BH08_A_2.5	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3921252)									
EP2110727-038	BH99_A_1.5	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.02	0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.02	0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	14	14	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	14	14	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3911548)									
EP2110727-001	BH148_A_0.0	EA037: pH (F)	----	0.1	pH Unit	6.8	6.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.4	4.6	3.5	0% - 20%
EP2110727-010	BH08_A_0.0	EA037: pH (F)	----	0.1	pH Unit	6.8	6.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.4	4.4	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3911549)									
EP2110727-021	BH08_A_2.75	EA037: pH (F)	----	0.1	pH Unit	7.5	7.6	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.0	5.9	0.0	0% - 20%
EP2110727-030	BH08_A_5.0	EA037: pH (F)	----	0.1	pH Unit	6.8	6.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.2	6.1	2.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3911550)									
EP2110727-041	BH99_A_2.25	EA037: pH (F)	----	0.1	pH Unit	5.8	5.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.4	4.4	0.0	0% - 20%
EP2110727-050	BH99_A_4.5	EA037: pH (F)	----	0.1	pH Unit	7.0	7.1	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.7	5.7	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3921251)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	94.2	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 3921252)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	94.4	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3921251)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	91.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3921252)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	90.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3921251)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3921251)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3921252)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110727**	Page	: 1 of 7
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 13-Sep-2021
Site	: GEHBI - WP4.2_A	Issue Date	: 28-Sep-2021
Sampler	: Jaimon Hollett	No. of samples received	: 53
Order number	: 30058301	No. of samples analysed	: 53

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen (EA033)							
BH148_A_0.0, BH148_A_0.5, BH148_A_1.0, BH148_A_1.5, BH148_A_2.0, BH08_A_0.0, BH08_A_0.5, BH08_A_1.0, BH08_A_1.5, BH08_A_2.0, BH08_A_2.5, BH08_A_3.0, BH08_A_3.5, BH08_A_4.0, BH08_A_4.5, BH08_A_5.0, SQC033_A, BH99_A_0.0, BH99_A_0.5, BH99_A_1.0, SQC034_A, BH99_A_1.5, BH99_A_2.0, BH99_A_2.5, BH99_A_3.0, BH99_A_3.5, BH99_A_4.0, BH99_A_4.5, BH99_A_5.0	**13-Sep-2021**	**20-Sep-2021**	13-Sep-2022	✓	**24-Sep-2021**	19-Dec-2021	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen (EA033)							
BH148_A_0.0, BH148_A_0.5, BH148_A_1.0, BH148_A_1.5, BH148_A_2.0, BH08_A_0.0, BH08_A_0.5, BH08_A_1.0, BH08_A_1.5, BH08_A_2.0, BH08_A_2.5, BH08_A_3.0, BH08_A_3.5, BH08_A_4.0, BH08_A_4.5, BH08_A_5.0, SQC033_A, BH99_A_0.0, BH99_A_0.5, BH99_A_1.0, SQC034_A, BH99_A_1.5, BH99_A_2.0, BH99_A_2.5, BH99_A_3.0, BH99_A_3.5, BH99_A_4.0, BH99_A_4.5, BH99_A_5.0	**13-Sep-2021**	**20-Sep-2021**	13-Sep-2022	✓	**24-Sep-2021**	19-Dec-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA033)							
BH148_A_0.0, BH148_A_0.5, BH148_A_1.0, BH148_A_1.5, BH148_A_2.0, BH08_A_0.0, BH08_A_0.5, BH08_A_1.0, BH08_A_1.5, BH08_A_2.0, BH08_A_2.5, BH08_A_3.0, BH08_A_3.5, BH08_A_4.0, BH08_A_4.5, BH08_A_5.0, SQC033_A, BH99_A_0.0, BH99_A_0.5, BH99_A_1.0, SQC034_A, BH99_A_1.5, BH99_A_2.0, BH99_A_2.5, BH99_A_3.0, BH99_A_3.5, BH99_A_4.0, BH99_A_4.5, BH99_A_5.0	**13-Sep-2021**	**20-Sep-2021**	13-Sep-2022	✓	**24-Sep-2021**	19-Dec-2021	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen (EA033)							
BH148_A_0.0, BH148_A_0.5, BH148_A_1.0, BH148_A_1.5, BH148_A_2.0, BH08_A_0.0, BH08_A_0.5, BH08_A_1.0, BH08_A_1.5, BH08_A_2.0, BH08_A_2.5, BH08_A_3.0, BH08_A_3.5, BH08_A_4.0, BH08_A_4.5, BH08_A_5.0, SQC033_A, BH99_A_0.0, BH99_A_0.5, BH99_A_1.0, SQC034_A, BH99_A_1.5, BH99_A_2.0, BH99_A_2.5, BH99_A_3.0, BH99_A_3.5, BH99_A_4.0, BH99_A_4.5, BH99_A_5.0	**13-Sep-2021**	**20-Sep-2021**	13-Sep-2022	✓	**24-Sep-2021**	19-Dec-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)			Sample Date	Extraction / Preparation			Analysis		
				Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-E: Acid Base Accounting									
Snap Lock Bag - frozen (EA033)									
BH148_A_0.0,	BH148_A_0.5,		**13-Sep-2021**	**20-Sep-2021**	13-Sep-2022	✓	**24-Sep-2021**	19-Dec-2021	✓
BH148_A_1.0,	BH148_A_1.5,								
BH148_A_2.0,	BH08_A_0.0,								
BH08_A_0.5,	BH08_A_1.0,								
BH08_A_1.5,	BH08_A_2.0,								
BH08_A_2.5,	BH08_A_3.0,								
BH08_A_3.5,	BH08_A_4.0,								
BH08_A_4.5,	BH08_A_5.0,								
SQC033_A,	BH99_A_0.0,								
BH99_A_0.5,	BH99_A_1.0,								
SQC034_A,	BH99_A_1.5,	BH99_A_2.0,							
BH99_A_2.5,	BH99_A_3.0,								
BH99_A_3.5,	BH99_A_4.0,								
BH99_A_4.5,	BH99_A_5.0								

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH148_A_0.0,	BH148_A_0.25,	**13-Sep-2021**	**17-Sep-2021**	12-Mar-2022	✓	**17-Sep-2021**	12-Mar-2022	✓
BH148_A_0.5,	BH148_A_0.75,							
BH148_A_1.0,	BH148_A_1.25,							
BH148_A_1.5,	BH148_A_1.75,							
BH148_A_2.0,	BH08_A_0.0,							
BH08_A_0.25,	BH08_A_0.5,							
BH08_A_0.75,	BH08_A_1.0,							
BH08_A_1.25,	BH08_A_1.5,							
BH08_A_1.75,	BH08_A_2.0,							
BH08_A_2.25,	BH08_A_2.5,							
BH08_A_2.75,	BH08_A_3.0,							
BH08_A_3.25,	BH08_A_3.5,							
BH08_A_3.75,	BH08_A_4.0,							
BH08_A_4.25,	BH08_A_4.5,							
BH08_A_4.75,	BH08_A_5.0,							
SQC033_A,	BH99_A_0.0,							
BH99_A_0.25,	BH99_A_0.5,							
BH99_A_0.75,	BH99_A_1.0,							
BH99_A_1.25,	BH99_A_1.5,							
BH99_A_1.75,	BH99_A_2.0,							
BH99_A_2.25,	BH99_A_2.5,							
BH99_A_2.75,	BH99_A_3.0,							
BH99_A_3.25,	BH99_A_3.5,							
BH99_A_3.75,	BH99_A_4.0,							
BH99_A_4.25,	BH99_A_4.5,							
BH99_A_4.75,	BH99_A_5.0,							
SQC034_A								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	6	53	**11.32**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	29	**10.34**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

ALSCompass SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110869

Telephone : – 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: GEHBL_WP4.1_A **Client:** Arcadis **Project Manager:** Bronwyn Van Valkengoed
Phone: (0408 751 386)

ALS Compass COC Reference: 27664 **# Samples:** 28 **Sampler:** Jaimon Hollett
Phone: (0420 838 328)

Turnaround Requirements: (Standard) _____ Urgent _____

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	(N/A)
	Free ice / frozen ice bricks upon receipt?	(YES)	NO	N/A
	Random sample temperature on receipt?	3.2 °C		

Custody:

Relinquished by: JH	**Received by:** SP	**Relinquished by:**	**Received by:**
Date / Time: 15/9/21 1500	**Date / Time:** 1535 15/9/21	**Date / Time:**	**Date / Time:**

CHAIN OF CUSTODY

ALS COC#: 27664 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: ND 15/9/21 1535	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH13_A_0.0		15/09/2021 08:03 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH13_A_0.25		15/09/2021 08:03 AM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH13_A_0.5		15/09/2021 08:04 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH13_A_0.75		15/09/2021 08:04 AM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH13_A_1.0		15/09/2021 08:04 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH13_A_1.25		15/09/2021 08:05 AM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH13_A_1.5		15/09/2021 08:05 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH13_A_1.75		15/09/2021 08:05 AM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH13_A_2.0		15/09/2021 08:05 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27664 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH15_A_0.0		15/09/2021 08:51 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
011	BH15_A_0.25		15/09/2021 08:52 AM	Soil	ALS: 1 Non ALS: 0	No	X			
012	BH15_A_0.5		15/09/2021 08:52 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
013	BH15_A_0.75		15/09/2021 08:53 AM	Soil	ALS: 1 Non ALS: 0	No	X			
014	BH15_A_1.0		15/09/2021 08:53 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
015	BH15_A_1.25		15/09/2021 08:54 AM	Soil	ALS: 1 Non ALS: 0	No	X			
016	BH15_A_1.5		15/09/2021 08:54 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
017	BH15_A_1.75		15/09/2021 08:55 AM	Soil	ALS: 1 Non ALS: 0	No	X			
018	BH15_A_2.0		15/09/2021 08:55 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

(ALS) COC#: **27664** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH15_A_2.25		15/09/2021 08:55 AM	Soil	ALS: 1 Non ALS: 0	No	X			
020	BH15_A_2.5		15/09/2021 08:56 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
021	BH15_A_2.75		15/09/2021 08:57 AM	Soil	ALS: 1 Non ALS: 0	No	X			
022	BH15_A_3.0		15/09/2021 08:57 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
023	BH15_A_3.25		15/09/2021 08:58 AM	Soil	ALS: 1 Non ALS: 0	No	X			
024	BH15_A_3.5		15/09/2021 08:58 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
025	BH15_A_4.0		15/09/2021 08:59 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
026	BH15_A_4.5		15/09/2021 08:59 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
027	BH15_A_5.0		15/09/2021 09:00 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

(ALS) COC#: **27664** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
/ EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	SQC042_A		15/09/2021 09:00 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27664 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

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PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH13_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621072013	Green	No	
002	BH13_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621072012	Green	No	
003	BH13_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071992	Green	No	
004	BH13_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071997	Green	No	
005	BH13_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071996	Green	No	
006	BH13_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071995	Green	No	
007	BH13_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071994	Green	No	
008	BH13_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071993	Green	No	
009	BH13_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071969	Green	No	
010	BH15_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621073243	Green	No	
011	BH15_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621073242	Green	No	
012	BH15_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621073241	Green	No	
013	BH15_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621073240	Green	No	
014	BH15_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621073239	Green	No	
015	BH15_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621073238	Green	No	
016	BH15_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621073237	Green	No	
017	BH15_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621073236	Green	No	
018	BH15_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621073235	Green	No	
019	BH15_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621073234	Green	No	
020	BH15_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621073233	Green	No	
021	BH15_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621073232	Green	No	
022	BH15_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621073231	Green	No	
023	BH15_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621073230	Green	No	
024	BH15_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621073229	Green	No	
025	BH15_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621073227	Green	No	
026	BH15_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621073225	Green	No	

CHAIN OF CUSTODY

ALS COC#: **27664** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Jaimon Hollett

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A

Random Sample Temperature on Receipt: °C

Other comments:

027	BH15_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621073223	Green	No	
028	SQC042_A	Snap Lock Bag - frozen	1 Medium	00130621073222	Green	No	

Total Bottle Count: ALS: 28, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2110869**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 27664	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP4.1_A		
Sampler	: Jaimon Hollett		

Dates

Date Samples Received	: 15-Sep-2021 15:35	Issue Date	: 15-Sep-2021
Client Requested Due Date	: 30-Sep-2021	Scheduled Reporting Date	: **30-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 7	Temperature	: 3.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 28 / 28

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110869-001	15-Sep-2021 08:03	BH13_A_0.0	✓	✓
EP2110869-002	15-Sep-2021 08:03	BH13_A_0.25		✓
EP2110869-003	15-Sep-2021 08:04	BH13_A_0.5	✓	✓
EP2110869-004	15-Sep-2021 08:04	BH13_A_0.75		✓
EP2110869-005	15-Sep-2021 08:04	BH13_A_1.0	✓	✓
EP2110869-006	15-Sep-2021 08:05	BH13_A_1.25		✓
EP2110869-007	15-Sep-2021 08:05	BH13_A_1.5	✓	✓
EP2110869-008	15-Sep-2021 08:05	BH13_A_1.75		✓
EP2110869-009	15-Sep-2021 08:05	BH13_A_2.0	✓	✓
EP2110869-010	15-Sep-2021 08:51	BH15_A_0.0	✓	✓
EP2110869-011	15-Sep-2021 08:52	BH15_A_0.25		✓
EP2110869-012	15-Sep-2021 08:52	BH15_A_0.5	✓	✓
EP2110869-013	15-Sep-2021 08:53	BH15_A_0.75		✓
EP2110869-014	15-Sep-2021 08:53	BH15_A_1.0	✓	✓
EP2110869-015	15-Sep-2021 08:54	BH15_A_1.25		✓
EP2110869-016	15-Sep-2021 08:54	BH15_A_1.5	✓	✓
EP2110869-017	15-Sep-2021 08:55	BH15_A_1.75		✓
EP2110869-018	15-Sep-2021 08:55	BH15_A_2.0	✓	✓
EP2110869-019	15-Sep-2021 08:55	BH15_A_2.25		✓
EP2110869-020	15-Sep-2021 08:56	BH15_A_2.5	✓	✓
EP2110869-021	15-Sep-2021 08:57	BH15_A_2.75		✓
EP2110869-022	15-Sep-2021 08:57	BH15_A_3.0	✓	✓
EP2110869-023	15-Sep-2021 08:58	BH15_A_3.25		✓
EP2110869-024	15-Sep-2021 08:58	BH15_A_3.5	✓	✓
EP2110869-025	15-Sep-2021 08:59	BH15_A_4.0	✓	✓
EP2110869-026	15-Sep-2021 08:59	BH15_A_4.5	✓	✓
EP2110869-027	15-Sep-2021 09:00	BH15_A_5.0	✓	✓
EP2110869-028	15-Sep-2021 09:00	SQC042_A	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ARCADIS ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Carina Andersen

- A4 - AU Tax Invoice (INV)	Email	carina.andersen@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110869**	Page	: 1 of 8
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 15-Sep-2021 15:35
Order number	: 30058301	Date Analysis Commenced	: 17-Sep-2021
C-O-C number	: 27664	Issue Date	: 30-Sep-2021 17:33
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP4.1_A		
Quote number	: EP/529/21_V4		
No. of samples received	: 28		
No. of samples analysed	: 28		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH13_A_0.0	BH13_A_0.25	BH13_A_0.5	BH13_A_0.75	BH13_A_1.0
			Sampling date / time	15-Sep-2021 08:03	15-Sep-2021 08:03	15-Sep-2021 08:04	15-Sep-2021 08:04	15-Sep-2021 08:04
Compound	CAS Number	LOR	Unit	EP2110869-001	EP2110869-002	EP2110869-003	EP2110869-004	EP2110869-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.4**	**----**	**5.7**	**----**	**5.5**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	**7**	**----**	**9**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.57**	**----**	**----**	**----**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**115**	**----**	**----**	**----**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.18**	**----**	**----**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	**0.02**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	**10**
Liming Rate	----	1	kg CaCO3/t	<1	**----**	**1**	**----**	**1**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	**0.02**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	**10**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	**1**	**----**	**1**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.7**	**7.4**	**7.3**	**6.6**	**6.6**
pH (Fox)	----	0.1	pH Unit	**5.3**	**4.6**	**4.6**	**4.6**	**4.9**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Moderate**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH13_A_1.25	BH13_A_1.5	BH13_A_1.75	BH13_A_2.0	BH15_A_0.0
			Sampling date / time	15-Sep-2021 08:05	15-Sep-2021 08:05	15-Sep-2021 08:05	15-Sep-2021 08:05	15-Sep-2021 08:51
Compound	CAS Number	LOR	Unit	EP2110869-006	EP2110869-007	EP2110869-008	EP2110869-009	EP2110869-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.4	----	5.4	9.2
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	12	----	11	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.02	----	0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	0.006
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	----	----	15.4
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	----	----	3090
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	----	----	4.95
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	0.02	----	0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	13	----	13	<10
Liming Rate	----	1	kg CaCO3/t	----	1	----	1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.02	----	0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	13	----	13	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	----	1	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.1	6.2	6.1	5.9	8.2
pH (Fox)	----	0.1	pH Unit	4.9	4.9	4.7	4.5	6.0
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Moderate

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH15_A_0.25	BH15_A_0.5	BH15_A_0.75	BH15_A_1.0	BH15_A_1.25
			Sampling date / time	15-Sep-2021 08:52	15-Sep-2021 08:52	15-Sep-2021 08:53	15-Sep-2021 08:53	15-Sep-2021 08:54
Compound	CAS Number	LOR	Unit	EP2110869-011	EP2110869-012	EP2110869-013	EP2110869-014	EP2110869-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	9.5	----	9.2	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.006	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	22.7	----	6.39	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	4540	----	1280	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	7.27	----	2.05	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	8.6	8.9	8.4	8.4	8.2
pH (Fox)	----	0.1	pH Unit	6.3	6.5	6.5	6.4	6.4
Reaction Rate	----	1	-	Moderate	Moderate	Moderate	Moderate	Moderate

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH15_A_1.5	BH15_A_1.75	BH15_A_2.0	BH15_A_2.25	BH15_A_2.5
			Sampling date / time	15-Sep-2021 08:54	15-Sep-2021 08:55	15-Sep-2021 08:55	15-Sep-2021 08:55	15-Sep-2021 08:56
Compound	CAS Number	LOR	Unit	EP2110869-016	EP2110869-017	EP2110869-018	EP2110869-019	EP2110869-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.4**	**----**	**7.4**	**----**	**5.6**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	**11**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	**0.02**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.25**	**----**	**0.62**	**----**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**50**	**----**	**125**	**----**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.08**	**----**	**0.20**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	**0.02**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	**11**
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	**1**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	**0.02**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	**11**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	**1**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.4**	**7.2**	**6.8**	**6.6**	**6.1**
pH (Fox)	----	0.1	pH Unit	**5.4**	**5.6**	**5.2**	**5.0**	**4.8**
Reaction Rate	----	1	-	**Moderate**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH15_A_2.75	BH15_A_3.0	BH15_A_3.25	BH15_A_3.5	BH15_A_4.0
			Sampling date / time	15-Sep-2021 08:57	15-Sep-2021 08:57	15-Sep-2021 08:58	15-Sep-2021 08:58	15-Sep-2021 08:59
Compound	CAS Number	LOR	Unit	EP2110869-021	EP2110869-022	EP2110869-023	EP2110869-024	EP2110869-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.9	----	4.9	6.9
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	5	----	15	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	----	----	0.60
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	----	----	120
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	----	----	0.19
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	0.03	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	16	<10
Liming Rate	----	1	kg CaCO3/t	----	<1	----	1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	0.03	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	16	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	1	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.6	5.7	6.3	6.3	7.2
pH (Fox)	----	0.1	pH Unit	4.4	4.5	4.8	5.2	6.5
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH15_A_4.5	BH15_A_5.0	SQC042_A	----	----
			Sampling date / time	15-Sep-2021 08:59	15-Sep-2021 09:00	15-Sep-2021 09:00	----	----
Compound	CAS Number	LOR	Unit	EP2110869-026	EP2110869-027	EP2110869-028	--------	--------
				Result	Result	Result	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.8**	**5.9**	**9.3**	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**4**	<2	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	<0.005	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.50**	----	**28.9**	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**100**	----	**5770**	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.16**	----	**9.25**	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	----	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.6**	**7.5**	**7.8**	----	----
pH (Fox)	----	0.1	pH Unit	**6.9**	**6.5**	**6.4**	----	----
Reaction Rate	----	1	-	**Slight**	**Slight**	**Moderate**	----	----

QUALITY CONTROL REPORT

Work Order	: **EP2110869**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 15-Sep-2021
Order number	: 30058301	Date Analysis Commenced	: 17-Sep-2021
C-O-C number	: 27664	Issue Date	: 30-Sep-2021
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP4.1_A		
Quote number	: EP/529/21_V4		
No. of samples received	: 28		
No. of samples analysed	: 28		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3921259)									
EP2110869-001	BH13_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.4	8.5	0.0	0% - 20%
EP2110869-020	BH15_A_2.5	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.02	0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	11	11	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.6	5.7	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3921259)									
EP2110869-001	BH13_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110869-020	BH15_A_2.5	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3921259)									
EP2110869-001	BH13_A_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.57	0.57	0.0	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.18	0.18	0.0	0% - 50%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	115	115	0.0	0% - 50%
EA033-E: Acid Base Accounting (QC Lot: 3921259)									
EP2110869-001	BH13_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-E: Acid Base Accounting (QC Lot: 3921259) - continued									
EP2110869-001	BH13_A_0.0	EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110869-020	BH15_A_2.5	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.02	0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.02	0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	11	12	8.7	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	11	12	8.7	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3912292)									
EP2110869-001	BH13_A_0.0	EA037: pH (F)	----	0.1	pH Unit	7.7	7.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.3	5.4	1.9	0% - 20%
EP2110869-010	BH15_A_0.0	EA037: pH (F)	----	0.1	pH Unit	8.2	8.3	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.0	6.0	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3912293)									
EP2110869-021	BH15_A_2.75	EA037: pH (F)	----	0.1	pH Unit	5.6	5.6	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.4	4.4	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3921259)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	99.0	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3921259)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	84.6	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3921259)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3921259)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110869**	Page	: 1 of 6
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 15-Sep-2021
Site	: GEHBI - WP4.1_A	Issue Date	: 30-Sep-2021
Sampler	: Jaimon Hollett	No. of samples received	: 28
Order number	: 30058301	No. of samples analysed	: 28

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen (EA033)							
BH13_A_0.0, BH13_A_0.5, BH13_A_1.0, BH13_A_1.5, BH13_A_2.0, BH15_A_0.0, BH15_A_0.5, BH15_A_1.0, BH15_A_1.5, BH15_A_2.0, BH15_A_2.5, BH15_A_3.0, BH15_A_3.5, BH15_A_4.0, BH15_A_4.5, BH15_A_5.0, SQC042_A	**15-Sep-2021**	**22-Sep-2021**	15-Sep-2022	✓	**24-Sep-2021**	21-Dec-2021	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen (EA033)							
BH13_A_0.0, BH13_A_0.5, BH13_A_1.0, BH13_A_1.5, BH13_A_2.0, BH15_A_0.0, BH15_A_0.5, BH15_A_1.0, BH15_A_1.5, BH15_A_2.0, BH15_A_2.5, BH15_A_3.0, BH15_A_3.5, BH15_A_4.0, BH15_A_4.5, BH15_A_5.0, SQC042_A	**15-Sep-2021**	**22-Sep-2021**	15-Sep-2022	✓	**24-Sep-2021**	21-Dec-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA033)							
BH13_A_0.0, BH13_A_0.5, BH13_A_1.0, BH13_A_1.5, BH13_A_2.0, BH15_A_0.0, BH15_A_0.5, BH15_A_1.0, BH15_A_1.5, BH15_A_2.0, BH15_A_2.5, BH15_A_3.0, BH15_A_3.5, BH15_A_4.0, BH15_A_4.5, BH15_A_5.0, SQC042_A	**15-Sep-2021**	**22-Sep-2021**	15-Sep-2022	✓	**24-Sep-2021**	21-Dec-2021	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen (EA033)							
BH13_A_0.0, BH13_A_0.5, BH13_A_1.0, BH13_A_1.5, BH13_A_2.0, BH15_A_0.0, BH15_A_0.5, BH15_A_1.0, BH15_A_1.5, BH15_A_2.0, BH15_A_2.5, BH15_A_3.0, BH15_A_3.5, BH15_A_4.0, BH15_A_4.5, BH15_A_5.0, SQC042_A	**15-Sep-2021**	**22-Sep-2021**	15-Sep-2022	✓	**24-Sep-2021**	21-Dec-2021	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen (EA033)							
BH13_A_0.0, BH13_A_0.5, BH13_A_1.0, BH13_A_1.5, BH13_A_2.0, BH15_A_0.0, BH15_A_0.5, BH15_A_1.0, BH15_A_1.5, BH15_A_2.0, BH15_A_2.5, BH15_A_3.0, BH15_A_3.5, BH15_A_4.0, BH15_A_4.5, BH15_A_5.0, SQC042_A	**15-Sep-2021**	**22-Sep-2021**	15-Sep-2022	✓	**24-Sep-2021**	21-Dec-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH13_A_0.0,	BH13_A_0.25,	**15-Sep-2021**	**17-Sep-2021**	14-Mar-2022	✓	**17-Sep-2021**	14-Mar-2022	✓
BH13_A_0.5,	BH13_A_0.75,							
BH13_A_1.0,	BH13_A_1.25,							
BH13_A_1.5,	BH13_A_1.75,							
BH13_A_2.0,	BH15_A_0.0,							
BH15_A_0.25,	BH15_A_0.5,							
BH15_A_0.75,	BH15_A_1.0,							
BH15_A_1.25,	BH15_A_1.5,							
BH15_A_1.75,	BH15_A_2.0,							
BH15_A_2.25,	BH15_A_2.5,							
BH15_A_2.75,	BH15_A_3.0,							
BH15_A_3.25,	BH15_A_3.5,							
BH15_A_4.0,	BH15_A_4.5,							
BH15_A_5.0,	SQC042_A							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	3	28	**10.71**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Environmental Division
Perth
Work Order Reference
EP2110809

Telephone : -- 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: GEHBI_WP4.2_A **Client:** Arcadis **Project Manager:** Bronwyn Van Valkengoed
Phone: (0408 751 386)

ALS Compass COC Reference: 29602 **# Samples:** 22 **Sampler:** Jamon Hollatt
Phone: (0420 838 328)

Turnaround Requirements: (Standard) _____ Urgent _____

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	(N/A)
	Free ice / frozen ice bricks upon receipt?	(YES)	NO	N/A
	Random sample temperature on receipt?	3.2 °C		

Custody:

Relinquished by:	**Received by:**	**Relinquished by:**	**Received by:**
Date / Time: 14/9/21 1530	**Date / Time:** 14/09 @ 1705	**Date / Time:**	**Date / Time:**

CHAIN OF CUSTODY

ALS COC#: 27602 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH105_A_0.0		14/09/2021 10:26 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH105_A_0.25		14/09/2021 10:27 AM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH105_A_0.5		14/09/2021 10:27 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH105_A_0.75		14/09/2021 10:28 AM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH105_A_1.0		14/09/2021 10:28 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH105_A_1.25		14/09/2021 10:29 AM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH105_A_1.5		14/09/2021 10:29 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH105_A_1.75		14/09/2021 10:29 AM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH105_A_2.0		14/09/2021 10:30 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: **27602** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH105_A_2.25		14/09/2021 10:30 AM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH105_A_2.5		14/09/2021 10:30 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
012	BH105_A_2.75		14/09/2021 10:31 AM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH105_A_3.0		14/09/2021 10:31 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
014	BH105_A_3.25		14/09/2021 10:32 AM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH105_A_3.5		14/09/2021 10:32 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
016	BH105_A_3.75		14/09/2021 10:33 AM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH105_A_4.0		14/09/2021 10:33 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
018	BH105_A_4.25		14/09/2021 10:33 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 27602 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

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EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH105_A_4.5		14/09/2021 10:34 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
020	BH105_A_4.75		14/09/2021 10:34 AM	Soil	ALS: 1 Non ALS: 0	No	X			
021	BH105_A_5.0		14/09/2021 10:34 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
022	SQC037_A		14/09/2021 10:35 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

(ALS) *COC#:* **27602** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.2_A

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH105_A_0.0	Snap Lock Bag - frozen	1 Medium	00130220048686	Green	No	
002	BH105_A_0.25	Snap Lock Bag - frozen	1 Medium	00130220048685	Green	No	
003	BH105_A_0.5	Snap Lock Bag - frozen	1 Medium	00130220048684	Green	No	
004	BH105_A_0.75	Snap Lock Bag - frozen	1 Medium	00130220048683	Green	No	
005	BH105_A_1.0	Snap Lock Bag - frozen	1 Medium	00130220048682	Green	No	
006	BH105_A_1.25	Snap Lock Bag - frozen	1 Medium	00130220048681	Green	No	
007	BH105_A_1.5	Snap Lock Bag - frozen	1 Medium	00130220048680	Green	No	
008	BH105_A_1.75	Snap Lock Bag - frozen	1 Medium	00130220048679	Green	No	
009	BH105_A_2.0	Snap Lock Bag - frozen	1 Medium	00130220048678	Green	No	
010	BH105_A_2.25	Snap Lock Bag - frozen	1 Medium	00130220048677	Green	No	
011	BH105_A_2.5	Snap Lock Bag - frozen	1 Medium	00130220048676	Green	No	
012	BH105_A_2.75	Snap Lock Bag - frozen	1 Medium	00130220048675	Green	No	
013	BH105_A_3.0	Snap Lock Bag - frozen	1 Medium	00130220048633	Green	No	
014	BH105_A_3.25	Snap Lock Bag - frozen	1 Medium	00130220048632	Green	No	
015	BH105_A_3.5	Snap Lock Bag - frozen	1 Medium	00130220048631	Green	No	
016	BH105_A_3.75	Snap Lock Bag - frozen	1 Medium	00130220048630	Green	No	
017	BH105_A_4.0	Snap Lock Bag - frozen	1 Medium	00130220048629	Green	No	
018	BH105_A_4.25	Snap Lock Bag - frozen	1 Medium	00130220048628	Green	No	
019	BH105_A_4.5	Snap Lock Bag - frozen	1 Medium	00130220048627	Green	No	
020	BH105_A_4.75	Snap Lock Bag - frozen	1 Medium	00130220048626	Green	No	
021	BH105_A_5.0	Snap Lock Bag - frozen	1 Medium	00130220048659	Green	No	
022	SQC037_A	Snap Lock Bag - frozen	1 Medium	00130220048658	Green	No	

Total Bottle Count: ALS: 22, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2112980**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: GEHBI WP4 ASS - additional analysis	Page	: 1 of 3
Order number	: ----	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BRONWYN VAN VALKENGOED		

Dates

Date Samples Received	: 26-Oct-2021 17:06	Issue Date	: 28-Oct-2021
Client Requested Due Date	: 05-Nov-2021	Scheduled Reporting Date	: **05-Nov-2021**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: ----
Receipt Detail	:	No. of samples received / analysed	: 16 / 16

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils
EP2112980-001	17-Aug-2021 00:00	BH06_A_0.25	✓
EP2112980-002	17-Aug-2021 00:00	BH06_A_2.75	✓
EP2112980-003	17-Aug-2021 00:00	BH06_A_5.25	✓
EP2112980-004	14-Sep-2021 00:00	BH09_A_1.25	✓
EP2112980-005	14-Sep-2021 00:00	BH09_A_2.75	✓
EP2112980-006	14-Sep-2021 00:00	BH09_A_3.75	✓
EP2112980-007	14-Sep-2021 00:00	BH105_A_3.75	✓
EP2112980-008	13-Sep-2021 00:00	BH112_A_1.25	✓
EP2112980-009	02-Sep-2021 00:00	BH20_A_4.75	✓
EP2112980-010	02-Sep-2021 00:00	BH20_A_5.25	✓
EP2112980-011	02-Sep-2021 00:00	BH20_A_6.25	✓
EP2112980-012	16-Aug-2021 00:00	BH29_A_3.25	✓
EP2112980-013	16-Aug-2021 00:00	BH30_A_3.25	✓
EP2112980-014	16-Aug-2021 00:00	BH30_A_3.75	✓
EP2112980-015	16-Aug-2021 00:00	BH94_A_2.75	✓
EP2112980-016	16-Aug-2021 00:00	BH94_A_5.25	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES		
- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com
BRONWYN VAN VALKENGOED		
- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com
BROOKE KELLY		
- *AU Certificate of Analysis - NATA (COA)	Email	brooke.kelly@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	brooke.kelly@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	brooke.kelly@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	brooke.kelly@arcadis.com
- Chain of Custody (CoC) (COC)	Email	brooke.kelly@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	brooke.kelly@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	brooke.kelly@arcadis.com
CIARAN LAVERY		
- *AU Certificate of Analysis - NATA (COA)	Email	ciaran.lavery@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ciaran.lavery@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ciaran.lavery@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ciaran.lavery@arcadis.com
- Chain of Custody (CoC) (COC)	Email	ciaran.lavery@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	ciaran.lavery@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	ciaran.lavery@arcadis.com
DIGBY VELING		
- *AU Certificate of Analysis - NATA (COA)	Email	Digby.Veling@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	Digby.Veling@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	Digby.Veling@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	Digby.Veling@arcadis.com
- Chain of Custody (CoC) (COC)	Email	Digby.Veling@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	Digby.Veling@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	Digby.Veling@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110809**	Page	: 1 of 7
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 14-Sep-2021 17:05
Order number	: 30058301	Date Analysis Commenced	: 16-Sep-2021
C-O-C number	: 27602	Issue Date	: 29-Sep-2021 16:50
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP4.2_A		
Quote number	: EP/529/21_V4		
No. of samples received	: 22		
No. of samples analysed	: 22		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required for particular samples because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH105_A_0.0	BH105_A_0.25	BH105_A_0.5	BH105_A_0.75	BH105_A_1.0
			Sampling date / time	14-Sep-2021 10:26	14-Sep-2021 10:27	14-Sep-2021 10:27	14-Sep-2021 10:28	14-Sep-2021 10:28
Compound	CAS Number	LOR	Unit	EP2110809-001	EP2110809-002	EP2110809-003	EP2110809-004	EP2110809-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.9**	**----**	**9.1**	**----**	**8.6**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	**0.005**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**3.78**	**----**	**9.27**	**----**	**1.09**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**754**	**----**	**1850**	**----**	**217**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**1.21**	**----**	**2.97**	**----**	**0.35**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.3**	**8.3**	**8.5**	**8.1**	**8.3**
pH (Fox)	----	0.1	pH Unit	**5.7**	**6.2**	**6.3**	**7.0**	**7.4**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Moderate**	**Strong**	**Strong**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH105_A_1.25	BH105_A_1.5	BH105_A_1.75	BH105_A_2.0	BH105_A_2.25
			Sampling date / time	14-Sep-2021 10:29	14-Sep-2021 10:29	14-Sep-2021 10:29	14-Sep-2021 10:30	14-Sep-2021 10:30
Compound	CAS Number	LOR	Unit	EP2110809-006	EP2110809-007	EP2110809-008	EP2110809-009	EP2110809-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	8.2	----	7.3	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	0.54	----	0.37	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	108	----	73	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.17	----	0.12	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	8.2	8.0	8.1	8.1	8.3
pH (Fox)	----	0.1	pH Unit	6.3	6.4	6.2	6.1	6.5
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH105_A_2.5	BH105_A_2.75	BH105_A_3.0	BH105_A_3.25	BH105_A_3.5
			Sampling date / time	14-Sep-2021 10:30	14-Sep-2021 10:31	14-Sep-2021 10:31	14-Sep-2021 10:32	14-Sep-2021 10:32
Compound	CAS Number	LOR	Unit	EP2110809-011	EP2110809-012	EP2110809-013	EP2110809-014	EP2110809-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.3	----	5.9	----	5.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	6	----	11
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	13
Liming Rate	----	1	kg CaCO3/t	<1	----	1	----	1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	13
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	1	----	1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.1	6.9	7.1	6.8	7.0
pH (Fox)	----	0.1	pH Unit	5.8	5.5	5.5	5.4	5.7
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH105_A_3.75	BH105_A_4.0	BH105_A_4.25	BH105_A_4.5	BH105_A_4.75
			Sampling date / time	14-Sep-2021 10:33	14-Sep-2021 10:33	14-Sep-2021 10:33	14-Sep-2021 10:34	14-Sep-2021 10:34
Compound	CAS Number	LOR	Unit	EP2110809-016	EP2110809-017	EP2110809-018	EP2110809-019	EP2110809-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.5	----	5.4	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	18	----	17	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.03	----	0.03	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.03	----	0.03	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	20	----	19	----
Liming Rate	----	1	kg CaCO3/t	----	1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.03	----	0.03	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	20	----	19	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.8	6.9	6.8	7.1	6.8
pH (Fox)	----	0.1	pH Unit	5.5	5.6	5.3	5.5	5.4
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH105_A_5.0	SQC037_A	----	----	----
			Sampling date / time	14-Sep-2021 10:34	14-Sep-2021 10:35	----	----	----
Compound	CAS Number	LOR	Unit	EP2110809-021	EP2110809-022	--------	--------	--------
				Result	Result	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.2**	**9.0**	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**15**	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.02**	<0.02	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.005**	<0.005	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**----**	**8.47**	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**----**	**1690**	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**----**	**2.71**	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	**0.03**	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	**18**	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	**1**	<1	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.03**	<0.02	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**18**	<10	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	<1	----	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.1**	**8.5**	----	----	----
pH (Fox)	----	0.1	pH Unit	**5.4**	**6.3**	----	----	----
Reaction Rate	----	1	-	**Slight**	**Moderate**	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EP2110809**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 14-Sep-2021
Order number	: 30058301	Date Analysis Commenced	: 16-Sep-2021
C-O-C number	: 27602	Issue Date	: 29-Sep-2021
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP4.2_A		
Quote number	: EP/529/21_V4		
No. of samples received	: 22		
No. of samples analysed	: 22		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3921258)									
EP2110809-001	BH105_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.9	8.9	0.0	0% - 20%
EP2110809-021	BH105_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.02	0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	15	15	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.2	5.2	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3921258)									
EP2110809-001	BH105_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110809-021	BH105_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3921258)									
EP2110809-001	BH105_A_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	3.78	3.77	0.3	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.21	1.21	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	754	754	0.0	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 3921258)									
EP2110809-001	BH105_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-E: Acid Base Accounting (QC Lot: 3921258) - continued									
EP2110809-001	BH105_A_0.0	EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110809-021	BH105_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.03	0.03	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.03	0.03	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	18	16	11.8	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	18	16	11.8	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3912290)									
EP2110809-001	BH105_A_0.0	EA037: pH (F)	----	0.1	pH Unit	8.3	8.2	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.7	5.7	0.0	0% - 20%
EP2110809-010	BH105_A_2.25	EA037: pH (F)	----	0.1	pH Unit	8.3	8.3	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.5	6.6	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3912291)									
EP2110809-021	BH105_A_5.0	EA037: pH (F)	----	0.1	pH Unit	7.1	7.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.4	5.4	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3921258)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	99.9	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3921258)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	85.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3921258)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3921258)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110809**	Page	: 1 of 5
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 14-Sep-2021
Site	: GEHBI - WP4.2_A	Issue Date	: 29-Sep-2021
Sampler	: Jaimon Hollett	No. of samples received	: 22
Order number	: 30058301	No. of samples analysed	: 22

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
BH105_A_0.0,	BH105_A_0.5,	**14-Sep-2021**	**21-Sep-2021**	14-Sep-2022	✓	**24-Sep-2021**	20-Dec-2021	✓
BH105_A_1.0,	BH105_A_1.5,							
BH105_A_2.0,	BH105_A_2.5,							
BH105_A_3.0,	BH105_A_3.5,							
BH105_A_4.0,	BH105_A_4.5,							
BH105_A_5.0,	SQC037_A							
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
BH105_A_0.0,	BH105_A_0.5,	**14-Sep-2021**	**21-Sep-2021**	14-Sep-2022	✓	**24-Sep-2021**	20-Dec-2021	✓
BH105_A_1.0,	BH105_A_1.5,							
BH105_A_2.0,	BH105_A_2.5,							
BH105_A_3.0,	BH105_A_3.5,							
BH105_A_4.0,	BH105_A_4.5,							
BH105_A_5.0,	SQC037_A							
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033)								
BH105_A_0.0,	BH105_A_0.5,	**14-Sep-2021**	**21-Sep-2021**	14-Sep-2022	✓	**24-Sep-2021**	20-Dec-2021	✓
BH105_A_1.0,	BH105_A_1.5,							
BH105_A_2.0,	BH105_A_2.5,							
BH105_A_3.0,	BH105_A_3.5,							
BH105_A_4.0,	BH105_A_4.5,							
BH105_A_5.0,	SQC037_A							
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033)								
BH105_A_0.0,	BH105_A_0.5,	**14-Sep-2021**	**21-Sep-2021**	14-Sep-2022	✓	**24-Sep-2021**	20-Dec-2021	✓
BH105_A_1.0,	BH105_A_1.5,							
BH105_A_2.0,	BH105_A_2.5,							
BH105_A_3.0,	BH105_A_3.5,							
BH105_A_4.0,	BH105_A_4.5,							
BH105_A_5.0,	SQC037_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033)								
BH105_A_0.0,	BH105_A_0.5,	**14-Sep-2021**	**21-Sep-2021**	14-Sep-2022	✓	**24-Sep-2021**	20-Dec-2021	✓
BH105_A_1.0,	BH105_A_1.5,							
BH105_A_2.0,	BH105_A_2.5,							
BH105_A_3.0,	BH105_A_3.5,							
BH105_A_4.0,	BH105_A_4.5,							
BH105_A_5.0,	SQC037_A							
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH105_A_0.0,	BH105_A_0.25,	**14-Sep-2021**	**16-Sep-2021**	13-Mar-2022	✓	**16-Sep-2021**	13-Mar-2022	✓
BH105_A_0.5,	BH105_A_0.75,							
BH105_A_1.0,	BH105_A_1.25,							
BH105_A_1.5,	BH105_A_1.75,							
BH105_A_2.0,	BH105_A_2.25,							
BH105_A_2.5,	BH105_A_2.75,							
BH105_A_3.0,	BH105_A_3.25,							
BH105_A_3.5,	BH105_A_3.75,							
BH105_A_4.0,	BH105_A_4.25,							
SQC037_A,								
BH105_A_4.5,	BH105_A_4.75,							
BH105_A_5.0								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	3	22	**13.64**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

ALSCompass SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110806

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: GEHBI_WP4.1_A **Client:** Arcadis **Project Manager:** Bronwyn Van Valkengoed
Phone: (0408 751 386)

ALS Compass COC Reference: 27599 **# Samples:** 44 **Sampler:** Jarrod Hallett
Phone: (0420 838 328)

Turnaround Requirements: Standard _____ Urgent _____

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	(N/A)
	Free ice / frozen ice bricks upon receipt?	(YES)	NO	N/A
	Random sample temperature on receipt?	3.2 °C		

Custody:

Relinquished by:	**Received by:**	**Relinquished by:**	**Received by:**
Date / Time: 14/9/21 1530	**Date / Time:** 1705 14/09/21	**Date / Time:**	**Date / Time:**

CHAIN OF CUSTODY

ALS COC#: 27599 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, carina.andersen@arcadis.com, au.accounts.payable@arcadis.com

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH100_A_0.0		14/09/2021 07:47 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
002	BH100_A_0.25		14/09/2021 07:48 AM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH100_A_0.5		14/09/2021 07:48 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
004	BH100_A_0.75		14/09/2021 07:49 AM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH100_A_1.0		14/09/2021 07:49 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
006	BH100_A_1.25		14/09/2021 07:49 AM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH100_A_1.5		14/09/2021 07:50 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
008	BH100_A_1.75		14/09/2021 07:50 AM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH100_A_2.0		14/09/2021 07:50 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27599 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH100_A_2.25		14/09/2021 07:51 AM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH100_A_2.5		14/09/2021 07:52 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
012	BH100_A_2.75		14/09/2021 07:52 AM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH100_A_3.0		14/09/2021 07:53 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
014	BH100_A_3.25		14/09/2021 07:53 AM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH100_A_3.5		14/09/2021 07:53 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
016	BH100_A_3.75		14/09/2021 07:54 AM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH100_A_4.0		14/09/2021 07:54 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
018	BH100_A_4.25		14/09/2021 07:55 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 27599 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

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TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH100_A_4.5		14/09/2021 07:55 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
020	BH100_A_4.75		14/09/2021 07:55 AM	Soil	ALS: 1 Non ALS: 0	No	X			
021	BH100_A_5.0		14/09/2021 07:56 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
022	SQC035_A		14/09/2021 07:56 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
023	BH09_A_0.0		14/09/2021 07:57 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
024	BH09_A_0.25		14/09/2021 07:57 AM	Soil	ALS: 1 Non ALS: 0	No	X			
025	BH09_A_0.5		14/09/2021 07:58 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
026	BH09_A_0.75		14/09/2021 07:58 AM	Soil	ALS: 1 Non ALS: 0	No	X			
027	BH09_A_1.0		14/09/2021 08:00 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27599 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH09_A_1.25		14/09/2021 08:01 AM	Soil	ALS: 1 Non ALS: 0	No	X			
029	BH09_A_1.5		14/09/2021 08:01 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
030	BH09_A_1.75		14/09/2021 08:02 AM	Soil	ALS: 1 Non ALS: 0	No	X			
031	BH09_A_2.0		14/09/2021 08:02 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
032	BH09_A_2.25		14/09/2021 08:03 AM	Soil	ALS: 1 Non ALS: 0	No	X			
033	BH09_A_2.5		14/09/2021 08:03 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
034	BH09_A_2.75		14/09/2021 08:03 AM	Soil	ALS: 1 Non ALS: 0	No	X			
035	BH09_A_3.0		14/09/2021 08:05 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
036	BH09_A_3.25		14/09/2021 08:05 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 27599 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

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PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
037	BH09_A_3.5		14/09/2021 08:06 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
038	BH09_A_3.75		14/09/2021 08:06 AM	Soil	ALS: 1 Non ALS: 0	No	X			
039	BH09_A_4.0		14/09/2021 08:07 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
040	BH09_A_4.25		14/09/2021 08:07 AM	Soil	ALS: 1 Non ALS: 0	No	X			
041	BH09_A_4.5		14/09/2021 08:07 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
042	BH09_A_4.75		14/09/2021 08:08 AM	Soil	ALS: 1 Non ALS: 0	No	X			
043	BH09_A_5.0		14/09/2021 08:08 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		
044	SQC036_A		14/09/2021 08:08 AM	Soil	ALS: 1 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 27599 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH100_A_0.0	Snap Lock Bag - frozen	1 Medium	00130220048655	Green	No	
002	BH100_A_0.25	Snap Lock Bag - frozen	1 Medium	00130220048654	Green	No	
003	BH100_A_0.5	Snap Lock Bag - frozen	1 Medium	00130220048653	Green	No	
004	BH100_A_0.75	Snap Lock Bag - frozen	1 Medium	00130220048652	Green	No	
005	BH100_A_1.0	Snap Lock Bag - frozen	1 Medium	00130220048651	Green	No	
006	BH100_A_1.25	Snap Lock Bag - frozen	1 Medium	00130220048650	Green	No	
007	BH100_A_1.5	Snap Lock Bag - frozen	1 Medium	00130220048649	Green	No	
008	BH100_A_1.75	Snap Lock Bag - frozen	1 Medium	00130220048648	Green	No	
009	BH100_A_2.0	Snap Lock Bag - frozen	1 Medium	00130220048647	Green	No	
010	BH100_A_2.25	Snap Lock Bag - frozen	1 Medium	00130220048646	Green	No	
011	BH100_A_2.5	Snap Lock Bag - frozen	1 Medium	00130220048645	Green	No	
012	BH100_A_2.75	Snap Lock Bag - frozen	1 Medium	00130220048644	Green	No	
013	BH100_A_3.0	Snap Lock Bag - frozen	1 Medium	00130220048643	Green	No	
014	BH100_A_3.25	Snap Lock Bag - frozen	1 Medium	00130220048642	Green	No	
015	BH100_A_3.5	Snap Lock Bag - frozen	1 Medium	00130220048641	Green	No	
016	BH100_A_3.75	Snap Lock Bag - frozen	1 Medium	00130220048640	Green	No	
017	BH100_A_4.0	Snap Lock Bag - frozen	1 Medium	00130220048639	Green	No	
018	BH100_A_4.25	Snap Lock Bag - frozen	1 Medium	00130220048638	Green	No	
019	BH100_A_4.5	Snap Lock Bag - frozen	1 Medium	00130220048637	Green	No	
020	BH100_A_4.75	Snap Lock Bag - frozen	1 Medium	00130220048636	Green	No	
021	BH100_A_5.0	Snap Lock Bag - frozen	1 Medium	00130220048635	Green	No	
022	SQC035_A	Snap Lock Bag - frozen	1 Medium	00130220048634	Green	No	
023	BH09_A_0.0	Snap Lock Bag - frozen	1 Medium	00130220048707	Green	No	
024	BH09_A_0.25	Snap Lock Bag - frozen	1 Medium	00130220048706	Green	No	
025	BH09_A_0.5	Snap Lock Bag - frozen	1 Medium	00130220048705	Green	No	
026	BH09_A_0.75	Snap Lock Bag - frozen	1 Medium	00130220048704	Green	No	

CHAIN OF CUSTODY

ALS COC#: **27599** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4.1_A

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Jaimon Hollett QUOTE NO: EP/529/21 / EP2021HYDCON0003

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027	BH09_A_1.0	Snap Lock Bag - frozen	1 Medium	00130220048703	Green	No	
028	BH09_A_1.25	Snap Lock Bag - frozen	1 Medium	00130220048702	Green	No	
029	BH09_A_1.5	Snap Lock Bag - frozen	1 Medium	00130220048701	Green	No	
030	BH09_A_1.75	Snap Lock Bag - frozen	1 Medium	00130220048700	Green	No	
031	BH09_A_2.0	Snap Lock Bag - frozen	1 Medium	00130220048699	Green	No	
032	BH09_A_2.25	Snap Lock Bag - frozen	1 Medium	00130220048698	Green	No	
033	BH09_A_2.5	Snap Lock Bag - frozen	1 Medium	00130220048697	Green	No	
034	BH09_A_2.75	Snap Lock Bag - frozen	1 Medium	00130220048696	Green	No	
035	BH09_A_3.0	Snap Lock Bag - frozen	1 Medium	00130220048695	Green	No	
036	BH09_A_3.25	Snap Lock Bag - frozen	1 Medium	00130220048694	Green	No	
037	BH09_A_3.5	Snap Lock Bag - frozen	1 Medium	00130220048693	Green	No	
038	BH09_A_3.75	Snap Lock Bag - frozen	1 Medium	00130220048692	Green	No	
039	BH09_A_4.0	Snap Lock Bag - frozen	1 Medium	00130220048691	Green	No	
040	BH09_A_4.25	Snap Lock Bag - frozen	1 Medium	00130220048690	Green	No	
041	BH09_A_4.5	Snap Lock Bag - frozen	1 Medium	00130220048689	Green	No	
042	BH09_A_4.75	Snap Lock Bag - frozen	1 Medium	00130220048688	Green	No	
043	BH09_A_5.0	Snap Lock Bag - frozen	1 Medium	00130220048687	Green	No	
044	SQC036_A	Snap Lock Bag - frozen	1 Medium	00130220048625	Green	No	

Total Bottle Count: ALS: 44, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2110806**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 27599	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP4.1_A		
Sampler	: Jaimon Hollett		

Dates

Date Samples Received	: 14-Sep-2021 17:05	Issue Date	: 14-Sep-2021
Client Requested Due Date	: 29-Sep-2021	Scheduled Reporting Date	: **29-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 3.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 44 / 44

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110806-001	14-Sep-2021 07:47	BH100_A_0.0	✓	✓
EP2110806-002	14-Sep-2021 07:48	BH100_A_0.25		✓
EP2110806-003	14-Sep-2021 07:48	BH100_A_0.5	✓	✓
EP2110806-004	14-Sep-2021 07:49	BH100_A_0.75		✓
EP2110806-005	14-Sep-2021 07:49	BH100_A_1.0	✓	✓
EP2110806-006	14-Sep-2021 07:49	BH100_A_1.25		✓
EP2110806-007	14-Sep-2021 07:50	BH100_A_1.5	✓	✓
EP2110806-008	14-Sep-2021 07:50	BH100_A_1.75		✓
EP2110806-009	14-Sep-2021 07:50	BH100_A_2.0	✓	✓
EP2110806-010	14-Sep-2021 07:51	BH100_A_2.25		✓
EP2110806-011	14-Sep-2021 07:52	BH100_A_2.5	✓	✓
EP2110806-012	14-Sep-2021 07:52	BH100_A_2.75		✓
EP2110806-013	14-Sep-2021 07:53	BH100_A_3.0	✓	✓
EP2110806-014	14-Sep-2021 07:53	BH100_A_3.25		✓
EP2110806-015	14-Sep-2021 07:53	BH100_A_3.5	✓	✓
EP2110806-016	14-Sep-2021 07:54	BH100_A_3.75		✓
EP2110806-017	14-Sep-2021 07:54	BH100_A_4.0	✓	✓
EP2110806-018	14-Sep-2021 07:55	BH100_A_4.25		✓
EP2110806-019	14-Sep-2021 07:55	BH100_A_4.5	✓	✓
EP2110806-020	14-Sep-2021 07:55	BH100_A_4.75		✓
EP2110806-021	14-Sep-2021 07:56	BH100_A_5.0	✓	✓
EP2110806-022	14-Sep-2021 07:56	SQC035_A	✓	✓
EP2110806-023	14-Sep-2021 07:57	BH09_A_0.0	✓	✓
EP2110806-024	14-Sep-2021 07:57	BH09_A_0.25		✓
EP2110806-025	14-Sep-2021 07:58	BH09_A_0.5	✓	✓
EP2110806-026	14-Sep-2021 07:58	BH09_A_0.75		✓
EP2110806-027	14-Sep-2021 08:00	BH09_A_1.0	✓	✓
EP2110806-028	14-Sep-2021 08:01	BH09_A_1.25		✓
EP2110806-029	14-Sep-2021 08:01	BH09_A_1.5	✓	✓
EP2110806-030	14-Sep-2021 08:02	BH09_A_1.75		✓
EP2110806-031	14-Sep-2021 08:02	BH09_A_2.0	✓	✓
EP2110806-032	14-Sep-2021 08:03	BH09_A_2.25		✓
EP2110806-033	14-Sep-2021 08:03	BH09_A_2.5	✓	✓
EP2110806-034	14-Sep-2021 08:03	BH09_A_2.75		✓
EP2110806-035	14-Sep-2021 08:05	BH09_A_3.0	✓	✓

			SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2110806-036	14-Sep-2021 08:05	BH09_A_3.25		✓
EP2110806-037	14-Sep-2021 08:06	BH09_A_3.5	✓	✓
EP2110806-038	14-Sep-2021 08:06	BH09_A_3.75		✓
EP2110806-039	14-Sep-2021 08:07	BH09_A_4.0	✓	✓
EP2110806-040	14-Sep-2021 08:07	BH09_A_4.25		✓
EP2110806-041	14-Sep-2021 08:07	BH09_A_4.5	✓	✓
EP2110806-042	14-Sep-2021 08:08	BH09_A_4.75		✓
EP2110806-043	14-Sep-2021 08:08	BH09_A_5.0	✓	✓
EP2110806-044	14-Sep-2021 08:08	SQC036_A	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ARCADIS ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Carina Andersen

- A4 - AU Tax Invoice (INV)	Email	carina.andersen@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110806**	Page	: 1 of 11
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 14-Sep-2021 17:05
Order number	: 30058301	Date Analysis Commenced	: 16-Sep-2021
C-O-C number	: 27599	Issue Date	: 29-Sep-2021 17:18
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP4.1_A		
Quote number	: EP/529/21_V4		
No. of samples received	: 44		
No. of samples analysed	: 44		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required for particular samples because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH100_A_0.0	BH100_A_0.25	BH100_A_0.5	BH100_A_0.75	BH100_A_1.0
			Sampling date / time	14-Sep-2021 07:47	14-Sep-2021 07:48	14-Sep-2021 07:48	14-Sep-2021 07:49	14-Sep-2021 07:49
Compound	CAS Number	LOR	Unit	EP2110806-001	EP2110806-002	EP2110806-003	EP2110806-004	EP2110806-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.1**	**----**	**5.2**	**----**	**5.3**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**23**	**----**	**21**	**----**	**17**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.04**	**----**	**0.03**	**----**	**0.03**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.04**	**----**	**0.04**	**----**	**0.03**
Net Acidity (acidity units)	----	10	mole H+ / t	**24**	**----**	**22**	**----**	**19**
Liming Rate	----	1	kg CaCO3/t	**2**	**----**	**2**	**----**	**1**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.04**	**----**	**0.04**	**----**	**0.03**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**24**	**----**	**22**	**----**	**19**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**2**	**----**	**2**	**----**	**1**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.0**	**6.3**	**6.5**	**6.7**	**6.6**
pH (Fox)	----	0.1	pH Unit	**3.6**	**5.6**	**6.3**	**6.5**	**5.9**
Reaction Rate	----	1	-	**Strong**	**Strong**	**Strong**	**Strong**	**Strong**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH100_A_1.25	BH100_A_1.5	BH100_A_1.75	BH100_A_2.0	BH100_A_2.25
			Sampling date / time	14-Sep-2021 07:49	14-Sep-2021 07:50	14-Sep-2021 07:50	14-Sep-2021 07:50	14-Sep-2021 07:51
Compound	CAS Number	LOR	Unit	EP2110806-006	EP2110806-007	EP2110806-008	EP2110806-009	EP2110806-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	4.9	----	5.0	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	30	----	26	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.05	----	0.04	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.05	----	0.04	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	31	----	26	----
Liming Rate	----	1	kg CaCO3/t	----	2	----	2	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.05	----	0.04	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	31	----	26	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	2	----	2	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.7	5.3	5.4	5.4	5.3
pH (Fox)	----	0.1	pH Unit	4.2	4.5	4.2	5.5	4.2
Reaction Rate	----	1	-	Slight	Strong	Slight	Strong	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH100_A_2.5	BH100_A_2.75	BH100_A_3.0	BH100_A_3.25	BH100_A_3.5
			Sampling date / time	14-Sep-2021 07:52	14-Sep-2021 07:52	14-Sep-2021 07:53	14-Sep-2021 07:53	14-Sep-2021 07:53
Compound	CAS Number	LOR	Unit	EP2110806-011	EP2110806-012	EP2110806-013	EP2110806-014	EP2110806-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	4.8	----	4.9	----	5.4
Titratable Actual Acidity (23F)	----	2	mole H+ / t	28	----	28	----	20
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.05	----	0.05	----	0.03
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.05	----	0.05	----	0.03
Net Acidity (acidity units)	----	10	mole H+ / t	30	----	31	----	22
Liming Rate	----	1	kg CaCO3/t	2	----	2	----	2
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.05	----	0.05	----	0.03
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	30	----	31	----	22
Liming Rate excluding ANC	----	1	kg CaCO3/t	2	----	2	----	2
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.1	5.4	5.0	5.1	5.7
pH (Fox)	----	0.1	pH Unit	4.1	4.2	4.2	4.2	4.5
Reaction Rate	----	1	-	Slight	Moderate	Moderate	Moderate	Moderate

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH100_A_3.75	BH100_A_4.0	BH100_A_4.25	BH100_A_4.5	BH100_A_4.75
			Sampling date / time	14-Sep-2021 07:54	14-Sep-2021 07:54	14-Sep-2021 07:55	14-Sep-2021 07:55	14-Sep-2021 07:55
Compound	CAS Number	LOR	Unit	EP2110806-016	EP2110806-017	EP2110806-018	EP2110806-019	EP2110806-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.3	----	5.4	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	32	----	25	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.05	----	0.04	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.05	----	0.04	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	34	----	26	----
Liming Rate	----	1	kg CaCO3/t	----	3	----	2	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.05	----	0.04	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	34	----	26	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	3	----	2	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.8	6.6	6.7	6.7	6.2
pH (Fox)	----	0.1	pH Unit	4.5	4.8	5.7	5.8	4.8
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH100_A_5.0	SQC035_A	BH09_A_0.0	BH09_A_0.25	BH09_A_0.5
			Sampling date / time	14-Sep-2021 07:56	14-Sep-2021 07:56	14-Sep-2021 07:57	14-Sep-2021 07:57	14-Sep-2021 07:58
Compound	CAS Number	LOR	Unit	EP2110806-021	EP2110806-022	EP2110806-023	EP2110806-024	EP2110806-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.4	5.3	8.6	----	7.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t	24	14	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.04	0.02	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	0.94	----	0.25
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	187	----	49
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	0.30	----	0.08
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.04	0.03	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	25	16	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	2	1	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.04	0.03	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	25	16	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	2	1	<1	----	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.3	6.7	7.7	7.5	7.5
pH (Fox)	----	0.1	pH Unit	4.9	5.3	6.5	6.0	5.7
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Moderate

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH09_A_0.75	BH09_A_1.0	BH09_A_1.25	BH09_A_1.5	BH09_A_1.75
			Sampling date / time	14-Sep-2021 07:58	14-Sep-2021 08:00	14-Sep-2021 08:01	14-Sep-2021 08:01	14-Sep-2021 08:02
Compound	CAS Number	LOR	Unit	EP2110806-026	EP2110806-027	EP2110806-028	EP2110806-029	EP2110806-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.4	----	5.7	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	20	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	0.03	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.007	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	0.03	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	21	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	2	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	0.03	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	21	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	2	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.6	6.8	6.4	6.1	6.5
pH (Fox)	----	0.1	pH Unit	6.3	4.8	3.9	3.8	4.6
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH09_A_2.0	BH09_A_2.25	BH09_A_2.5	BH09_A_2.75	BH09_A_3.0
			Sampling date / time	14-Sep-2021 08:02	14-Sep-2021 08:03	14-Sep-2021 08:03	14-Sep-2021 08:03	14-Sep-2021 08:05
Compound	CAS Number	LOR	Unit	EP2110806-031	EP2110806-032	EP2110806-033	EP2110806-034	EP2110806-035
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.0**	**----**	**5.2**	**----**	**6.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**4**	**----**	**22**	**----**	**4**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	**0.04**	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	**0.005**	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	**0.04**	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	**26**	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	**2**	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	**0.04**	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	**26**	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	**2**	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.1**	**4.8**	**4.4**	**6.7**	**6.0**
pH (Fox)	----	0.1	pH Unit	**4.5**	**3.6**	**3.2**	**3.8**	**4.3**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Strong**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH09_A_3.25	BH09_A_3.5	BH09_A_3.75	BH09_A_4.0	BH09_A_4.25
			Sampling date / time	14-Sep-2021 08:05	14-Sep-2021 08:06	14-Sep-2021 08:06	14-Sep-2021 08:07	14-Sep-2021 08:07
Compound	CAS Number	LOR	Unit	EP2110806-036	EP2110806-037	EP2110806-038	EP2110806-039	EP2110806-040
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.1	----	5.6	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	2	----	12	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	0.006	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	0.03	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	16	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	0.03	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	16	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.8	5.8	5.8	7.1	6.9
pH (Fox)	----	0.1	pH Unit	4.3	4.5	4.5	5.5	5.6
Reaction Rate	----	1	-	Slight	Slight	Slight	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH09_A_4.5	BH09_A_4.75	BH09_A_5.0	SQC036_A	----
			Sampling date / time	14-Sep-2021 08:07	14-Sep-2021 08:08	14-Sep-2021 08:08	14-Sep-2021 08:08	----
Compound	CAS Number	LOR	Unit	EP2110806-041	EP2110806-042	EP2110806-043	EP2110806-044	--------
				Result	Result	Result	Result	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.6**	**----**	**6.1**	**8.3**	**----**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**9**	**----**	<2	<2	**----**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	<0.02	**----**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	**0.007**	<0.005	**----**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	<10	**----**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**----**	**----**	**----**	**0.35**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**----**	**----**	**----**	**69**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**----**	**----**	**----**	**0.11**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S	**0.02**	**----**	<0.02	<0.02	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	**11**	**----**	<10	<10	**----**
Liming Rate	----	1	kg CaCO3/t	**1**	**----**	<1	<1	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.02**	**----**	<0.02	<0.02	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**11**	**----**	<10	<10	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	**----**	<1	<1	**----**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.8**	**6.4**	**6.1**	**7.6**	**----**
pH (Fox)	----	0.1	pH Unit	**5.5**	**4.9**	**4.9**	**6.2**	**----**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Moderate**	**----**

QUALITY CONTROL REPORT

Work Order	: **EP2110806**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 14-Sep-2021
Order number	: 30058301	Date Analysis Commenced	: 16-Sep-2021
C-O-C number	: 27599	Issue Date	: 29-Sep-2021
Sampler	: Jaimon Hollett		
Site	: GEHBI - WP4.1_A		
Quote number	: EP/529/21_V4		
No. of samples received	: 44		
No. of samples analysed	: 44		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3921255)									
EP2110806-001	BH100_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.04	0.04	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	23	23	0.0	0% - 50%
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.1	5.1	0.0	0% - 20%
EP2110806-021	BH100_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.04	0.04	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	24	23	0.0	0% - 50%
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.4	5.4	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 3921256)									
EP2110806-039	BH09_A_4.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.02	0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	12	12	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.6	5.6	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3921255)									
EP2110806-001	BH100_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2110806-021	BH100_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 3921256)									
EP2110806-039	BH09_A_4.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	0.006	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3921255)									
EP2110806-001	BH100_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.04	0.04	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-E: Acid Base Accounting (QC Lot: 3921255) - continued									
EP2110806-001	BH100_A_0.0	EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.04	0.04	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	2	2	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	2	2	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	24	25	4.1	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	24	25	4.1	No Limit
EP2110806-021	BH100_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.04	0.04	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.04	0.04	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	2	2	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	2	2	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	25	23	8.3	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	25	23	8.3	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3921256)									
EP2110806-039	BH09_A_4.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.03	0.03	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.03	0.03	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	16	16	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	16	16	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3912287)									
EP2110806-001	BH100_A_0.0	EA037: pH (F)	----	0.1	pH Unit	6.0	6.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.6	3.6	0.0	0% - 20%
EP2110806-010	BH100_A_2.25	EA037: pH (F)	----	0.1	pH Unit	5.3	5.4	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.2	4.2	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3912288)									
EP2110806-021	BH100_A_5.0	EA037: pH (F)	----	0.1	pH Unit	6.3	6.2	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.9	5.0	0.0	0% - 20%
EP2110806-030	BH09_A_1.75	EA037: pH (F)	----	0.1	pH Unit	6.5	6.6	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.6	4.7	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3912289)									
EP2110806-041	BH09_A_4.5	EA037: pH (F)	----	0.1	pH Unit	6.8	6.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.5	5.4	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3921255)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	99.9	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 3921256)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	99.9	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3921255)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	87.6	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3921256)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	85.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3921255)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3921255)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3921256)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110806**	Page	: 1 of 6
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 14-Sep-2021
Site	: GEHBI - WP4.1_A	Issue Date	: 29-Sep-2021
Sampler	: Jaimon Hollett	No. of samples received	: 44
Order number	: 30058301	No. of samples analysed	: 44

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
BH100_A_0.0,	BH100_A_0.5,	**14-Sep-2021**	**21-Sep-2021**	14-Sep-2022	✓	**24-Sep-2021**	20-Dec-2021	✓
BH100_A_1.0,	BH100_A_1.5,							
BH100_A_2.0,	BH100_A_2.5,							
BH100_A_3.0,	BH100_A_3.5,							
BH100_A_4.0,	BH100_A_4.5,							
BH100_A_5.0,	SQC035_A,							
BH09_A_0.0,	BH09_A_0.5,							
BH09_A_1.0,	BH09_A_1.5,							
BH09_A_2.0,	BH09_A_2.5,							
BH09_A_3.0,	BH09_A_3.5,							
BH09_A_4.0,	BH09_A_4.5,							
BH09_A_5.0,	SQC036_A							
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
BH100_A_0.0,	BH100_A_0.5,	**14-Sep-2021**	**21-Sep-2021**	14-Sep-2022	✓	**24-Sep-2021**	20-Dec-2021	✓
BH100_A_1.0,	BH100_A_1.5,							
BH100_A_2.0,	BH100_A_2.5,							
BH100_A_3.0,	BH100_A_3.5,							
BH100_A_4.0,	BH100_A_4.5,							
BH100_A_5.0,	SQC035_A,							
BH09_A_0.0,	BH09_A_0.5,							
BH09_A_1.0,	BH09_A_1.5,							
BH09_A_2.0,	BH09_A_2.5,							
BH09_A_3.0,	BH09_A_3.5,							
BH09_A_4.0,	BH09_A_4.5,							
BH09_A_5.0,	SQC036_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033)								
BH100_A_0.0,	BH100_A_0.5,	**14-Sep-2021**	**21-Sep-2021**	14-Sep-2022	✓	**24-Sep-2021**	20-Dec-2021	✓
BH100_A_1.0,	BH100_A_1.5,							
BH100_A_2.0,	BH100_A_2.5,							
BH100_A_3.0,	BH100_A_3.5,							
BH100_A_4.0,	BH100_A_4.5,							
BH100_A_5.0,	SQC035_A,							
BH09_A_0.0,	BH09_A_0.5,							
BH09_A_1.0,	BH09_A_1.5,							
BH09_A_2.0,	BH09_A_2.5,							
BH09_A_3.0,	BH09_A_3.5,							
BH09_A_4.0,	BH09_A_4.5,							
BH09_A_5.0,	SQC036_A							
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033)								
BH100_A_0.0,	BH100_A_0.5,	**14-Sep-2021**	**21-Sep-2021**	14-Sep-2022	✓	**24-Sep-2021**	20-Dec-2021	✓
BH100_A_1.0,	BH100_A_1.5,							
BH100_A_2.0,	BH100_A_2.5,							
BH100_A_3.0,	BH100_A_3.5,							
BH100_A_4.0,	BH100_A_4.5,							
BH100_A_5.0,	SQC035_A,							
BH09_A_0.0,	BH09_A_0.5,							
BH09_A_1.0,	BH09_A_1.5,							
BH09_A_2.0,	BH09_A_2.5,							
BH09_A_3.0,	BH09_A_3.5,							
BH09_A_4.0,	BH09_A_4.5,							
BH09_A_5.0,	SQC036_A							
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033)								
BH100_A_0.0,	BH100_A_0.5,	**14-Sep-2021**	**21-Sep-2021**	14-Sep-2022	✓	**24-Sep-2021**	20-Dec-2021	✓
BH100_A_1.0,	BH100_A_1.5,							
BH100_A_2.0,	BH100_A_2.5,							
BH100_A_3.0,	BH100_A_3.5,							
BH100_A_4.0,	BH100_A_4.5,							
BH100_A_5.0,	SQC035_A,							
BH09_A_0.0,	BH09_A_0.5,							
BH09_A_1.0,	BH09_A_1.5,							
BH09_A_2.0,	BH09_A_2.5,							
BH09_A_3.0,	BH09_A_3.5,							
BH09_A_4.0,	BH09_A_4.5,							
BH09_A_5.0,	SQC036_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis							
Snap Lock Bag - frozen (EA037)							
BH100_A_0.0, BH100_A_0.25, BH100_A_0.5, BH100_A_0.75, BH100_A_1.0, BH100_A_1.25, BH100_A_1.5, BH100_A_1.75, BH100_A_2.0, BH100_A_2.25, BH100_A_2.5, BH100_A_2.75, BH100_A_3.0, BH100_A_3.25, BH100_A_3.5, BH100_A_3.75, BH100_A_4.0, BH100_A_4.25, SQC035_A, BH100_A_4.5, BH100_A_4.75, BH100_A_5.0, BH09_A_0.0, BH09_A_0.25, BH09_A_0.5, BH09_A_0.75, BH09_A_1.0, BH09_A_1.25, BH09_A_1.5, BH09_A_1.75, BH09_A_2.0, BH09_A_2.25, BH09_A_2.5, BH09_A_2.75, BH09_A_3.0, BH09_A_3.25, BH09_A_3.5, BH09_A_3.75, BH09_A_4.0, BH09_A_4.25, BH09_A_4.5, BH09_A_4.75, BH09_A_5.0, SQC036_A	**14-Sep-2021**	**16-Sep-2021**	13-Mar-2022	✓	**16-Sep-2021**	13-Mar-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	5	44	**11.36**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	24	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Environmental Division
Perth
Work Order Reference
EP2112543

Telephone : -- 61-8-9406 1301

ALSCompass SAMPLING Intelligence

Custody Document for Submissions via ALS Compass App

Project: GEMBI **Client:** ARCADIS **Project Manager:** BROWN JW

Phone: ( )

ALS Compass COC Reference: EB64L **# Samples:** 88 **Sampler:** NICOLAS S

Phone: (+32 471 73 1618)

Turnaround Requirements: Standard _____ Urgent _____

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	(N/A)
	Free ice / frozen ice bricks upon receipt?	(YES)	NO	N/A
	Random sample temperature on receipt?	19.7/17.5°C		

Custody:

Relinquished by:	**Received by:** SP	**Relinquished by:**	**Received by:**
Date / Time:	**Date / Time:** 1720 18/10/21	**Date / Time:**	**Date / Time:**

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

RELINQUISHED BY:	RECEIVED BY: SP	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 19/10/21 1600	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? (Yes) No N/A

Random Sample Temperature on Receipt: 20.7/17.7 °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH97_A_0.0_0.00-0.00		18/10/2021 09:12 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
002	BH97_A_0.25		18/10/2021 09:32 AM	Soil	ALS: 1 Non ALS: 0	No		X			
003	BH97_A_0.5		18/10/2021 09:33 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
004	BH97_A_0.75		18/10/2021 09:34 AM	Soil	ALS: 1 Non ALS: 0	No		X			
005	BH97_A_1		18/10/2021 09:34 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
006	BH97_A_1.25		18/10/2021 09:35 AM	Soil	ALS: 1 Non ALS: 0	No		X			
007	BH97_A_1.5		18/10/2021 09:46 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
008	BH97_A_1.75		18/10/2021 09:46 AM	Soil	ALS: 1 Non ALS: 0	No		X			
009	BH97_A_2.0		18/10/2021 09:48 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		

CHAIN OF CUSTODY

ALS COC#: 28846 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH97_A_2.25		18/10/2021 09:49 AM	Soil	ALS: 1 Non ALS: 0	No		X			
011	BH97_A_2.5		18/10/2021 09:50 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
012	BH97_A_2.75		18/10/2021 09:51 AM	Soil	ALS: 1 Non ALS: 0	No		X			
013	BH97_A_3.0		18/10/2021 09:51 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
014	BH97_A_3.25		18/10/2021 09:52 AM	Soil	ALS: 1 Non ALS: 0	No		X			
015	BH97_A_3.5		18/10/2021 09:53 AM	Soil	ALS: 1 Non ALS: 0	No		X	X		
016	BH97_A_3.75		18/10/2021 10:01 AM	Soil	ALS: 1 Non ALS: 0	No		X			
017	BH97_A_4.0		18/10/2021 10:03 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
018	BH97_A_4.25		18/10/2021 10:03 AM	Soil	ALS: 1 Non ALS: 0	No		X			

CHAIN OF CUSTODY

(ALS) COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

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SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH97_A_4.5		18/10/2021 10:04 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
020	BH97_A_4.75		18/10/2021 10:05 AM	Soil	ALS: 1 Non ALS: 0	No		X			
021	BH97_A_5.0		18/10/2021 10:05 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
022	SQC044_A		18/10/2021 10:30 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
023	BH12_A_0.0		18/10/2021 10:35 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
024	BH12_A_0.25		18/10/2021 10:36 AM	Soil	ALS: 1 Non ALS: 0	No		X			
025	BH12_A_0.5		18/10/2021 10:37 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
026	BH12_A_0.75		18/10/2021 10:38 AM	Soil	ALS: 1 Non ALS: 0	No		X			
027	BH12_A_1.0		18/10/2021 10:39 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH12_A_1.25		18/10/2021 10:40 AM	Soil	ALS: 1 Non ALS: 0	No		X			
029	BH12_A_1.5		18/10/2021 10:41 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
030	BH12_A_1.75		18/10/2021 10:42 AM	Soil	ALS: 1 Non ALS: 0	No		X			
031	BH12_A_2.0		18/10/2021 10:43 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
032	BH12_A_2.25		18/10/2021 10:44 AM	Soil	ALS: 1 Non ALS: 0	No		X			
033	BH12_A_2.5		18/10/2021 10:45 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
034	BH12_A_2.75		18/10/2021 10:45 AM	Soil	ALS: 1 Non ALS: 0	No		X			
035	BH12_A_3.0		18/10/2021 10:46 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
036	BH12_A_3.25		18/10/2021 10:47 AM	Soil	ALS: 1 Non ALS: 0	No		X			

CHAIN OF CUSTODY

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CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
037	BH12_A_3.5		18/10/2021 10:49 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
038	BH12_A_3.75		18/10/2021 10:50 AM	Soil	ALS: 1 Non ALS: 0	No		X			
039	BH12_A_4.0		18/10/2021 10:50 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
040	BH12_A_4.25		18/10/2021 10:51 AM	Soil	ALS: 1 Non ALS: 0	No		X			
041	BH12_A_4.5		18/10/2021 10:52 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
042	BH12_A_4.75		18/10/2021 10:52 AM	Soil	ALS: 1 Non ALS: 0	No		X			
043	BH12_A_5.0		18/10/2021 10:53 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
044	SQC045_A		18/10/2021 11:34 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
045	BH96_A_0.0		18/10/2021 12:07 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		

CHAIN OF CUSTODY

(ALS) COC#: 28846 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
046	BH96_A_0.25		18/10/2021 12:15 PM	Soil	ALS: 1 Non ALS: 0	No		X			
047	BH96_A_0.5		18/10/2021 12:15 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
048	BH96_A_0.75		18/10/2021 12:17 PM	Soil	ALS: 1 Non ALS: 0	No		X			
049	BH96_A_1.0		18/10/2021 12:17 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
050	BH96_A_1.25		18/10/2021 12:18 PM	Soil	ALS: 1 Non ALS: 0	No		X			
051	BH96_A_1.5		18/10/2021 12:19 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
052	BH96_A_1.75		18/10/2021 12:19 PM	Soil	ALS: 1 Non ALS: 0	No		X			
053	BH96_A_2.0		18/10/2021 12:19 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
054	BH96_A_2.25		18/10/2021 12:22 PM	Soil	ALS: 1 Non ALS: 0	No		X			

CHAIN OF CUSTODY

ALS COC#: **28846** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
055	BH96_A_2.5		18/10/2021 12:22 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
056	BH96_A_2.75		18/10/2021 12:23 PM	Soil	ALS: 1 Non ALS: 0	No		X			
057	BH96_A_3.0		18/10/2021 12:24 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
058	BH96_A_3.25		18/10/2021 12:24 PM	Soil	ALS: 1 Non ALS: 0	No		X			
059	BH96_A_3.5		18/10/2021 12:25 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
060	BH96_A_3.75		18/10/2021 12:26 PM	Soil	ALS: 1 Non ALS: 0	No		X			
061	BH96_A_4.0		18/10/2021 12:27 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
062	BH96_A_4.25		18/10/2021 12:29 PM	Soil	ALS: 1 Non ALS: 0	No		X			
063	BH96_A_4.5		18/10/2021 12:29 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
064	BH96_A_4.75		18/10/2021 12:30 PM	Soil	ALS: 1 Non ALS: 0	No		X			
065	BH96_A_5.0		18/10/2021 12:30 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
066	SQC046_A		18/10/2021 01:16 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
067	BH98_A_0.0		18/10/2021 01:17 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
068	BH98_A_0.25		18/10/2021 01:17 PM	Soil	ALS: 1 Non ALS: 0	No		X			
069	BH98_A_0.5		18/10/2021 01:18 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
070	BH98_A_0.75		18/10/2021 01:18 PM	Soil	ALS: 1 Non ALS: 0	No		X			
071	BH98_A_1.0		18/10/2021 01:19 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
072	BH98_A_1.25		18/10/2021 01:19 PM	Soil	ALS: 1 Non ALS: 0	No		X			

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
073	BH98_A_1.5		18/10/2021 01:20 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
074	BH98_A_1.75		18/10/2021 01:20 PM	Soil	ALS: 1 Non ALS: 0	No		X			
075	BH98_A_2.0		18/10/2021 01:21 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
076	BH98_A_2.25		18/10/2021 01:21 PM	Soil	ALS: 1 Non ALS: 0	No		X			
077	BH98_A_2.5		18/10/2021 01:22 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
078	BH98_A_2.75		18/10/2021 01:22 PM	Soil	ALS: 1 Non ALS: 0	No		X			
079	BH98_A_3.0		18/10/2021 01:23 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
080	BH98_A_3.25		18/10/2021 01:24 PM	Soil	ALS: 1 Non ALS: 0	No		X			
081	BH98_A_3.5		18/10/2021 01:24 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		

CHAIN OF CUSTODY

(ALS) COC#: 28846 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
082	BH98_A_3.75		18/10/2021 01:25 PM	Soil	ALS: 1 Non ALS: 0	No		X			
083	BH98_A_4.0		18/10/2021 01:25 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
084	BH98_A_4.25		18/10/2021 01:25 PM	Soil	ALS: 1 Non ALS: 0	No		X			
085	BH98_A_4.5		18/10/2021 01:26 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
086	BH98_A_4.75		18/10/2021 01:26 PM	Soil	ALS: 1 Non ALS: 0	No		X			
087	BH98_A_5.0		18/10/2021 01:27 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
088	RQC008		18/10/2021 01:52 PM	Water	ALS: 13 Non ALS: 0	Yes	-				

CHAIN OF CUSTODY

(ALS) COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH97_A_0.0_0.00-0.00	Snap Lock Bag - frozen	1 Medium	00130621071903	Green	No	
001	BH97_A_0.0_0.00-0.00	Snap Lock Bag - frozen	1 Medium	00130621071860	Green	No	
002	BH97_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071904	Green	No	
003	BH97_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071857	Green	No	
003	BH97_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071950	Green	No	
004	BH97_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071905	Green	No	
005	BH97_A_1	Snap Lock Bag - frozen	1 Medium	00130621071862	Green	No	
005	BH97_A_1	Snap Lock Bag - frozen	1 Medium	00130621071858	Green	No	
006	BH97_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071861	Green	No	
007	BH97_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071948	Green	No	
007	BH97_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071949	Green	No	
008	BH97_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071866	Green	No	
009	BH97_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071865	Green	No	
009	BH97_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071945	Green	No	
010	BH97_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071947	Green	No	
011	BH97_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071859	Green	No	
011	BH97_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071946	Green	No	
012	BH97_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071943	Green	No	
013	BH97_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071942	Green	No	
013	BH97_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071944	Green	No	
014	BH97_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071951	Green	No	
015	BH97_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071952	Green	No	
016	BH97_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071161	Green	No	
017	BH97_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071187	Green	No	
017	BH97_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071176	Green	No	
018	BH97_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071186	Green	No	

CHAIN OF CUSTODY

(ALS) COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

019	BH97_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071175	Green	No	
019	BH97_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071164	Green	No	
020	BH97_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071174	Green	No	
021	BH97_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071173	Green	No	
021	BH97_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071172	Green	No	
022	SQC044_A	Snap Lock Bag - frozen	1 Medium	00130621071205	Green	No	
022	SQC044_A	Snap Lock Bag - frozen	1 Medium	00130621071171	Green	No	
023	BH12_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071170	Green	No	
023	BH12_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071169	Green	No	
024	BH12_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071168	Green	No	
025	BH12_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071153	Green	No	
025	BH12_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071152	Green	No	
026	BH12_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071151	Green	No	
027	BH12_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071183	Green	No	
027	BH12_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071184	Green	No	
028	BH12_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071182	Green	No	
029	BH12_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071181	Green	No	
029	BH12_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071180	Green	No	
030	BH12_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071179	Green	No	
031	BH12_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071178	Green	No	
031	BH12_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621&41F84	Green	No	
032	BH12_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071185	Green	No	
033	BH12_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071192	Green	No	
033	BH12_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071191	Green	No	
034	BH12_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071190	Green	No	
035	BH12_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071189	Green	No	
035	BH12_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071188	Green	No	

CHAIN OF CUSTODY

(ALS) COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

036	BH12_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071202	Green	No	
037	BH12_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071201	Green	No	
037	BH12_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071200	Green	No	
038	BH12_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071199	Green	No	
039	BH12_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071198	Green	No	
039	BH12_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071197	Green	No	
040	BH12_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071196	Green	No	
041	BH12_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071195	Green	No	
041	BH12_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071194	Green	No	
042	BH12_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071193	Green	No	
043	BH12_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071203	Green	No	
043	BH12_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071204	Green	No	
044	SQC045_A	Snap Lock Bag - frozen	1 Medium	00130621071213	Green	No	
044	SQC045_A	Snap Lock Bag - frozen	1 Medium	00130621071214	Green	No	
045	BH96_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071212	Green	No	
045	BH96_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071211	Green	No	
046	BH96_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071247	Green	No	
047	BH96_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071246	Green	No	
047	BH96_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071210	Green	No	
048	BH96_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071207	Green	No	
049	BH96_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071245	Green	No	
049	BH96_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071244	Green	No	
050	BH96_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071243	Green	No	
051	BH96_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071242	Green	No	
051	BH96_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071241	Green	No	
052	BH96_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071215	Green	No	
053	BH96_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071206	Green	No	

CHAIN OF CUSTODY

(ALS) COC#: **28846** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

053	BH96_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071209	Green	No	
054	BH96_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071240	Green	No	
055	BH96_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071239	Green	No	
055	BH96_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071238	Green	No	
056	BH96_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071237	Green	No	
057	BH96_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071236	Green	No	
057	BH96_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071235	Green	No	
058	BH96_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071234	Green	No	
059	BH96_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071233	Green	No	
059	BH96_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071232	Green	No	
060	BH96_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071231	Green	No	
061	BH96_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071219	Green	No	
061	BH96_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071218	Green	No	
062	BH96_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071217	Green	No	
063	BH96_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071220	Green	No	
063	BH96_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071208	Green	No	
064	BH96_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071223	Green	No	
065	BH96_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071221	Green	No	
065	BH96_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071222	Green	No	
066	SQC046_A	Snap Lock Bag - frozen	1 Medium	00130220048666	Green	No	
066	SQC046_A	Snap Lock Bag - frozen	1 Medium	00130220048665	Green	No	
067	BH98_A_0.0	Snap Lock Bag - frozen	1 Medium	00130220048657	Green	No	
067	BH98_A_0.0	Snap Lock Bag - frozen	1 Medium	00130220048656	Green	No	
068	BH98_A_0.25	Snap Lock Bag - frozen	1 Medium	00130220048664	Green	No	
069	BH98_A_0.5	Snap Lock Bag - frozen	1 Medium	00130220048663	Green	No	
069	BH98_A_0.5	Snap Lock Bag - frozen	1 Medium	00130220048662	Green	No	
070	BH98_A_0.75	Snap Lock Bag - frozen	1 Medium	00130220048661	Green	No	

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

071	BH98_A_1.0	Snap Lock Bag - frozen	1 Medium	00130220048660	Green	No	
071	BH98_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071224	Green	No	
072	BH98_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071230	Green	No	
073	BH98_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071229	Green	No	
073	BH98_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071228	Green	No	
074	BH98_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071227	Green	No	
075	BH98_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071226	Green	No	
075	BH98_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071225	Green	No	
076	BH98_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071216	Green	No	
077	BH98_A_2.5	Snap Lock Bag - frozen	1 Medium	00130220048673	Green	No	
077	BH98_A_2.5	Snap Lock Bag - frozen	1 Medium	00130220048672	Green	No	
078	BH98_A_2.75	Snap Lock Bag - frozen	1 Medium	00130220048671	Green	No	
079	BH98_A_3.0	Snap Lock Bag - frozen	1 Medium	00130220048670	Green	No	
079	BH98_A_3.0	Snap Lock Bag - frozen	1 Medium	00130220048669	Green	No	
080	BH98_A_3.25	Snap Lock Bag - frozen	1 Medium	00130220048668	Green	No	
081	BH98_A_3.5	Snap Lock Bag - frozen	1 Medium	00130220048674	Green	No	
081	BH98_A_3.5	Snap Lock Bag - frozen	1 Medium	00130220048667	Green	No	
082	BH98_A_3.75	Snap Lock Bag - frozen	1 Medium	00130220048714	Green	No	
083	BH98_A_4.0	Snap Lock Bag - frozen	1 Medium	00130220048712	Green	No	
083	BH98_A_4.0	Snap Lock Bag - frozen	1 Medium	00130220048711	Green	No	
084	BH98_A_4.25	Snap Lock Bag - frozen	1 Medium	00130220048710	Green	No	
085	BH98_A_4.5	Snap Lock Bag - frozen	1 Medium	00130220048709	Green	No	
085	BH98_A_4.5	Snap Lock Bag - frozen	1 Medium	00130220048708	Green	No	
086	BH98_A_4.75	Snap Lock Bag - frozen	1 Medium	00130220048715	Green	No	
087	BH98_A_5.0	Snap Lock Bag - frozen	1 Medium	00130220048716	Green	No	
087	BH98_A_5.0	Snap Lock Bag - frozen	1 Medium	00130220048713	Green	No	
088	RQC008	Amber Glass Bottle - Unpreserved	100 mL	00400321003455	Orange	No	

CHAIN OF CUSTODY

(ALS) COC#: **28846** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

088	RQC008	Amber Glass Bottle - Unpreserved	100 mL	00400321003472	Orange	No	
088	RQC008	Amber Bottle Unpreserved for Specialist Organics	100 mL	00320219006242	Green / White	No	
088	RQC008	Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified	60 mL	00382005064670	Red/Green	No	
088	RQC008	Clear Plastic Bottle - NaOH	60 mL	00140321009903	Blue	No	
088	RQC008	Clear Plastic Bottle - Natural	125 mL	00070220075829	Green	No	
088	RQC008	Clear Plastic Bottle - Natural	125 mL	00070220075908	Green	No	
088	RQC008	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100621081128	Purple	No	
088	RQC008	Amber VOC Vial - Sulfuric Acid	40 mL	00160621019475	Purple	No	
088	RQC008	Amber VOC Vial - Sulfuric Acid	40 mL	00160621019542	Purple	No	
088	RQC008	Amber Glass Bottle - Unpreserved	100 mL	00400321003473	Orange	No	
088	RQC008	Amber VOC Vial - Sulfuric Acid	40 mL	00160621019845	Purple	No	
088	RQC008	Amber VOC Vial - Sulfuric Acid	40 mL	00160621019428	Purple	No	

Total Bottle Count: ALS: 146, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2112543**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 4
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 18-Oct-2021 17:20	Issue Date	: 19-Oct-2021
Client Requested Due Date	: 02-Nov-2021	Scheduled Reporting Date	: **02-Nov-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 19.7/17.7
Receipt Detail	:	No. of samples received / analysed	: 44 / 43

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Please note that your submission has been split into several Work Orders EP2112538 and EP2112543 to facilitate the regular delivery of data.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2112543-045	18-Oct-2021 12:07	BH96_A_0.0	✓	✓
EP2112543-046	18-Oct-2021 12:15	BH96_A_0.25		✓
EP2112543-047	18-Oct-2021 12:15	BH96_A_0.5	✓	✓
EP2112543-048	18-Oct-2021 12:17	BH96_A_0.75		✓
EP2112543-049	18-Oct-2021 12:17	BH96_A_1.0	✓	✓
EP2112543-050	18-Oct-2021 12:18	BH96_A_1.25		✓
EP2112543-051	18-Oct-2021 12:19	BH96_A_1.5	✓	✓
EP2112543-052	18-Oct-2021 12:19	BH96_A_1.75		✓
EP2112543-053	18-Oct-2021 12:19	BH96_A_2.0	✓	✓
EP2112543-054	18-Oct-2021 12:22	BH96_A_2.25		✓
EP2112543-055	18-Oct-2021 12:22	BH96_A_2.5	✓	✓
EP2112543-056	18-Oct-2021 12:23	BH96_A_2.75		✓
EP2112543-057	18-Oct-2021 12:24	BH96_A_3.0	✓	✓
EP2112543-058	18-Oct-2021 12:24	BH96_A_3.25		✓
EP2112543-059	18-Oct-2021 12:25	BH96_A_3.5	✓	✓
EP2112543-060	18-Oct-2021 12:26	BH96_A_3.75		✓
EP2112543-061	18-Oct-2021 12:27	BH96_A_4.0	✓	✓
EP2112543-062	18-Oct-2021 12:29	BH96_A_4.25		✓
EP2112543-063	18-Oct-2021 12:29	BH96_A_4.5	✓	✓
EP2112543-064	18-Oct-2021 12:30	BH96_A_4.75		✓
EP2112543-065	18-Oct-2021 12:30	BH96_A_5.0	✓	✓
EP2112543-066	18-Oct-2021 13:16	SQC046_A	✓	✓
EP2112543-067	18-Oct-2021 13:17	BH98_A_0.0	✓	✓
EP2112543-068	18-Oct-2021 13:17	BH98_A_0.25		✓
EP2112543-069	18-Oct-2021 13:18	BH98_A_0.5	✓	✓
EP2112543-070	18-Oct-2021 13:18	BH98_A_0.75		✓
EP2112543-071	18-Oct-2021 13:19	BH98_A_1.0	✓	✓
EP2112543-072	18-Oct-2021 13:19	BH98_A_1.25		✓
EP2112543-073	18-Oct-2021 13:20	BH98_A_1.5	✓	✓
EP2112543-074	18-Oct-2021 13:20	BH98_A_1.75		✓
EP2112543-075	18-Oct-2021 13:21	BH98_A_2.0	✓	✓
EP2112543-076	18-Oct-2021 13:21	BH98_A_2.25		✓
EP2112543-077	18-Oct-2021 13:22	BH98_A_2.5	✓	✓
EP2112543-078	18-Oct-2021 13:22	BH98_A_2.75		✓
EP2112543-079	18-Oct-2021 13:23	BH98_A_3.0	✓	✓

			SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2112543-080	18-Oct-2021 13:24	BH98_A_3.25		✓
EP2112543-081	18-Oct-2021 13:24	BH98_A_3.5	✓	✓
EP2112543-082	18-Oct-2021 13:25	BH98_A_3.75		✓
EP2112543-083	18-Oct-2021 13:25	BH98_A_4.0	✓	✓
EP2112543-084	18-Oct-2021 13:25	BH98_A_4.25		✓
EP2112543-085	18-Oct-2021 13:26	BH98_A_4.5	✓	✓
EP2112543-086	18-Oct-2021 13:26	BH98_A_4.75		✓
EP2112543-087	18-Oct-2021 13:27	BH98_A_5.0	✓	✓

Matrix: **WATER**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	(On Hold) WATER No analysis requested
EP2112543-088	18-Oct-2021 13:52	RQC008	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ARCADIS ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Nixon Edward

- A4 - AU Tax Invoice (INV)	Email	Nixon.Edward@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2112543**	Page	: 1 of 11
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 18-Oct-2021 17:20
Order number	: 30058301	Date Analysis Commenced	: 20-Oct-2021
C-O-C number	: ----	Issue Date	: 02-Nov-2021 16:56
Sampler	: ----		
Site	: ----		
Quote number	: EP/529/21_V4		
No. of samples received	: 44		
No. of samples analysed	: 43		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Laboratory Manager (Perth)	Perth ASS, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH96_A_0.0	BH96_A_0.25	BH96_A_0.5	BH96_A_0.75	BH96_A_1.0
			Sampling date / time	18-Oct-2021 12:07	18-Oct-2021 12:15	18-Oct-2021 12:15	18-Oct-2021 12:17	18-Oct-2021 12:17
Compound	CAS Number	LOR	Unit	EP2112543-045	EP2112543-046	EP2112543-047	EP2112543-048	EP2112543-049
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.1**	**----**	**4.8**	**----**	**5.4**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**101**	**----**	**112**	**----**	**53**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.16**	**----**	**0.18**	**----**	**0.08**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.007**	**----**	**0.007**	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.17**	**----**	**0.19**	**----**	**0.09**
Net Acidity (acidity units)	----	10	mole H+ / t	**105**	**----**	**117**	**----**	**55**
Liming Rate	----	1	kg CaCO3/t	**8**	**----**	**9**	**----**	**4**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.17**	**----**	**0.19**	**----**	**0.09**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**105**	**----**	**117**	**----**	**55**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**8**	**----**	**9**	**----**	**4**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.7**	**5.5**	**5.4**	**5.4**	**5.6**
pH (Fox)	----	0.1	pH Unit	**3.8**	**3.4**	**3.7**	**3.8**	**3.8**
Reaction Rate	----	1	-	**Extreme**	**Extreme**	**Extreme**	**Extreme**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH96_A_1.25	BH96_A_1.5	BH96_A_1.75	BH96_A_2.0	BH96_A_2.25
			Sampling date / time	18-Oct-2021 12:18	18-Oct-2021 12:19	18-Oct-2021 12:19	18-Oct-2021 12:19	18-Oct-2021 12:22
Compound	CAS Number	LOR	Unit	EP2112543-050	EP2112543-051	EP2112543-052	EP2112543-053	EP2112543-054
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.8	----	5.7	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	11	----	8	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	15	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	15	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.3	6.3	6.2	6.4	6.0
pH (Fox)	----	0.1	pH Unit	4.2	3.7	4.0	4.2	4.3
Reaction Rate	----	1	-	Strong	Moderate	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH96_A_2.5	BH96_A_2.75	BH96_A_3.0	BH96_A_3.25	BH96_A_3.5
			Sampling date / time	18-Oct-2021 12:22	18-Oct-2021 12:23	18-Oct-2021 12:24	18-Oct-2021 12:24	18-Oct-2021 12:25
Compound	CAS Number	LOR	Unit	EP2112543-055	EP2112543-056	EP2112543-057	EP2112543-058	EP2112543-059
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.8**	**----**	**5.7**	**----**	**5.5**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**5**	**----**	**4**	**----**	**8**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	**1**	**----**	<1	**----**	**1**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	**----**	<1	**----**	**1**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.0**	**6.0**	**6.0**	**6.0**	**5.7**
pH (Fox)	----	0.1	pH Unit	**4.7**	**5.3**	**4.3**	**4.3**	**4.2**
Reaction Rate	----	1	-	**Strong**	**Strong**	**Strong**	**Strong**	**Strong**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH96_A_3.75	BH96_A_4.0	BH96_A_4.25	BH96_A_4.5	BH96_A_4.75
			Sampling date / time	18-Oct-2021 12:26	18-Oct-2021 12:27	18-Oct-2021 12:29	18-Oct-2021 12:29	18-Oct-2021 12:30
Compound	CAS Number	LOR	Unit	EP2112543-060	EP2112543-061	EP2112543-062	EP2112543-063	EP2112543-064
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.4	----	5.7	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	9	----	5	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.9	6.1	6.1	6.0	6.0
pH (Fox)	----	0.1	pH Unit	4.6	3.8	4.7	4.5	5.2
Reaction Rate	----	1	-	Strong	Moderate	Moderate	Moderate	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH96_A_5.0	SQC046_A	BH98_A_0.0	BH98_A_0.25	BH98_A_0.5
			Sampling date / time	18-Oct-2021 12:30	18-Oct-2021 13:16	18-Oct-2021 13:17	18-Oct-2021 13:17	18-Oct-2021 13:18
Compound	CAS Number	LOR	Unit	EP2112543-065	EP2112543-066	EP2112543-067	EP2112543-068	EP2112543-069
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.1	5.2	5.3	----	5.8
Titratable Actual Acidity (23F)	----	2	mole H+ / t	16	64	76	----	22
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.03	0.10	0.12	----	0.04
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.006	0.009	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.03	0.11	0.13	----	0.03
Net Acidity (acidity units)	----	10	mole H+ / t	18	68	81	----	21
Liming Rate	----	1	kg CaCO3/t	1	5	6	----	2
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.03	0.11	0.13	----	0.03
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	18	68	81	----	21
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	5	6	----	2
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.0	6.3	6.0	6.5	6.9
pH (Fox)	----	0.1	pH Unit	5.1	4.6	3.8	4.2	4.6
Reaction Rate	----	1	-	Strong	Extreme	Extreme	Extreme	Extreme

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH98_A_0.75	BH98_A_1.0	BH98_A_1.25	BH98_A_1.5	BH98_A_1.75
			Sampling date / time	18-Oct-2021 13:18	18-Oct-2021 13:19	18-Oct-2021 13:19	18-Oct-2021 13:20	18-Oct-2021 13:20
Compound	CAS Number	LOR	Unit	EP2112543-070	EP2112543-071	EP2112543-072	EP2112543-073	EP2112543-074
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.9	----	5.9	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	13	----	11	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.02	----	0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.02	----	0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	15	----	14	----
Liming Rate	----	1	kg CaCO3/t	----	1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.02	----	0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	15	----	14	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.5	6.2	6.0	6.0	6.1
pH (Fox)	----	0.1	pH Unit	4.5	4.9	4.6	5.1	4.6
Reaction Rate	----	1	-	Extreme	Extreme	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH98_A_2.0	BH98_A_2.25	BH98_A_2.5	BH98_A_2.75	BH98_A_3.0
			Sampling date / time	18-Oct-2021 13:21	18-Oct-2021 13:21	18-Oct-2021 13:22	18-Oct-2021 13:22	18-Oct-2021 13:23
Compound	CAS Number	LOR	Unit	EP2112543-075	EP2112543-076	EP2112543-077	EP2112543-078	EP2112543-079
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.8	----	5.9	----	5.6
Titratable Actual Acidity (23F)	----	2	mole H+ / t	11	----	8	----	12
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.02	----	<0.02	----	0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.02	----	<0.02	----	0.02
Net Acidity (acidity units)	----	10	mole H+ / t	14	----	<10	----	14
Liming Rate	----	1	kg CaCO3/t	1	----	1	----	1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.02	----	<0.02	----	0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	14	----	<10	----	14
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	----	1	----	1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.1	6.1	6.0	6.2	6.0
pH (Fox)	----	0.1	pH Unit	4.8	5.2	4.6	4.5	4.3
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH98_A_3.25	BH98_A_3.5	BH98_A_3.75	BH98_A_4.0	BH98_A_4.25
			Sampling date / time	18-Oct-2021 13:24	18-Oct-2021 13:24	18-Oct-2021 13:25	18-Oct-2021 13:25	18-Oct-2021 13:25
Compound	CAS Number	LOR	Unit	EP2112543-080	EP2112543-081	EP2112543-082	EP2112543-083	EP2112543-084
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.3	----	5.1	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	16	----	21	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.03	----	0.03	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.03	----	0.03	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	17	----	21	----
Liming Rate	----	1	kg CaCO3/t	----	1	----	2	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.03	----	0.03	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	17	----	21	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	----	2	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.1	6.0	5.8	5.6	5.4
pH (Fox)	----	0.1	pH Unit	4.0	4.2	4.6	4.9	4.4
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH98_A_4.5	BH98_A_4.75	BH98_A_5.0	----	----
			Sampling date / time	18-Oct-2021 13:26	18-Oct-2021 13:26	18-Oct-2021 13:27	----	----
Compound	CAS Number	LOR	Unit	EP2112543-085	EP2112543-086	EP2112543-087	--------	--------
				Result	Result	Result	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.5**	----	**5.3**	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**11**	----	**14**	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.02**	----	**0.02**	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	**1.5**	----	----
Net Acidity (sulfur units)	----	0.02	% S	**0.02**	----	**0.02**	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	**12**	----	**15**	----	----
Liming Rate	----	1	kg CaCO3/t	**1**	----	**1**	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.02**	----	**0.02**	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**12**	----	**15**	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	----	**1**	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.1**	**5.2**	**5.4**	----	----
pH (Fox)	----	0.1	pH Unit	**4.2**	**4.2**	**4.1**	----	----
Reaction Rate	----	1	-	**Strong**	**Strong**	**Strong**	----	----

QUALITY CONTROL REPORT

Work Order	: **EP2112543**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 18-Oct-2021
Order number	: 30058301	Date Analysis Commenced	: 20-Oct-2021
C-O-C number	: ----	Issue Date	: 02-Nov-2021
Sampler	: ----		
Site	: ----		
Quote number	: EP/529/21_V4		
No. of samples received	: 44		
No. of samples analysed	: 43		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Laboratory Manager (Perth)	Perth ASS, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3982717)									
EP2112543-045	BH96_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.16	0.16	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	101	101	0.0	0% - 20%
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.1	5.0	0.0	0% - 20%
EP2112543-065	BH96_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.03	0.03	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	16	16	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.1	5.0	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 3982718)									
EP2112543-083	BH98_A_4.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.03	0.03	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	21	21	0.0	0% - 50%
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.1	5.1	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3982717)									
EP2112543-045	BH96_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.007	<0.005	33.3	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2112543-065	BH96_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 3982718)									
EP2112543-083	BH98_A_4.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3982717)									
EP2112543-045	BH96_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.17	0.17	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-E: Acid Base Accounting (QC Lot: 3982717) - continued									
EP2112543-045	BH96_A_0.0	EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.17	0.17	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	8	8	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	8	8	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	105	103	1.9	0% - 50%
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	105	103	1.9	0% - 50%
EP2112543-065	BH96_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.03	0.03	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.03	0.03	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	18	19	5.4	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	18	19	5.4	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3982718)									
EP2112543-083	BH98_A_4.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.03	0.03	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.03	0.03	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	2	1	66.7	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	2	1	66.7	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	21	20	4.9	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	21	20	4.9	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3974471)									
EP2112543-045	BH96_A_0.0	EA037: pH (F)	----	0.1	pH Unit	5.7	5.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.8	3.7	0.0	0% - 20%
EP2112543-054	BH96_A_2.25	EA037: pH (F)	----	0.1	pH Unit	6.0	6.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.3	4.2	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3974472)									
EP2112543-065	BH96_A_5.0	EA037: pH (F)	----	0.1	pH Unit	6.0	6.1	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.1	5.1	0.0	0% - 20%
EP2112543-074	BH98_A_1.75	EA037: pH (F)	----	0.1	pH Unit	6.1	6.1	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.6	4.6	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3974473)									
EP2112543-085	BH98_A_4.5	EA037: pH (F)	----	0.1	pH Unit	5.1	5.1	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.2	4.3	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3982717)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	96.2	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 3982718)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	96.0	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3982717)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	91.1	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3982718)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	106	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3982717)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3982718)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2112543**	Page	: 1 of 6
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 18-Oct-2021
Site	: ----	Issue Date	: 02-Nov-2021
Sampler	: ----	No. of samples received	: 44
Order number	: 30058301	No. of samples analysed	: 43

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen (EA033)							
BH96_A_0.0, BH96_A_0.5, BH96_A_1.0, BH96_A_1.5, BH96_A_2.0, BH96_A_2.5, BH96_A_3.0, BH96_A_3.5, BH96_A_4.0, BH96_A_4.5, BH96_A_5.0, SQC046_A, BH98_A_0.0, BH98_A_0.5, BH98_A_1.0, BH98_A_1.5, BH98_A_2.0, BH98_A_2.5, BH98_A_3.0, BH98_A_3.5, BH98_A_4.0, BH98_A_4.5, BH98_A_5.0	**18-Oct-2021**	**25-Oct-2021**	18-Oct-2022	✓	**02-Nov-2021**	23-Jan-2022	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen (EA033)							
BH96_A_0.0, BH96_A_0.5, BH96_A_1.0, BH96_A_1.5, BH96_A_2.0, BH96_A_2.5, BH96_A_3.0, BH96_A_3.5, BH96_A_4.0, BH96_A_4.5, BH96_A_5.0, SQC046_A, BH98_A_0.0, BH98_A_0.5, BH98_A_1.0, BH98_A_1.5, BH98_A_2.0, BH98_A_2.5, BH98_A_3.0, BH98_A_3.5, BH98_A_4.0, BH98_A_4.5, BH98_A_5.0	**18-Oct-2021**	**25-Oct-2021**	18-Oct-2022	✓	**02-Nov-2021**	23-Jan-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA033)							
BH96_A_0.0, BH96_A_0.5, BH96_A_1.0, BH96_A_1.5, BH96_A_2.0, BH96_A_2.5, BH96_A_3.0, BH96_A_3.5, BH96_A_4.0, BH96_A_4.5, BH96_A_5.0, SQC046_A, BH98_A_0.0, BH98_A_0.5, BH98_A_1.0, BH98_A_1.5, BH98_A_2.0, BH98_A_2.5, BH98_A_3.0, BH98_A_3.5, BH98_A_4.0, BH98_A_4.5, BH98_A_5.0	**18-Oct-2021**	**25-Oct-2021**	18-Oct-2022	✓	**02-Nov-2021**	23-Jan-2022	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen (EA033)							
BH96_A_0.0, BH96_A_0.5, BH96_A_1.0, BH96_A_1.5, BH96_A_2.0, BH96_A_2.5, BH96_A_3.0, BH96_A_3.5, BH96_A_4.0, BH96_A_4.5, BH96_A_5.0, SQC046_A, BH98_A_0.0, BH98_A_0.5, BH98_A_1.0, BH98_A_1.5, BH98_A_2.0, BH98_A_2.5, BH98_A_3.0, BH98_A_3.5, BH98_A_4.0, BH98_A_4.5, BH98_A_5.0	**18-Oct-2021**	**25-Oct-2021**	18-Oct-2022	✓	**02-Nov-2021**	23-Jan-2022	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen (EA033)							
BH96_A_0.0, BH96_A_0.5, BH96_A_1.0, BH96_A_1.5, BH96_A_2.0, BH96_A_2.5, BH96_A_3.0, BH96_A_3.5, BH96_A_4.0, BH96_A_4.5, BH96_A_5.0, SQC046_A, BH98_A_0.0, BH98_A_0.5, BH98_A_1.0, BH98_A_1.5, BH98_A_2.0, BH98_A_2.5, BH98_A_3.0, BH98_A_3.5, BH98_A_4.0, BH98_A_4.5, BH98_A_5.0	**18-Oct-2021**	**25-Oct-2021**	18-Oct-2022	✓	**02-Nov-2021**	23-Jan-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH96_A_0.0,	BH96_A_0.25,	**18-Oct-2021**	**20-Oct-2021**	16-Apr-2022	✓	**20-Oct-2021**	16-Apr-2022	✓
BH96_A_0.5,	BH96_A_0.75,							
BH96_A_1.0,	BH96_A_1.25,							
BH96_A_1.5,	BH96_A_1.75,							
BH96_A_2.0,	BH96_A_2.25,							
BH96_A_2.5,	BH96_A_2.75,							
BH96_A_3.0,	BH96_A_3.25,							
BH96_A_3.5,	BH96_A_3.75,							
BH96_A_4.0,	BH96_A_4.25,							
BH96_A_4.5,	BH96_A_4.75,							
BH96_A_5.0,	SQC046_A,							
BH98_A_0.0,	BH98_A_0.25,							
BH98_A_0.5,	BH98_A_0.75,							
BH98_A_1.0,	BH98_A_1.25,							
BH98_A_1.5,	BH98_A_1.75,							
BH98_A_2.0,	BH98_A_2.25,							
BH98_A_2.5,	BH98_A_2.75,							
BH98_A_3.0,	BH98_A_3.25,							
BH98_A_3.5,	BH98_A_3.75,							
BH98_A_4.0,	BH98_A_4.25,							
BH98_A_4.5,	BH98_A_4.75,							
BH98_A_5.0								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	5	43	**11.63**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	23	**13.04**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	23	**8.70**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	23	**8.70**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2112538

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: GEMBI **Client:** ARCADIS **Project Manager:** BRUNO

Phone: ( )

ALS Compass COC Reference: 88696 **# Samples:** 88 **Sampler:** NICOLAS S

Phone: (+32 471 73 1618)

Turnaround Requirements: Standard _____ Urgent _____

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	(N/A)
	Free ice / frozen ice bricks upon receipt?	(YES)	NO	N/A
	Random sample temperature on receipt?	19.7/17.7°C		

Custody:

Relinquished by:	**Received by:** SP	**Relinquished by:**	**Received by:**
Date / Time:	**Date / Time:** 1720 18/10/21	**Date / Time:**	**Date / Time:**

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

RELINQUISHED BY:	RECEIVED BY: SP	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 19/10/21 1600	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? (Yes) No N/A

Random Sample Temperature on Receipt: 20.7/17.7 °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH97_A_0.0_0.00-0.00		18/10/2021 09:12 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
002	BH97_A_0.25		18/10/2021 09:32 AM	Soil	ALS: 1 Non ALS: 0	No		X			
003	BH97_A_0.5		18/10/2021 09:33 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
004	BH97_A_0.75		18/10/2021 09:34 AM	Soil	ALS: 1 Non ALS: 0	No		X			
005	BH97_A_1		18/10/2021 09:34 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
006	BH97_A_1.25		18/10/2021 09:35 AM	Soil	ALS: 1 Non ALS: 0	No		X			
007	BH97_A_1.5		18/10/2021 09:46 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
008	BH97_A_1.75		18/10/2021 09:46 AM	Soil	ALS: 1 Non ALS: 0	No		X			
009	BH97_A_2.0		18/10/2021 09:48 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		

CHAIN OF CUSTODY

(ALS) COC#: 28846 *ALS Laboratory:* EP Perth

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH97_A_2.25		18/10/2021 09:49 AM	Soil	ALS: 1 Non ALS: 0	No		X			
011	BH97_A_2.5		18/10/2021 09:50 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
012	BH97_A_2.75		18/10/2021 09:51 AM	Soil	ALS: 1 Non ALS: 0	No		X			
013	BH97_A_3.0		18/10/2021 09:51 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
014	BH97_A_3.25		18/10/2021 09:52 AM	Soil	ALS: 1 Non ALS: 0	No		X			
015	BH97_A_3.5		18/10/2021 09:53 AM	Soil	ALS: 1 Non ALS: 0	No		X	X		
016	BH97_A_3.75		18/10/2021 10:01 AM	Soil	ALS: 1 Non ALS: 0	No		X			
017	BH97_A_4.0		18/10/2021 10:03 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
018	BH97_A_4.25		18/10/2021 10:03 AM	Soil	ALS: 1 Non ALS: 0	No		X			

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH97_A_4.5		18/10/2021 10:04 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
020	BH97_A_4.75		18/10/2021 10:05 AM	Soil	ALS: 1 Non ALS: 0	No		X			
021	BH97_A_5.0		18/10/2021 10:05 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
022	SQC044_A		18/10/2021 10:30 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
023	BH12_A_0.0		18/10/2021 10:35 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
024	BH12_A_0.25		18/10/2021 10:36 AM	Soil	ALS: 1 Non ALS: 0	No		X			
025	BH12_A_0.5		18/10/2021 10:37 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
026	BH12_A_0.75		18/10/2021 10:38 AM	Soil	ALS: 1 Non ALS: 0	No		X			
027	BH12_A_1.0		18/10/2021 10:39 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		

CHAIN OF CUSTODY

ALS COC#: 28846 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

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TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH12_A_1.25		18/10/2021 10:40 AM	Soil	ALS: 1 Non ALS: 0	No		X			
029	BH12_A_1.5		18/10/2021 10:41 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
030	BH12_A_1.75		18/10/2021 10:42 AM	Soil	ALS: 1 Non ALS: 0	No		X			
031	BH12_A_2.0		18/10/2021 10:43 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
032	BH12_A_2.25		18/10/2021 10:44 AM	Soil	ALS: 1 Non ALS: 0	No		X			
033	BH12_A_2.5		18/10/2021 10:45 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
034	BH12_A_2.75		18/10/2021 10:45 AM	Soil	ALS: 1 Non ALS: 0	No		X			
035	BH12_A_3.0		18/10/2021 10:46 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
036	BH12_A_3.25		18/10/2021 10:47 AM	Soil	ALS: 1 Non ALS: 0	No		X			

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

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ORDER NO: 30058301

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
037	BH12_A_3.5		18/10/2021 10:49 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
038	BH12_A_3.75		18/10/2021 10:50 AM	Soil	ALS: 1 Non ALS: 0	No		X			
039	BH12_A_4.0		18/10/2021 10:50 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
040	BH12_A_4.25		18/10/2021 10:51 AM	Soil	ALS: 1 Non ALS: 0	No		X			
041	BH12_A_4.5		18/10/2021 10:52 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
042	BH12_A_4.75		18/10/2021 10:52 AM	Soil	ALS: 1 Non ALS: 0	No		X			
043	BH12_A_5.0		18/10/2021 10:53 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
044	SQC045_A		18/10/2021 11:34 AM	Soil	ALS: 2 Non ALS: 0	No		X	X		
045	BH96_A_0.0		18/10/2021 12:07 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		

CHAIN OF CUSTODY

(ALS) COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

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ORDER NO: 30058301

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SAMPLER MOBILE:

/ EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
046	BH96_A_0.25		18/10/2021 12:15 PM	Soil	ALS: 1 Non ALS: 0	No		X			
047	BH96_A_0.5		18/10/2021 12:15 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
048	BH96_A_0.75		18/10/2021 12:17 PM	Soil	ALS: 1 Non ALS: 0	No		X			
049	BH96_A_1.0		18/10/2021 12:17 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
050	BH96_A_1.25		18/10/2021 12:18 PM	Soil	ALS: 1 Non ALS: 0	No		X			
051	BH96_A_1.5		18/10/2021 12:19 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
052	BH96_A_1.75		18/10/2021 12:19 PM	Soil	ALS: 1 Non ALS: 0	No		X			
053	BH96_A_2.0		18/10/2021 12:19 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
054	BH96_A_2.25		18/10/2021 12:22 PM	Soil	ALS: 1 Non ALS: 0	No		X			

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
055	BH96_A_2.5		18/10/2021 12:22 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
056	BH96_A_2.75		18/10/2021 12:23 PM	Soil	ALS: 1 Non ALS: 0	No		X			
057	BH96_A_3.0		18/10/2021 12:24 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
058	BH96_A_3.25		18/10/2021 12:24 PM	Soil	ALS: 1 Non ALS: 0	No		X			
059	BH96_A_3.5		18/10/2021 12:25 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
060	BH96_A_3.75		18/10/2021 12:26 PM	Soil	ALS: 1 Non ALS: 0	No		X			
061	BH96_A_4.0		18/10/2021 12:27 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
062	BH96_A_4.25		18/10/2021 12:29 PM	Soil	ALS: 1 Non ALS: 0	No		X			
063	BH96_A_4.5		18/10/2021 12:29 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

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DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
064	BH96_A_4.75		18/10/2021 12:30 PM	Soil	ALS: 1 Non ALS: 0	No		X			
065	BH96_A_5.0		18/10/2021 12:30 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
066	SQC046_A		18/10/2021 01:16 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
067	BH98_A_0.0		18/10/2021 01:17 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
068	BH98_A_0.25		18/10/2021 01:17 PM	Soil	ALS: 1 Non ALS: 0	No		X			
069	BH98_A_0.5		18/10/2021 01:18 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
070	BH98_A_0.75		18/10/2021 01:18 PM	Soil	ALS: 1 Non ALS: 0	No		X			
071	BH98_A_1.0		18/10/2021 01:19 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
072	BH98_A_1.25		18/10/2021 01:19 PM	Soil	ALS: 1 Non ALS: 0	No		X			

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

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DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
073	BH98_A_1.5		18/10/2021 01:20 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
074	BH98_A_1.75		18/10/2021 01:20 PM	Soil	ALS: 1 Non ALS: 0	No		X			
075	BH98_A_2.0		18/10/2021 01:21 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
076	BH98_A_2.25		18/10/2021 01:21 PM	Soil	ALS: 1 Non ALS: 0	No		X			
077	BH98_A_2.5		18/10/2021 01:22 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
078	BH98_A_2.75		18/10/2021 01:22 PM	Soil	ALS: 1 Non ALS: 0	No		X			
079	BH98_A_3.0		18/10/2021 01:23 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
080	BH98_A_3.25		18/10/2021 01:24 PM	Soil	ALS: 1 Non ALS: 0	No		X			
081	BH98_A_3.5		18/10/2021 01:24 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		

CHAIN OF CUSTODY

(ALS) COC#: **28846** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
082	BH98_A_3.75		18/10/2021 01:25 PM	Soil	ALS: 1 Non ALS: 0	No		X			
083	BH98_A_4.0		18/10/2021 01:25 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
084	BH98_A_4.25		18/10/2021 01:25 PM	Soil	ALS: 1 Non ALS: 0	No		X			
085	BH98_A_4.5		18/10/2021 01:26 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
086	BH98_A_4.75		18/10/2021 01:26 PM	Soil	ALS: 1 Non ALS: 0	No		X			
087	BH98_A_5.0		18/10/2021 01:27 PM	Soil	ALS: 2 Non ALS: 0	No		X	X		
088	RQC008		18/10/2021 01:52 PM	Water	ALS: 13 Non ALS: 0	Yes	-				

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

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DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH97_A_0.0_0.00-0.00	Snap Lock Bag - frozen	1 Medium	00130621071903	Green	No	
001	BH97_A_0.0_0.00-0.00	Snap Lock Bag - frozen	1 Medium	00130621071860	Green	No	
002	BH97_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071904	Green	No	
003	BH97_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071857	Green	No	
003	BH97_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071950	Green	No	
004	BH97_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071905	Green	No	
005	BH97_A_1	Snap Lock Bag - frozen	1 Medium	00130621071862	Green	No	
005	BH97_A_1	Snap Lock Bag - frozen	1 Medium	00130621071858	Green	No	
006	BH97_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071861	Green	No	
007	BH97_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071948	Green	No	
007	BH97_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071949	Green	No	
008	BH97_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071866	Green	No	
009	BH97_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071865	Green	No	
009	BH97_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071945	Green	No	
010	BH97_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071947	Green	No	
011	BH97_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071859	Green	No	
011	BH97_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071946	Green	No	
012	BH97_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071943	Green	No	
013	BH97_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071942	Green	No	
013	BH97_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071944	Green	No	
014	BH97_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071951	Green	No	
015	BH97_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071952	Green	No	
016	BH97_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071161	Green	No	
017	BH97_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071187	Green	No	
017	BH97_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071176	Green	No	
018	BH97_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071186	Green	No	

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

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TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

019	BH97_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071175	Green	No	
019	BH97_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071164	Green	No	
020	BH97_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071174	Green	No	
021	BH97_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071173	Green	No	
021	BH97_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071172	Green	No	
022	SQC044_A	Snap Lock Bag - frozen	1 Medium	00130621071205	Green	No	
022	SQC044_A	Snap Lock Bag - frozen	1 Medium	00130621071171	Green	No	
023	BH12_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071170	Green	No	
023	BH12_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071169	Green	No	
024	BH12_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071168	Green	No	
025	BH12_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071153	Green	No	
025	BH12_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071152	Green	No	
026	BH12_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071151	Green	No	
027	BH12_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071183	Green	No	
027	BH12_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071184	Green	No	
028	BH12_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071182	Green	No	
029	BH12_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071181	Green	No	
029	BH12_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071180	Green	No	
030	BH12_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071179	Green	No	
031	BH12_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071178	Green	No	
031	BH12_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621&41F84	Green	No	
032	BH12_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071185	Green	No	
033	BH12_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071192	Green	No	
033	BH12_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071191	Green	No	
034	BH12_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071190	Green	No	
035	BH12_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071189	Green	No	
035	BH12_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071188	Green	No	

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

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TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

036	BH12_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071202	Green	No	
037	BH12_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071201	Green	No	
037	BH12_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071200	Green	No	
038	BH12_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071199	Green	No	
039	BH12_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071198	Green	No	
039	BH12_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071197	Green	No	
040	BH12_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071196	Green	No	
041	BH12_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071195	Green	No	
041	BH12_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071194	Green	No	
042	BH12_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071193	Green	No	
043	BH12_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071203	Green	No	
043	BH12_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071204	Green	No	
044	SQC045_A	Snap Lock Bag - frozen	1 Medium	00130621071213	Green	No	
044	SQC045_A	Snap Lock Bag - frozen	1 Medium	00130621071214	Green	No	
045	BH96_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071212	Green	No	
045	BH96_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621071211	Green	No	
046	BH96_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621071247	Green	No	
047	BH96_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071246	Green	No	
047	BH96_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621071210	Green	No	
048	BH96_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621071207	Green	No	
049	BH96_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071245	Green	No	
049	BH96_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071244	Green	No	
050	BH96_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071243	Green	No	
051	BH96_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071242	Green	No	
051	BH96_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071241	Green	No	
052	BH96_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071215	Green	No	
053	BH96_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071206	Green	No	

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

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TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

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Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

053	BH96_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071209	Green	No	
054	BH96_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071240	Green	No	
055	BH96_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071239	Green	No	
055	BH96_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621071238	Green	No	
056	BH96_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621071237	Green	No	
057	BH96_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071236	Green	No	
057	BH96_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621071235	Green	No	
058	BH96_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621071234	Green	No	
059	BH96_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071233	Green	No	
059	BH96_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621071232	Green	No	
060	BH96_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621071231	Green	No	
061	BH96_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071219	Green	No	
061	BH96_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621071218	Green	No	
062	BH96_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621071217	Green	No	
063	BH96_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071220	Green	No	
063	BH96_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621071208	Green	No	
064	BH96_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621071223	Green	No	
065	BH96_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071221	Green	No	
065	BH96_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621071222	Green	No	
066	SQC046_A	Snap Lock Bag - frozen	1 Medium	00130220048666	Green	No	
066	SQC046_A	Snap Lock Bag - frozen	1 Medium	00130220048665	Green	No	
067	BH98_A_0.0	Snap Lock Bag - frozen	1 Medium	00130220048657	Green	No	
067	BH98_A_0.0	Snap Lock Bag - frozen	1 Medium	00130220048656	Green	No	
068	BH98_A_0.25	Snap Lock Bag - frozen	1 Medium	00130220048664	Green	No	
069	BH98_A_0.5	Snap Lock Bag - frozen	1 Medium	00130220048663	Green	No	
069	BH98_A_0.5	Snap Lock Bag - frozen	1 Medium	00130220048662	Green	No	
070	BH98_A_0.75	Snap Lock Bag - frozen	1 Medium	00130220048661	Green	No	

CHAIN OF CUSTODY

ALS COC#: 28846 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

071	BH98_A_1.0	Snap Lock Bag - frozen	1 Medium	00130220048660	Green	No	
071	BH98_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621071224	Green	No	
072	BH98_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621071230	Green	No	
073	BH98_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071229	Green	No	
073	BH98_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621071228	Green	No	
074	BH98_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621071227	Green	No	
075	BH98_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071226	Green	No	
075	BH98_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621071225	Green	No	
076	BH98_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621071216	Green	No	
077	BH98_A_2.5	Snap Lock Bag - frozen	1 Medium	00130220048673	Green	No	
077	BH98_A_2.5	Snap Lock Bag - frozen	1 Medium	00130220048672	Green	No	
078	BH98_A_2.75	Snap Lock Bag - frozen	1 Medium	00130220048671	Green	No	
079	BH98_A_3.0	Snap Lock Bag - frozen	1 Medium	00130220048670	Green	No	
079	BH98_A_3.0	Snap Lock Bag - frozen	1 Medium	00130220048669	Green	No	
080	BH98_A_3.25	Snap Lock Bag - frozen	1 Medium	00130220048668	Green	No	
081	BH98_A_3.5	Snap Lock Bag - frozen	1 Medium	00130220048674	Green	No	
081	BH98_A_3.5	Snap Lock Bag - frozen	1 Medium	00130220048667	Green	No	
082	BH98_A_3.75	Snap Lock Bag - frozen	1 Medium	00130220048714	Green	No	
083	BH98_A_4.0	Snap Lock Bag - frozen	1 Medium	00130220048712	Green	No	
083	BH98_A_4.0	Snap Lock Bag - frozen	1 Medium	00130220048711	Green	No	
084	BH98_A_4.25	Snap Lock Bag - frozen	1 Medium	00130220048710	Green	No	
085	BH98_A_4.5	Snap Lock Bag - frozen	1 Medium	00130220048709	Green	No	
085	BH98_A_4.5	Snap Lock Bag - frozen	1 Medium	00130220048708	Green	No	
086	BH98_A_4.75	Snap Lock Bag - frozen	1 Medium	00130220048715	Green	No	
087	BH98_A_5.0	Snap Lock Bag - frozen	1 Medium	00130220048716	Green	No	
087	BH98_A_5.0	Snap Lock Bag - frozen	1 Medium	00130220048713	Green	No	
088	RQC008	Amber Glass Bottle - Unpreserved	100 mL	00400321003455	Orange	No	

CHAIN OF CUSTODY

ALS COC#: **28846** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 - 18/11

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

088	RQC008	Amber Glass Bottle - Unpreserved	100 mL	00400321003472	Orange	No	
088	RQC008	Amber Bottle Unpreserved for Specialist Organics	100 mL	00320219006242	Green / White	No	
088	RQC008	Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified	60 mL	00382005064670	Red/Green	No	
088	RQC008	Clear Plastic Bottle - NaOH	60 mL	00140321009903	Blue	No	
088	RQC008	Clear Plastic Bottle - Natural	125 mL	00070220075829	Green	No	
088	RQC008	Clear Plastic Bottle - Natural	125 mL	00070220075908	Green	No	
088	RQC008	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100621081128	Purple	No	
088	RQC008	Amber VOC Vial - Sulfuric Acid	40 mL	00160621019475	Purple	No	
088	RQC008	Amber VOC Vial - Sulfuric Acid	40 mL	00160621019542	Purple	No	
088	RQC008	Amber Glass Bottle - Unpreserved	100 mL	00400321003473	Orange	No	
088	RQC008	Amber VOC Vial - Sulfuric Acid	40 mL	00160621019845	Purple	No	
088	RQC008	Amber VOC Vial - Sulfuric Acid	40 mL	00160621019428	Purple	No	

Total Bottle Count: ALS: 146, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2112538**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 28846	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP4 - 18/11		
Sampler	: NICOLAS SOENENS		

Dates

Date Samples Received	: 18-Oct-2021 17:20	Issue Date	: 19-Oct-2021
Client Requested Due Date	: 02-Nov-2021	Scheduled Reporting Date	: **02-Nov-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 19.7/17.7 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 44 / 44

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Please note that your submission has been split into several Work Orders EP2112538 and EP2112543 to facilitate the regular delivery of data.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2112538-001 : 18-Oct-2021 09:12 : BH97_A_0.0_0.00-0.00

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2112538-001	18-Oct-2021 09:12	BH97_A_0.0_0.00-0.00	✓	✓
EP2112538-002	18-Oct-2021 09:32	BH97_A_0.25		✓
EP2112538-003	18-Oct-2021 09:33	BH97_A_0.5	✓	✓
EP2112538-004	18-Oct-2021 09:34	BH97_A_0.75		✓
EP2112538-005	18-Oct-2021 09:34	BH97_A_1	✓	✓
EP2112538-006	18-Oct-2021 09:35	BH97_A_1.25		✓
EP2112538-007	18-Oct-2021 09:46	BH97_A_1.5	✓	✓
EP2112538-008	18-Oct-2021 09:46	BH97_A_1.75		✓
EP2112538-009	18-Oct-2021 09:48	BH97_A_2.0	✓	✓
EP2112538-010	18-Oct-2021 09:49	BH97_A_2.25		✓
EP2112538-011	18-Oct-2021 09:50	BH97_A_2.5	✓	✓
EP2112538-012	18-Oct-2021 09:51	BH97_A_2.75		✓
EP2112538-013	18-Oct-2021 09:51	BH97_A_3.0	✓	✓
EP2112538-014	18-Oct-2021 09:52	BH97_A_3.25		✓
EP2112538-015	18-Oct-2021 09:53	BH97_A_3.5	✓	✓
EP2112538-016	18-Oct-2021 10:01	BH97_A_3.75		✓
EP2112538-017	18-Oct-2021 10:03	BH97_A_4.0	✓	✓
EP2112538-018	18-Oct-2021 10:03	BH97_A_4.25		✓
EP2112538-019	18-Oct-2021 10:04	BH97_A_4.5	✓	✓
EP2112538-020	18-Oct-2021 10:05	BH97_A_4.75		✓
EP2112538-021	18-Oct-2021 10:05	BH97_A_5.0	✓	✓
EP2112538-022	18-Oct-2021 10:30	SQC044_A	✓	✓
EP2112538-023	18-Oct-2021 10:35	BH12_A_0.0	✓	✓
EP2112538-024	18-Oct-2021 10:36	BH12_A_0.25		✓
EP2112538-025	18-Oct-2021 10:37	BH12_A_0.5	✓	✓
EP2112538-026	18-Oct-2021 10:38	BH12_A_0.75		✓
EP2112538-027	18-Oct-2021 10:39	BH12_A_1.0	✓	✓
EP2112538-028	18-Oct-2021 10:40	BH12_A_1.25		✓
EP2112538-029	18-Oct-2021 10:41	BH12_A_1.5	✓	✓
EP2112538-030	18-Oct-2021 10:42	BH12_A_1.75		✓
EP2112538-031	18-Oct-2021 10:43	BH12_A_2.0	✓	✓
EP2112538-032	18-Oct-2021 10:44	BH12_A_2.25		✓
EP2112538-033	18-Oct-2021 10:45	BH12_A_2.5	✓	✓

			SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2112538-034	18-Oct-2021 10:45	BH12_A_2.75		✓
EP2112538-035	18-Oct-2021 10:46	BH12_A_3.0	✓	✓
EP2112538-036	18-Oct-2021 10:47	BH12_A_3.25		✓
EP2112538-037	18-Oct-2021 10:49	BH12_A_3.5	✓	✓
EP2112538-038	18-Oct-2021 10:50	BH12_A_3.75		✓
EP2112538-039	18-Oct-2021 10:50	BH12_A_4.0	✓	✓
EP2112538-040	18-Oct-2021 10:51	BH12_A_4.25		✓
EP2112538-041	18-Oct-2021 10:52	BH12_A_4.5	✓	✓
EP2112538-042	18-Oct-2021 10:52	BH12_A_4.75		✓
EP2112538-043	18-Oct-2021 10:53	BH12_A_5.0	✓	✓
EP2112538-044	18-Oct-2021 11:34	SQC045_A	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ARCADIS ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV) — Email — AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA) — Email — bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV) — Email — bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC) — Email — bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG) — Email — bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT) — Email — bronwyn.vanvalkengoed@arcadis.com

Nixon Edward

- A4 - AU Tax Invoice (INV) — Email — Nixon.Edward@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2112538**	Page	: 1 of 11
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 18-Oct-2021 17:20
Order number	: 30058301	Date Analysis Commenced	: 20-Oct-2021
C-O-C number	: 28846	Issue Date	: 02-Nov-2021 17:20
Sampler	: NICOLAS SOENENS		
Site	: GEHBI - WP4 - 18/11		
Quote number	: EP/529/21_V4		
No. of samples received	: 44		
No. of samples analysed	: 44		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Laboratory Manager (Perth)	Perth ASS, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH97_A_0.0_0.00-0.00	BH97_A_0.25	BH97_A_0.5	BH97_A_0.75	BH97_A_1
			Sampling date / time	18-Oct-2021 09:12	18-Oct-2021 09:32	18-Oct-2021 09:33	18-Oct-2021 09:34	18-Oct-2021 09:34
Compound	CAS Number	LOR	Unit	EP2112538-001	EP2112538-002	EP2112538-003	EP2112538-004	EP2112538-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	8.8	----	5.8	----	5.8
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	19	----	28
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	0.03	----	0.04
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	0.009	----	0.009
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	1.71	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	341	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.55	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	0.04	----	0.05
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	24	----	33
Liming Rate	----	1	kg CaCO3/t	<1	----	2	----	2
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	0.04	----	0.05
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	24	----	33
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	2	----	2
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.7	7.0	6.7	6.6	6.6
pH (Fox)	----	0.1	pH Unit	6.0	4.7	4.0	4.4	4.4
Reaction Rate	----	1	-	Moderate	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH97_A_1.25	BH97_A_1.5	BH97_A_1.75	BH97_A_2.0	BH97_A_2.25
			Sampling date / time	18-Oct-2021 09:35	18-Oct-2021 09:46	18-Oct-2021 09:46	18-Oct-2021 09:48	18-Oct-2021 09:49
Compound	CAS Number	LOR	Unit	EP2112538-006	EP2112538-007	EP2112538-008	EP2112538-009	EP2112538-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.9	----	5.9	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	18	----	11	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.03	----	0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.03	----	0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	20	----	11	----
Liming Rate	----	1	kg CaCO3/t	----	2	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.03	----	0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	20	----	11	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	2	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.7	6.6	6.6	6.7	6.7
pH (Fox)	----	0.1	pH Unit	5.4	5.6	5.8	5.3	6.5
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH97_A_2.5	BH97_A_2.75	BH97_A_3.0	BH97_A_3.25	BH97_A_3.5
			Sampling date / time	18-Oct-2021 09:50	18-Oct-2021 09:51	18-Oct-2021 09:51	18-Oct-2021 09:52	18-Oct-2021 09:53
Compound	CAS Number	LOR	Unit	EP2112538-011	EP2112538-012	EP2112538-013	EP2112538-014	EP2112538-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.8	----	5.6	----	5.6
Titratable Actual Acidity (23F)	----	2	mole H+ / t	13	----	11	----	14
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.02	----	0.02	----	0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	----	0.008	----	0.008
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.03	----	0.03	----	0.03
Net Acidity (acidity units)	----	10	mole H+ / t	17	----	16	----	19
Liming Rate	----	1	kg CaCO3/t	1	----	1	----	1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.03	----	0.03	----	0.03
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	17	----	16	----	19
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	----	1	----	1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.8	6.4	6.5	6.8	6.6
pH (Fox)	----	0.1	pH Unit	6.8	3.8	4.0	4.8	5.0
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH97_A_3.75	BH97_A_4.0	BH97_A_4.25	BH97_A_4.5	BH97_A_4.75
			Sampling date / time	18-Oct-2021 10:01	18-Oct-2021 10:03	18-Oct-2021 10:03	18-Oct-2021 10:04	18-Oct-2021 10:05
Compound	CAS Number	LOR	Unit	EP2112538-016	EP2112538-017	EP2112538-018	EP2112538-019	EP2112538-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.5	----	5.4	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	11	----	11	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.02	----	0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.005	----	0.008	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.02	----	0.03	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	15	----	16	----
Liming Rate	----	1	kg CaCO3/t	----	1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.02	----	0.03	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	15	----	16	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.3	6.3	6.1	6.3	6.5
pH (Fox)	----	0.1	pH Unit	3.0	4.0	3.6	3.7	3.3
Reaction Rate	----	1	-	Moderate	Moderate	Moderate	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH97_A_5.0	SQC044_A	BH12_A_0.0	BH12_A_0.25	BH12_A_0.5
			Sampling date / time	18-Oct-2021 10:05	18-Oct-2021 10:30	18-Oct-2021 10:35	18-Oct-2021 10:36	18-Oct-2021 10:37
Compound	CAS Number	LOR	Unit	EP2112538-021	EP2112538-022	EP2112538-023	EP2112538-024	EP2112538-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.6	5.2	5.0	----	4.4
Titratable Actual Acidity (23F)	----	2	mole H+ / t	11	22	43	----	142
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.02	0.04	0.07	----	0.23
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.010	<0.005	<0.005	----	0.007
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	----	<10
EA033-D: Retained Acidity								
Net Acid Soluble Sulfur (20Je)	----	0.02	% S	----	----	----	----	0.02
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	----	----	----	----	12
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	----	----	----	----	0.02
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	----	----	----	0.02
HCl Extractable Sulfur (20Be)	----	0.02	% S	----	----	----	----	0.03
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.03	0.04	0.07	----	0.25
Net Acidity (acidity units)	----	10	mole H+ / t	18	25	45	----	158
Liming Rate	----	1	kg CaCO3/t	1	2	3	----	12
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.03	0.04	0.07	----	0.25
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	18	25	45	----	158
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	2	3	----	12
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.5	5.3	5.4	5.1	5.1
pH (Fox)	----	0.1	pH Unit	3.0	3.1	3.0	3.3	3.4
Reaction Rate	----	1	-	Moderate	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH12_A_0.75	BH12_A_1.0	BH12_A_1.25	BH12_A_1.5	BH12_A_1.75
			Sampling date / time	18-Oct-2021 10:38	18-Oct-2021 10:39	18-Oct-2021 10:40	18-Oct-2021 10:41	18-Oct-2021 10:42
Compound	CAS Number	LOR	Unit	EP2112538-026	EP2112538-027	EP2112538-028	EP2112538-029	EP2112538-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	4.8	----	4.9	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	74	----	49	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.12	----	0.08	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.12	----	0.08	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	76	----	52	----
Liming Rate	----	1	kg CaCO3/t	----	6	----	4	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.12	----	0.08	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	76	----	52	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	6	----	4	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.3	5.9	5.7	6.2	6.0
pH (Fox)	----	0.1	pH Unit	3.2	3.4	3.4	4.1	3.4
Reaction Rate	----	1	-	Strong	Strong	Moderate	Moderate	Moderate

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH12_A_2.0	BH12_A_2.25	BH12_A_2.5	BH12_A_2.75	BH12_A_3.0
			Sampling date / time	18-Oct-2021 10:43	18-Oct-2021 10:44	18-Oct-2021 10:45	18-Oct-2021 10:45	18-Oct-2021 10:46
Compound	CAS Number	LOR	Unit	EP2112538-031	EP2112538-032	EP2112538-033	EP2112538-034	EP2112538-035
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.2	----	5.1	----	4.8
Titratable Actual Acidity (23F)	----	2	mole H+ / t	19	----	15	----	26
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.03	----	0.02	----	0.04
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.03	----	0.03	----	0.05
Net Acidity (acidity units)	----	10	mole H+ / t	21	----	17	----	29
Liming Rate	----	1	kg CaCO3/t	2	----	1	----	2
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.03	----	0.03	----	0.05
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	21	----	17	----	29
Liming Rate excluding ANC	----	1	kg CaCO3/t	2	----	1	----	2
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.2	6.3	6.2	6.4	6.6
pH (Fox)	----	0.1	pH Unit	4.4	5.9	5.3	5.4	5.6
Reaction Rate	----	1	-	Slight	Moderate	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH12_A_3.25	BH12_A_3.5	BH12_A_3.75	BH12_A_4.0	BH12_A_4.25
			Sampling date / time	18-Oct-2021 10:47	18-Oct-2021 10:49	18-Oct-2021 10:50	18-Oct-2021 10:50	18-Oct-2021 10:51
Compound	CAS Number	LOR	Unit	EP2112538-036	EP2112538-037	EP2112538-038	EP2112538-039	EP2112538-040
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	4.7	----	5.8	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	24	----	2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.04	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	0.132	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	82	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.04	----	0.14	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	25	----	85	----
Liming Rate	----	1	kg CaCO3/t	----	2	----	6	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.04	----	0.14	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	25	----	85	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	2	----	6	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.6	7.0	7.3	7.6	7.7
pH (Fox)	----	0.1	pH Unit	5.6	6.1	6.0	6.1	6.5
Reaction Rate	----	1	-	Slight	Moderate	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH12_A_4.5	BH12_A_4.75	BH12_A_5.0	SQC045_A	----
			Sampling date / time	18-Oct-2021 10:52	18-Oct-2021 10:52	18-Oct-2021 10:53	18-Oct-2021 11:34	----
Compound	CAS Number	LOR	Unit	EP2112538-041	EP2112538-042	EP2112538-043	EP2112538-044	--------
				Result	Result	Result	Result	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.8**	**----**	**5.8**	**4.9**	**----**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**4**	**----**	**4**	**83**	**----**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**0.13**	**----**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.006**	**----**	<0.005	**0.005**	**----**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	<10	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**0.14**	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**86**	**----**
Liming Rate	----	1	kg CaCO3/t	**1**	**----**	<1	**6**	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**0.14**	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**86**	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	**----**	<1	**6**	**----**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.3**	**7.1**	**7.3**	**5.8**	**----**
pH (Fox)	----	0.1	pH Unit	**6.1**	**6.0**	**5.7**	**3.1**	**----**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Moderate**	**----**

QUALITY CONTROL REPORT

Work Order	: **EP2112538**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 18-Oct-2021
Order number	: 30058301	Date Analysis Commenced	: 20-Oct-2021
C-O-C number	: 28846	Issue Date	: 02-Nov-2021
Sampler	: NICOLAS SOENENS		
Site	: GEHBI - WP4 - 18/11		
Quote number	: EP/529/21_V4		
No. of samples received	: 44		
No. of samples analysed	: 44		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Laboratory Manager (Perth)	Perth ASS, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3982714)									
EP2112538-001	BH97_A_0.0_0.00-0.00	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.8	8.8	0.0	0% - 20%
EP2112538-021	BH97_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.02	0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	11	11	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.6	5.6	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 3982715)									
EP2112538-039	BH12_A_4.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	2	2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.8	5.8	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3982714)									
EP2112538-001	BH97_A_0.0_0.00-0.00	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2112538-021	BH97_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.010	<0.005	66.7	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 3982715)									
EP2112538-039	BH12_A_4.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.132	0.138	4.4	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	82	86	4.8	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3982714)									
EP2112538-001	BH97_A_0.0_0.00-0.00	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	1.71	1.69	1.2	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-C: Acid Neutralising Capacity (QC Lot: 3982714) - continued									
EP2112538-001	BH97_A_0.0_0.00-0.00	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.55	0.54	1.8	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	341	338	0.7	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 3982714)									
EP2112538-001	BH97_A_0.0_0.00-0.00	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2112538-021	BH97_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.03	0.02	40.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.03	0.02	40.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	18	14	25.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	18	14	25.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3982715)									
EP2112538-039	BH12_A_4.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.14	0.14	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.14	0.14	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	6	7	15.4	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	6	7	15.4	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	85	89	4.6	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	85	89	4.6	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3974468)									
EP2112538-001	BH97_A_0.0_0.00-0.00	EA037: pH (F)	----	0.1	pH Unit	7.7	7.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.0	6.0	0.0	0% - 20%
EP2112538-010	BH97_A_2.25	EA037: pH (F)	----	0.1	pH Unit	6.7	6.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.5	6.5	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3974469)									
EP2112538-021	BH97_A_5.0	EA037: pH (F)	----	0.1	pH Unit	6.5	6.5	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.0	3.0	0.0	0% - 20%
EP2112538-030	BH12_A_1.75	EA037: pH (F)	----	0.1	pH Unit	6.0	6.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.4	3.4	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3974470)									
EP2112538-041	BH12_A_4.5	EA037: pH (F)	----	0.1	pH Unit	7.3	7.3	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.1	6.1	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3982714)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	95.8	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 3982715)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	96.0	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3982714)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	105	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3982715)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	106	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3982714)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3982714)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3982715)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2112538**	Page	: 1 of 6
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 18-Oct-2021
Site	: GEHBI - WP4 - 18/11	Issue Date	: 02-Nov-2021
Sampler	: NICOLAS SOENENS	No. of samples received	: 44
Order number	: 30058301	No. of samples analysed	: 44

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
BH97_A_0.0_0.00-0.00,	BH97_A_0.5,	**18-Oct-2021**	**25-Oct-2021**	18-Oct-2022	✓	**02-Nov-2021**	23-Jan-2022	✓
BH97_A_1,	BH97_A_1.5,							
BH97_A_2.0,	BH97_A_2.5,							
BH97_A_3.0,	BH97_A_3.5,							
BH97_A_4.0,	BH97_A_4.5,							
BH97_A_5.0,	SQC044_A,							
BH12_A_0.0,	BH12_A_0.5,							
BH12_A_1.0,	BH12_A_1.5,							
BH12_A_2.0,	BH12_A_2.5,							
BH12_A_3.0,	BH12_A_3.5,							
BH12_A_4.0,	BH12_A_4.5,							
BH12_A_5.0,	SQC045_A							
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
BH97_A_0.0_0.00-0.00,	BH97_A_0.5,	**18-Oct-2021**	**25-Oct-2021**	18-Oct-2022	✓	**02-Nov-2021**	23-Jan-2022	✓
BH97_A_1,	BH97_A_1.5,							
BH97_A_2.0,	BH97_A_2.5,							
BH97_A_3.0,	BH97_A_3.5,							
BH97_A_4.0,	BH97_A_4.5,							
BH97_A_5.0,	SQC044_A,							
BH12_A_0.0,	BH12_A_0.5,							
BH12_A_1.0,	BH12_A_1.5,							
BH12_A_2.0,	BH12_A_2.5,							
BH12_A_3.0,	BH12_A_3.5,							
BH12_A_4.0,	BH12_A_4.5,							
BH12_A_5.0,	SQC045_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033)								
BH97_A_0.0_0.00-0.00,	BH97_A_0.5,	**18-Oct-2021**	**25-Oct-2021**	18-Oct-2022	✓	**02-Nov-2021**	23-Jan-2022	✓
BH97_A_1,	BH97_A_1.5,							
BH97_A_2.0,	BH97_A_2.5,							
BH97_A_3.0,	BH97_A_3.5,							
BH97_A_4.0,	BH97_A_4.5,							
BH97_A_5.0,	SQC044_A,							
BH12_A_0.0,	BH12_A_0.5,							
BH12_A_1.0,	BH12_A_1.5,							
BH12_A_2.0,	BH12_A_2.5,							
BH12_A_3.0,	BH12_A_3.5,							
BH12_A_4.0,	BH12_A_4.5,							
BH12_A_5.0,	SQC045_A							
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033)								
BH97_A_0.0_0.00-0.00,	BH97_A_0.5,	**18-Oct-2021**	**25-Oct-2021**	18-Oct-2022	✓	**02-Nov-2021**	23-Jan-2022	✓
BH97_A_1,	BH97_A_1.5,							
BH97_A_2.0,	BH97_A_2.5,							
BH97_A_3.0,	BH97_A_3.5,							
BH97_A_4.0,	BH97_A_4.5,							
BH97_A_5.0,	SQC044_A,							
BH12_A_0.0,	BH12_A_0.5,							
BH12_A_1.0,	BH12_A_1.5,							
BH12_A_2.0,	BH12_A_2.5,							
BH12_A_3.0,	BH12_A_3.5,							
BH12_A_4.0,	BH12_A_4.5,							
BH12_A_5.0,	SQC045_A							
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033)								
BH97_A_0.0_0.00-0.00,	BH97_A_0.5,	**18-Oct-2021**	**25-Oct-2021**	18-Oct-2022	✓	**02-Nov-2021**	23-Jan-2022	✓
BH97_A_1,	BH97_A_1.5,							
BH97_A_2.0,	BH97_A_2.5,							
BH97_A_3.0,	BH97_A_3.5,							
BH97_A_4.0,	BH97_A_4.5,							
BH97_A_5.0,	SQC044_A,							
BH12_A_0.0,	BH12_A_0.5,							
BH12_A_1.0,	BH12_A_1.5,							
BH12_A_2.0,	BH12_A_2.5,							
BH12_A_3.0,	BH12_A_3.5,							
BH12_A_4.0,	BH12_A_4.5,							
BH12_A_5.0,	SQC045_A							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH97_A_0.0_0.00-0.00,	BH97_A_0.25,	**18-Oct-2021**	**20-Oct-2021**	16-Apr-2022	✓	**20-Oct-2021**	16-Apr-2022	✓
BH97_A_0.5,	BH97_A_0.75,							
BH97_A_1,	BH97_A_1.25,							
BH97_A_1.5,	BH97_A_1.75,							
BH97_A_2.0,	BH97_A_2.25,							
BH97_A_2.5,	BH97_A_2.75,							
BH97_A_3.0,	BH97_A_3.25,							
BH97_A_3.5,	BH97_A_3.75,							
BH97_A_4.0,	BH97_A_4.25,							
BH97_A_4.5,	BH97_A_4.75,							
BH97_A_5.0,	SQC044_A,							
BH12_A_0.0,	BH12_A_0.25,							
BH12_A_0.5,	BH12_A_0.75,							
BH12_A_1.0,	BH12_A_1.25,							
BH12_A_1.5,	BH12_A_1.75,							
BH12_A_2.0,	BH12_A_2.25,							
BH12_A_2.5,	BH12_A_2.75,							
BH12_A_3.0,	BH12_A_3.25,							
BH12_A_3.5,	BH12_A_3.75,							
BH12_A_4.0,	BH12_A_4.25,							
BH12_A_4.5,	BH12_A_4.75,							
BH12_A_5.0,	SQC045_A							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	5	44	**11.36**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	24	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2112529

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: GEMBI **Client:** ARCADIS **Project Manager:** BRONWYN

Phone: ( )

ALS Compass COC Reference: 28957 28903 28918 **# Samples:** 130 **Sampler:** NICHOLAS S.

Phone: +32 471 23 16 18

Turnaround Requirements: ~~Standard~~ 8 Urgent

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	(N/A)
	Free ice / frozen ice bricks upon receipt?	(YES)	NO	N/A
	Random sample temperature on receipt?	5.6 °C		

Custody:

Relinquished by:	Received by: SP	Relinquished by:	Received by:
Date / Time:	Date / Time: 1800 19/10/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: **28957** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS 2

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH11_A_5.5		19/10/2021 10:58 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	BH11_A_5.75		19/10/2021 10:58 AM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH11_A_6.0		19/10/2021 10:59 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
004	BH104_A_0.0		19/10/2021 12:03 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
005	SQC052_A		19/10/2021 12:04 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
006	BH104_A_0.25		19/10/2021 12:05 PM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH104_A_0.5		19/10/2021 12:06 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
008	BH104_A_0.75		19/10/2021 12:07 PM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH104_A_1.0		19/10/2021 12:07 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 28957 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS 2

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH104_A_1.25		19/10/2021 12:08 PM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH104_A_1.5		19/10/2021 12:08 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
012	BH104_A_1.75		19/10/2021 12:09 PM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH104_A_2.0		19/10/2021 12:10 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
014	BH104_A_2.25		19/10/2021 12:10 PM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH104_A_2.5		19/10/2021 12:11 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
016	BH104_A_2.75		19/10/2021 12:12 PM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH104_A_3.0		19/10/2021 12:12 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
018	BH104_A_3.25		19/10/2021 12:13 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: **28957** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS 2

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:
QUOTE NO: EP/529/21

SAMPLER MOBILE:
/ EP2021HYDCON0003

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EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH104_A_3.5		19/10/2021 12:14 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
020	BH104_A_3.75		19/10/2021 12:15 PM	Soil	ALS: 1 Non ALS: 0	No	X			
021	BH104_A_4.0		19/10/2021 12:15 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
022	BH104_A_4.25		19/10/2021 12:16 PM	Soil	ALS: 1 Non ALS: 0	No	X			
023	BH104_A_4.5		19/10/2021 12:16 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
024	BH104_A_4.75		19/10/2021 12:17 PM	Soil	ALS: 1 Non ALS: 0	No	X			
025	BH104_A_5.0		19/10/2021 12:18 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
026	BH104_A_5.25		19/10/2021 12:18 PM	Soil	ALS: 1 Non ALS: 0	No	X			
027	SQC053_A		19/10/2021 12:20 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

COC#: **28957** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS 2

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH104_A_5.5		19/10/2021 12:20 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
029	BH104_A_5.75		19/10/2021 12:21 PM	Soil	ALS: 1 Non ALS: 0	No	X			
030	BH104_A_6.0		19/10/2021 12:22 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
031	BH11_A_0.0		19/10/2021 01:27 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
032	BH11_A_0.25		19/10/2021 01:27 PM	Soil	ALS: 1 Non ALS: 0	No	X			
033	BH11_A_0.5		19/10/2021 01:28 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
034	BH11_A_0.75		19/10/2021 01:28 PM	Soil	ALS: 1 Non ALS: 0	No	X			
035	BH11_A_1.0		19/10/2021 01:29 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
036	BH11_A_1.25		19/10/2021 01:30 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

COC#: **28957** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS 2

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed
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SAMPLER MOBILE:
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TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
037	BH11_A_1.5		19/10/2021 01:30 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
038	BH11_A_1.75		19/10/2021 01:31 PM	Soil	ALS: 1 Non ALS: 0	No	X			
039	BH11_A_2.0		19/10/2021 01:31 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
040	BH11_A_2.25		19/10/2021 01:32 PM	Soil	ALS: 1 Non ALS: 0	No	X			
041	BH11_A_2.5		19/10/2021 01:33 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
042	BH11_A_2.75		19/10/2021 01:33 PM	Soil	ALS: 1 Non ALS: 0	No	X			
043	BH11_A_3.0		19/10/2021 01:33 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
044	BH11_A_3.25		19/10/2021 01:34 PM	Soil	ALS: 1 Non ALS: 0	No	X			
045	BH11_A_3.5		19/10/2021 01:34 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 28957 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS 2

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

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TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
046	BH11_A_3.75		19/10/2021 01:35 PM	Soil	ALS: 1 Non ALS: 0	No	X			
047	BH11_A_4.0		19/10/2021 01:35 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
048	BH11_A_4.25		19/10/2021 01:35 PM	Soil	ALS: 1 Non ALS: 0	No	X			
049	BH11_A_4.5		19/10/2021 01:36 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
050	BH11_A_4.75		19/10/2021 01:36 PM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 28957 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS 2

ORDER NO: 30058301

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QUOTE NO: EP/529/21

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH11_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621066435	Green	No	
001	BH11_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621066436	Green	No	
002	BH11_A_5.75	Snap Lock Bag - frozen	1 Medium	00130621066437	Green	No	
003	BH11_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621066438	Green	No	
003	BH11_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621066439	Green	No	
004	BH104_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621066533	Green	No	
004	BH104_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621066532	Green	No	
005	SQC052_A	Snap Lock Bag - frozen	1 Medium	00130621066440	Green	No	
005	SQC052_A	Snap Lock Bag - frozen	1 Medium	00130621066441	Green	No	
006	BH104_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621066442	Green	No	
007	BH104_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621066443	Green	No	
007	BH104_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621066444	Green	No	
008	BH104_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621066445	Green	No	
009	BH104_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621066446	Green	No	
009	BH104_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621066447	Green	No	
010	BH104_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621066448	Green	No	
011	BH104_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621066449	Green	No	
011	BH104_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621066450	Green	No	
012	BH104_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621066451	Green	No	
013	BH104_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621066452	Green	No	
013	BH104_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621066453	Green	No	
014	BH104_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621066454	Green	No	
015	BH104_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621066456	Green	No	
015	BH104_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621066455	Green	No	
016	BH104_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621066457	Green	No	
017	BH104_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621066493	Green	No	

CHAIN OF CUSTODY

ALS COC#: 28957 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS 2

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

017	BH104_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621066494	Green	No	
018	BH104_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621066495	Green	No	
019	BH104_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621066492	Green	No	
019	BH104_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621066491	Green	No	
020	BH104_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621066497	Green	No	
021	BH104_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621066498	Green	No	
021	BH104_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621066490	Green	No	
022	BH104_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621066499	Green	No	
023	BH104_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621066500	Green	No	
023	BH104_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621066501	Green	No	
024	BH104_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621066502	Green	No	
025	BH104_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621066503	Green	No	
025	BH104_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621066504	Green	No	
026	BH104_A_5.25	Snap Lock Bag - frozen	1 Medium	00130621066505	Green	No	
027	SQC053_A	Snap Lock Bag - frozen	1 Medium	00130621066506	Green	No	
028	BH104_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621066507	Green	No	
028	BH104_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621066509	Green	No	
029	BH104_A_5.75	Snap Lock Bag - frozen	1 Medium	00130621066512	Green	No	
030	BH104_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621066510	Green	No	
030	BH104_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621066508	Green	No	
031	BH11_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621066515	Green	No	
031	BH11_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621066516	Green	No	
032	BH11_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621066517	Green	No	
033	BH11_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621066518	Green	No	
033	BH11_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621066519	Green	No	
034	BH11_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621066520	Green	No	
035	BH11_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621066521	Green	No	

CHAIN OF CUSTODY

ALS COC#: **28957** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS 2

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

035	BH11_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621074783	Green	No	
036	BH11_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621066534	Green	No	
037	BH11_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621066523	Green	No	
037	BH11_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621066524	Green	No	
038	BH11_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621066525	Green	No	
039	BH11_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621066526	Green	No	
039	BH11_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621066527	Green	No	
040	BH11_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621066528	Green	No	
041	BH11_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621066529	Green	No	
041	BH11_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621066544	Green	No	
042	BH11_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621066545	Green	No	
043	BH11_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621066546	Green	No	
043	BH11_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621066547	Green	No	
044	BH11_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621066548	Green	No	
045	BH11_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621066549	Green	No	
045	BH11_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621066550	Green	No	
046	BH11_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621066551	Green	No	
047	BH11_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621066552	Green	No	
047	BH11_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621066553	Green	No	
048	BH11_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621066554	Green	No	
049	BH11_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621066555	Green	No	
049	BH11_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621066556	Green	No	
050	BH11_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621066557	Green	No	

Total Bottle Count: ALS: 76, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2112529**		
Amendment	: **2**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 28957	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP4 19/11 ASS 2		
Sampler	: NICOLAS SOENENS		

Dates

Date Samples Received	: 19-Oct-2021 18:00	Issue Date	: 17-Dec-2021
Client Requested Due Date	: 03-Nov-2021	Scheduled Reporting Date	: **03-Nov-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 6	Temperature	: 5.6 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 52 / 52

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2112529-001	19-Oct-2021 10:58	BH10_A_5.5	✓	✓
EP2112529-002	19-Oct-2021 10:58	BH10_A_5.75		✓
EP2112529-003	19-Oct-2021 10:59	BH10_A_6.0	✓	✓
EP2112529-004	19-Oct-2021 12:03	BH104_A_0.0	✓	✓
EP2112529-005	19-Oct-2021 12:04	SQC052_A	✓	✓
EP2112529-006	19-Oct-2021 12:05	BH104_A_0.25		✓
EP2112529-007	19-Oct-2021 12:06	BH104_A_0.5	✓	✓
EP2112529-008	19-Oct-2021 12:07	BH104_A_0.75		✓
EP2112529-009	19-Oct-2021 12:07	BH104_A_1.0	✓	✓
EP2112529-010	19-Oct-2021 12:08	BH104_A_1.25		✓
EP2112529-011	19-Oct-2021 12:08	BH104_A_1.5	✓	✓
EP2112529-012	19-Oct-2021 12:09	BH104_A_1.75		✓
EP2112529-013	19-Oct-2021 12:10	BH104_A_2.0	✓	✓
EP2112529-014	19-Oct-2021 12:10	BH104_A_2.25		✓
EP2112529-015	19-Oct-2021 12:11	BH104_A_2.5	✓	✓
EP2112529-016	19-Oct-2021 12:12	BH104_A_2.75		✓
EP2112529-017	19-Oct-2021 12:12	BH104_A_3.0	✓	✓
EP2112529-018	19-Oct-2021 12:13	BH104_A_3.25		✓
EP2112529-019	19-Oct-2021 12:14	BH104_A_3.5	✓	✓
EP2112529-020	19-Oct-2021 12:15	BH104_A_3.75		✓
EP2112529-021	19-Oct-2021 12:15	BH104_A_4.0	✓	✓
EP2112529-022	19-Oct-2021 12:16	BH104_A_4.25		✓
EP2112529-023	19-Oct-2021 12:16	BH104_A_4.5	✓	✓
EP2112529-024	19-Oct-2021 12:17	BH104_A_4.75		✓
EP2112529-025	19-Oct-2021 12:18	BH104_A_5.0	✓	✓
EP2112529-026	19-Oct-2021 12:18	BH104_A_5.25		✓
EP2112529-027	19-Oct-2021 12:20	SQC053_A		✓
EP2112529-028	19-Oct-2021 12:20	BH104_A_5.5	✓	✓
EP2112529-029	19-Oct-2021 12:21	BH104_A_5.75		✓
EP2112529-030	19-Oct-2021 12:22	BH104_A_6.0	✓	✓
EP2112529-031	19-Oct-2021 13:27	BH10_A_0.0	✓	✓
EP2112529-032	19-Oct-2021 13:27	BH10_A_0.25		✓
EP2112529-033	19-Oct-2021 13:28	BH10_A_0.5	✓	✓
EP2112529-034	19-Oct-2021 13:28	BH10_A_0.75		✓
EP2112529-035	19-Oct-2021 13:29	BH10_A_1.0	✓	✓

			SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2112529-036	19-Oct-2021 13:30	BH10_A_1.25		✓
EP2112529-037	19-Oct-2021 13:30	BH10_A_1.5	✓	✓
EP2112529-038	19-Oct-2021 13:31	BH10_A_1.75		✓
EP2112529-039	19-Oct-2021 13:31	BH10_A_2.0	✓	✓
EP2112529-040	19-Oct-2021 13:32	BH10_A_2.25		✓
EP2112529-041	19-Oct-2021 13:33	BH10_A_2.5	✓	✓
EP2112529-042	19-Oct-2021 13:33	BH10_A_2.75		✓
EP2112529-043	19-Oct-2021 13:33	BH10_A_3.0	✓	✓
EP2112529-044	19-Oct-2021 13:34	BH10_A_3.25		✓
EP2112529-045	19-Oct-2021 13:34	BH10_A_3.5	✓	✓
EP2112529-046	19-Oct-2021 13:35	BH10_A_3.75		✓
EP2112529-047	19-Oct-2021 13:35	BH10_A_4.0	✓	✓
EP2112529-048	19-Oct-2021 13:35	BH10_A_4.25		✓
EP2112529-049	19-Oct-2021 13:36	BH10_A_4.5	✓	✓
EP2112529-050	19-Oct-2021 13:36	BH10_A_4.75		✓
EP2112529-051	19-Oct-2021 00:00	SQA56		✓
EP2112529-052	19-Oct-2021 00:00	SQA57		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ARCADIS ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Nixon Edward

- A4 - AU Tax Invoice (INV)	Email	Nixon.Edward@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2112529**	Page	: 1 of 13
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 19-Oct-2021 18:00
Order number	: 30058301	Date Analysis Commenced	: 21-Oct-2021
C-O-C number	: 28957	Issue Date	: 03-Nov-2021 17:56
Sampler	: NICOLAS SOENENS		
Site	: GEHBI - WP4 19/11 ASS 2		
Quote number	: EP/529/21_V4		
No. of samples received	: 52		
No. of samples analysed	: 52		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required for particular samples because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH11_A_5.5	BH11_A_5.75	BH11_A_6.0	BH104_A_0.0	SQC052_A
			Sampling date / time	19-Oct-2021 10:58	19-Oct-2021 10:58	19-Oct-2021 10:59	19-Oct-2021 12:03	19-Oct-2021 12:04
Compound	CAS Number	LOR	Unit	EP2112529-001	EP2112529-002	EP2112529-003	EP2112529-004	EP2112529-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.0	----	6.0	6.7	6.7
Titratable Actual Acidity (23F)	----	2	mole H+ / t	6	----	6	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	0.029	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	18	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	----	0.15	0.07
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	----	30	15
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	----	0.05	0.02
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	0.04	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	25	<10	<10
Liming Rate	----	1	kg CaCO3/t	1	----	2	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	0.04	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	25	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	----	2	<1	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.9	6.9	6.8	6.9	7.0
pH (Fox)	----	0.1	pH Unit	2.8	3.2	2.3	4.7	4.9
Reaction Rate	----	1	-	Strong	Strong	Strong	Moderate	Moderate

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH104_A_0.25	BH104_A_0.5	BH104_A_0.75	BH104_A_1.0	BH104_A_1.25
			Sampling date / time	19-Oct-2021 12:05	19-Oct-2021 12:06	19-Oct-2021 12:07	19-Oct-2021 12:07	19-Oct-2021 12:08
Compound	CAS Number	LOR	Unit	EP2112529-006	EP2112529-007	EP2112529-008	EP2112529-009	EP2112529-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	8.7	----	5.4	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	49	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	0.08	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	0.006	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	1.15	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	230	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.37	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	0.09	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	53	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	4	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	0.09	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	53	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	4	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.1	7.2	6.8	5.9	6.1
pH (Fox)	----	0.1	pH Unit	4.6	4.6	4.0	3.8	3.9
Reaction Rate	----	1	-	Moderate	Moderate	Extreme	Extreme	Extreme

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH104_A_1.5	BH104_A_1.75	BH104_A_2.0	BH104_A_2.25	BH104_A_2.5
			Sampling date / time	19-Oct-2021 12:08	19-Oct-2021 12:09	19-Oct-2021 12:10	19-Oct-2021 12:10	19-Oct-2021 12:11
Compound	CAS Number	LOR	Unit	EP2112529-011	EP2112529-012	EP2112529-013	EP2112529-014	EP2112529-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.5**	**----**	**5.9**	**----**	**6.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**31**	**----**	**14**	**----**	**6**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.05**	**----**	**0.02**	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	**0.008**	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.05**	**----**	**0.03**	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	**34**	**----**	**19**	**----**	<10
Liming Rate	----	1	kg CaCO3/t	**3**	**----**	**1**	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.05**	**----**	**0.03**	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**34**	**----**	**19**	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	**3**	**----**	**1**	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.2**	**5.8**	**6.1**	**6.6**	**6.7**
pH (Fox)	----	0.1	pH Unit	**4.2**	**3.9**	**4.7**	**5.6**	**5.5**
Reaction Rate	----	1	-	**Extreme**	**Extreme**	**Extreme**	**Extreme**	**Extreme**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH104_A_2.75	BH104_A_3.0	BH104_A_3.25	BH104_A_3.5	BH104_A_3.75
			Sampling date / time	19-Oct-2021 12:12	19-Oct-2021 12:12	19-Oct-2021 12:13	19-Oct-2021 12:14	19-Oct-2021 12:15
Compound	CAS Number	LOR	Unit	EP2112529-016	EP2112529-017	EP2112529-018	EP2112529-019	EP2112529-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.3	----	6.0	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	6	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.6	6.8	6.2	6.4	6.9
pH (Fox)	----	0.1	pH Unit	4.8	5.4	4.0	5.2	6.8
Reaction Rate	----	1	-	Extreme	Extreme	Extreme	Extreme	Extreme

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH104_A_4.0	BH104_A_4.25	BH104_A_4.5	BH104_A_4.75	BH104_A_5.0
			Sampling date / time	19-Oct-2021 12:15	19-Oct-2021 12:16	19-Oct-2021 12:16	19-Oct-2021 12:17	19-Oct-2021 12:18
Compound	CAS Number	LOR	Unit	EP2112529-021	EP2112529-022	EP2112529-023	EP2112529-024	EP2112529-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.9**	**----**	**6.0**	**----**	**5.6**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**9**	**----**	**6**	**----**	**15**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	**0.02**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.005**	**----**	<0.005	**----**	**0.013**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.02**	**----**	<0.02	**----**	**0.04**
Net Acidity (acidity units)	----	10	mole H+ / t	**12**	**----**	<10	**----**	**23**
Liming Rate	----	1	kg CaCO3/t	**1**	**----**	<1	**----**	**2**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.02**	**----**	<0.02	**----**	**0.04**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**12**	**----**	<10	**----**	**23**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	**----**	<1	**----**	**2**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.8**	**6.8**	**6.9**	**6.7**	**6.5**
pH (Fox)	----	0.1	pH Unit	**4.0**	**5.2**	**6.4**	**5.0**	**4.0**
Reaction Rate	----	1	-	**Extreme**	**Extreme**	**Extreme**	**Extreme**	**Extreme**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH104_A_5.25	SQC053_A	BH104_A_5.5	BH104_A_5.75	BH104_A_6.0
			Sampling date / time	19-Oct-2021 12:18	19-Oct-2021 12:20	19-Oct-2021 12:20	19-Oct-2021 12:21	19-Oct-2021 12:22
Compound	CAS Number	LOR	Unit	EP2112529-026	EP2112529-027	EP2112529-028	EP2112529-029	EP2112529-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	----	5.5	----	5.2
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	24	----	23
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	0.04	----	0.04
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	----	0.018	----	0.009
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	----	11	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	----	0.06	----	0.05
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	35	----	28
Liming Rate	----	1	kg CaCO3/t	----	----	3	----	2
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	0.06	----	0.05
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	35	----	28
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	3	----	2
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.6	6.6	6.7	6.5	6.6
pH (Fox)	----	0.1	pH Unit	3.7	3.9	3.8	3.6	3.5
Reaction Rate	----	1	-	Extreme	Extreme	Extreme	Extreme	Extreme

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH11_A_0.0	BH11_A_0.25	BH11_A_0.5	BH11_A_0.75	BH11_A_1.0
			Sampling date / time	19-Oct-2021 13:27	19-Oct-2021 13:27	19-Oct-2021 13:28	19-Oct-2021 13:28	19-Oct-2021 13:29
Compound	CAS Number	LOR	Unit	EP2112529-031	EP2112529-032	EP2112529-033	EP2112529-034	EP2112529-035
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.0**	**----**	**10.2**	**----**	**9.0**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	**0.005**	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.70**	**----**	**2.36**	**----**	**0.65**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**140**	**----**	**471**	**----**	**130**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.23**	**----**	**0.75**	**----**	**0.21**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.4**	**7.3**	**8.5**	**8.1**	**8.0**
pH (Fox)	----	0.1	pH Unit	**4.0**	**5.8**	**6.8**	**6.9**	**6.2**
Reaction Rate	----	1	-	**Extreme**	**Extreme**	**Strong**	**Strong**	**Strong**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH11_A_1.25	BH11_A_1.5	BH11_A_1.75	BH11_A_2.0	BH11_A_2.25
			Sampling date / time	19-Oct-2021 13:30	19-Oct-2021 13:30	19-Oct-2021 13:31	19-Oct-2021 13:31	19-Oct-2021 13:32
Compound	CAS Number	LOR	Unit	EP2112529-036	EP2112529-037	EP2112529-038	EP2112529-039	EP2112529-040
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.7	----	6.4	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	25	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.04	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	0.006	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.04	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	28	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	2	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.04	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	28	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	2	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.6	6.1	6.4	6.6	6.7
pH (Fox)	----	0.1	pH Unit	5.4	4.0	5.4	5.1	5.9
Reaction Rate	----	1	-	Extreme	Extreme	Extreme	Extreme	Extreme

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH11_A_2.5	BH11_A_2.75	BH11_A_3.0	BH11_A_3.25	BH11_A_3.5
			Sampling date / time	19-Oct-2021 13:33	19-Oct-2021 13:33	19-Oct-2021 13:33	19-Oct-2021 13:34	19-Oct-2021 13:34
Compound	CAS Number	LOR	Unit	EP2112529-041	EP2112529-042	EP2112529-043	EP2112529-044	EP2112529-045
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.6**	**----**	**6.6**	**----**	**7.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	**0.006**	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.27**	**----**	**0.15**	**----**	<0.01
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**55**	**----**	**30**	**----**	<10
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.09**	**----**	**0.05**	**----**	<0.01
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.8**	**6.8**	**6.9**	**7.2**	**7.2**
pH (Fox)	----	0.1	pH Unit	**5.2**	**4.8**	**4.4**	**5.3**	**5.8**
Reaction Rate	----	1	-	**Extreme**	**Strong**	**Strong**	**Moderate**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH11_A_3.75	BH11_A_4.0	BH11_A_4.25	BH11_A_4.5	BH11_A_4.75
			Sampling date / time	19-Oct-2021 13:35	19-Oct-2021 13:35	19-Oct-2021 13:35	19-Oct-2021 13:36	19-Oct-2021 13:36
Compound	CAS Number	LOR	Unit	EP2112529-046	EP2112529-047	EP2112529-048	EP2112529-049	EP2112529-050
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.9	----	7.0	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	<0.01	----	0.10	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	<10	----	20	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	<0.01	----	0.03	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	<1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.0	7.0	7.1	7.0	6.2
pH (Fox)	----	0.1	pH Unit	5.5	5.5	5.5	5.4	3.8
Reaction Rate	----	1	-	Strong	Moderate	Moderate	Moderate	Slight

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Sample ID	**SQA56**	**SQA57**	**----**	**----**	**----**
			Sampling date / time	19-Oct-2021 00:00	19-Oct-2021 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EP2112529-051**	**EP2112529-052**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.4**	**6.4**	**----**	**----**	**----**
pH (Fox)	----	0.1	pH Unit	**5.4**	**3.4**	**----**	**----**	**----**
Reaction Rate	----	1	-	**Moderate**	**Slight**	**----**	**----**	**----**

QUALITY CONTROL REPORT

Work Order	: **EP2112529**	Page	: 1 of 5
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 19-Oct-2021
Order number	: 30058301	Date Analysis Commenced	: 21-Oct-2021
C-O-C number	: 28957	Issue Date	: 03-Nov-2021
Sampler	: NICOLAS SOENENS		
Site	: GEHBI - WP4 19/11 ASS 2		
Quote number	: EP/529/21_V4		
No. of samples received	: 52		
No. of samples analysed	: 52		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3982719)									
EP2112529-001	BH11_A_5.5	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	6	6	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.0	6.0	0.0	0% - 20%
EP2112529-019	BH104_A_3.5	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	6	6	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.0	6.0	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 3982720)									
EP2112529-039	BH11_A_2.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.4	6.4	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3982719)									
EP2112529-001	BH11_A_5.5	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2112529-019	BH104_A_3.5	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 3982720)									
EP2112529-039	BH11_A_2.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	<0.005	18.2	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3982719)									
EP2112529-001	BH11_A_5.5	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-E: Acid Base Accounting (QC Lot: 3982719) - continued									
EP2112529-001	BH11_A_5.5	EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2112529-019	BH104_A_3.5	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3982720)									
EP2112529-039	BH11_A_2.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3974475)									
EP2112529-001	BH11_A_5.5	EA037: pH (F)	----	0.1	pH Unit	6.9	6.9	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	2.8	2.8	0.0	0% - 20%
EP2112529-010	BH104_A_1.25	EA037: pH (F)	----	0.1	pH Unit	6.1	6.1	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.9	3.9	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3974476)									
EP2112529-021	BH104_A_4.0	EA037: pH (F)	----	0.1	pH Unit	6.8	6.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.0	3.8	6.7	0% - 20%
EP2112529-030	BH104_A_6.0	EA037: pH (F)	----	0.1	pH Unit	6.6	6.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.5	3.4	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3974477)									
EP2112529-041	BH11_A_2.5	EA037: pH (F)	----	0.1	pH Unit	6.8	6.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.2	5.1	0.0	0% - 20%
EP2112529-050	BH11_A_4.75	EA037: pH (F)	----	0.1	pH Unit	6.2	6.2	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.8	3.8	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3982719)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	95.9	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 3982720)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	96.4	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3982719)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	104	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3982720)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	103	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3982719)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3982720)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	# 0.0	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3982719)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3982720)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2112529**	Page	: 1 of 7
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 19-Oct-2021
Site	: GEHBI - WP4 19/11 ASS 2	Issue Date	: 03-Nov-2021
Sampler	: NICOLAS SOENENS	No. of samples received	: 52
Order number	: 30058301	No. of samples analysed	: 52

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EA033-C: Acid Neutralising Capacity	QC-3982720-002	----	**Acid Neutralising Capacity (19A2)**	----	0.0 %	98.1-108%	**Recovery less than lower control limit**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
BH11_A_5.5,	BH11_A_6.0,	**19-Oct-2021**	**26-Oct-2021**	19-Oct-2022	✓	**02-Nov-2021**	24-Jan-2022	✓
BH104_A_0.0,	SQC052_A,							
BH104_A_0.5,	BH104_A_1.0,							
BH104_A_1.5,	BH104_A_2.0,							
BH104_A_2.5,	BH104_A_3.0,							
BH104_A_3.5,	BH104_A_4.0,							
BH104_A_4.5,	BH104_A_5.0,							
BH104_A_5.5,	BH104_A_6.0,							
BH11_A_0.0,	BH11_A_0.5,							
BH11_A_1.0,	BH11_A_1.5,							
BH11_A_2.0,	BH11_A_2.5,							
BH11_A_3.0,	BH11_A_3.5,							
BH11_A_4.0,	BH11_A_4.5							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
BH11_A_5.5,	BH11_A_6.0,	**19-Oct-2021**	**26-Oct-2021**	19-Oct-2022	✓	**02-Nov-2021**	24-Jan-2022	✓
BH104_A_0.0,	SQC052_A,							
BH104_A_0.5,	BH104_A_1.0,							
BH104_A_1.5,	BH104_A_2.0,							
BH104_A_2.5,	BH104_A_3.0,							
BH104_A_3.5,	BH104_A_4.0,							
BH104_A_4.5,	BH104_A_5.0,							
BH104_A_5.5,	BH104_A_6.0,							
BH11_A_0.0,	BH11_A_0.5,							
BH11_A_1.0,	BH11_A_1.5,							
BH11_A_2.0,	BH11_A_2.5,							
BH11_A_3.0,	BH11_A_3.5,							
BH11_A_4.0,	BH11_A_4.5							
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033)								
BH11_A_5.5,	BH11_A_6.0,	**19-Oct-2021**	**26-Oct-2021**	19-Oct-2022	✓	**02-Nov-2021**	24-Jan-2022	✓
BH104_A_0.0,	SQC052_A,							
BH104_A_0.5,	BH104_A_1.0,							
BH104_A_1.5,	BH104_A_2.0,							
BH104_A_2.5,	BH104_A_3.0,							
BH104_A_3.5,	BH104_A_4.0,							
BH104_A_4.5,	BH104_A_5.0,							
BH104_A_5.5,	BH104_A_6.0,							
BH11_A_0.0,	BH11_A_0.5,							
BH11_A_1.0,	BH11_A_1.5,							
BH11_A_2.0,	BH11_A_2.5,							
BH11_A_3.0,	BH11_A_3.5,							
BH11_A_4.0,	BH11_A_4.5							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033)								
BH11_A_5.5,	BH11_A_6.0,	**19-Oct-2021**	**26-Oct-2021**	19-Oct-2022	✓	**02-Nov-2021**	24-Jan-2022	✓
BH104_A_0.0,	SQC052_A,							
BH104_A_0.5,	BH104_A_1.0,							
BH104_A_1.5,	BH104_A_2.0,							
BH104_A_2.5,	BH104_A_3.0,							
BH104_A_3.5,	BH104_A_4.0,							
BH104_A_4.5,	BH104_A_5.0,							
BH104_A_5.5,	BH104_A_6.0,							
BH11_A_0.0,	BH11_A_0.5,							
BH11_A_1.0,	BH11_A_1.5,							
BH11_A_2.0,	BH11_A_2.5,							
BH11_A_3.0,	BH11_A_3.5,							
BH11_A_4.0,	BH11_A_4.5							
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033)								
BH11_A_5.5,	BH11_A_6.0,	**19-Oct-2021**	**26-Oct-2021**	19-Oct-2022	✓	**02-Nov-2021**	24-Jan-2022	✓
BH104_A_0.0,	SQC052_A,							
BH104_A_0.5,	BH104_A_1.0,							
BH104_A_1.5,	BH104_A_2.0,							
BH104_A_2.5,	BH104_A_3.0,							
BH104_A_3.5,	BH104_A_4.0,							
BH104_A_4.5,	BH104_A_5.0,							
BH104_A_5.5,	BH104_A_6.0,							
BH11_A_0.0,	BH11_A_0.5,							
BH11_A_1.0,	BH11_A_1.5,							
BH11_A_2.0,	BH11_A_2.5,							
BH11_A_3.0,	BH11_A_3.5,							
BH11_A_4.0,	BH11_A_4.5							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis							
Snap Lock Bag - frozen (EA037)							
BH11_A_5.5, BH11_A_5.75, BH11_A_6.0, BH104_A_0.0, SQC052_A, BH104_A_0.25, BH104_A_0.5, BH104_A_0.75, BH104_A_1.0, BH104_A_1.25, BH104_A_1.5, BH104_A_1.75, BH104_A_2.0, BH104_A_2.25, BH104_A_2.5, BH104_A_2.75, BH104_A_3.0, BH104_A_3.25, BH104_A_3.5, BH104_A_3.75, BH104_A_4.0, BH104_A_4.25, BH104_A_4.5, BH104_A_4.75, BH104_A_5.0, BH104_A_5.25, SQC053_A, BH104_A_5.5, BH104_A_5.75, BH104_A_6.0, BH11_A_0.0, BH11_A_0.25, BH11_A_0.5, BH11_A_0.75, BH11_A_1.0, BH11_A_1.25, BH11_A_1.5, BH11_A_1.75, SQA56, BH11_A_2.0, BH11_A_2.25, BH11_A_2.5, BH11_A_2.75, BH11_A_3.0, BH11_A_3.25, BH11_A_3.5, BH11_A_3.75, BH11_A_4.0, BH11_A_4.25, BH11_A_4.5, BH11_A_4.75, SQA57	**19-Oct-2021**	**21-Oct-2021**	17-Apr-2022	✓	**21-Oct-2021**	17-Apr-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	6	52	**11.54**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	26	**11.54**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Environmental Division
Perth
Work Order Reference
EP2112530

Telephone : -- 61-8-9406 1301

ALSCompass SAMPLING Intelligence

Custody Document for Submissions via ALS Compass App

Project: CEMBJ **Client:** ARCADIS **Project Manager:** BROWN

Phone: ( )

ALS Compass COC Reference: 28957 28909 28908 **# Samples:** 130 **Sampler:** NICOLAS S.

Phone: (+32 471 23 16 18

Turnaround Requirements: ~~Standard~~ 8 Urgent

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	(N/A)
	Free ice / frozen ice bricks upon receipt?	(YES)	NO	N/A
	Random sample temperature on receipt?	5.6	°C	

Custody:

Relinquished by:	Received by: SP	Relinquished by:	Received by:
Date / Time:	Date / Time: 1800 19/10/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: **28918** *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH139_A_0.0		19/10/2021 08:05 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	BH139_A_0.25		19/10/2021 08:12 AM	Soil	ALS: 1 Non ALS: 0	No	X			
003	BH139_A_0.5		19/10/2021 08:12 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
004	BH139_A_0.75		19/10/2021 08:13 AM	Soil	ALS: 1 Non ALS: 0	No	X			
005	BH139_A_1.0		19/10/2021 08:14 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
006	BH139_A_1.25		19/10/2021 08:15 AM	Soil	ALS: 1 Non ALS: 0	No	X			
007	BH139_A_1.5		19/10/2021 08:16 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
008	BH139_A_1.75		19/10/2021 08:17 AM	Soil	ALS: 1 Non ALS: 0	No	X			
009	BH139_A_2.0		19/10/2021 08:17 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 28918 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

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SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	BH139_A_2.25		19/10/2021 08:19 AM	Soil	ALS: 1 Non ALS: 0	No	X			
011	BH139_A_2.5		19/10/2021 08:19 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
012	BH139_A_2.75		19/10/2021 08:20 AM	Soil	ALS: 1 Non ALS: 0	No	X			
013	BH139_A_3.0		19/10/2021 08:21 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
014	BH139_A_3.25		19/10/2021 08:22 AM	Soil	ALS: 1 Non ALS: 0	No	X			
015	BH139_A_3.5		19/10/2021 08:22 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
016	BH139_A_3.75		19/10/2021 08:23 AM	Soil	ALS: 1 Non ALS: 0	No	X			
017	BH139_A_4.0		19/10/2021 08:24 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
018	BH139_A_4.25		19/10/2021 08:24 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

(ALS) COC#: 28918 *ALS Laboratory:* EP Perth

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CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

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ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

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SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	BH139_A_4.5		19/10/2021 08:25 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
020	BH139_A_4.75		19/10/2021 08:27 AM	Soil	ALS: 1 Non ALS: 0	No	X			
021	BH139_A_5.0		19/10/2021 08:27 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
022	BH139_A_5.25		19/10/2021 08:29 AM	Soil	ALS: 1 Non ALS: 0	No	X			
023	BH139_A_5.5		19/10/2021 08:30 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
024	BH139_A_5.75		19/10/2021 08:31 AM	Soil	ALS: 1 Non ALS: 0	No	X			
025	BH139_A_6.0		19/10/2021 08:32 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
026	SQC047_A		19/10/2021 08:40 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
027	SQC051_A		19/10/2021 10:31 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: 28918 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

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SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	BH11_A_0.0		19/10/2021 10:32 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
029	BH11_A_0.25		19/10/2021 10:33 AM	Soil	ALS: 1 Non ALS: 0	No	X			
030	BH11_A_0.5		19/10/2021 10:34 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
031	BH11_A_0.75		19/10/2021 10:35 AM	Soil	ALS: 1 Non ALS: 0	No	X			
032	BH11_A_1.0		19/10/2021 10:36 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
033	BH11_A_1.25		19/10/2021 10:37 AM	Soil	ALS: 1 Non ALS: 0	No	X			
034	BH11_A_1.5		19/10/2021 10:37 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
035	BH11_A_1.75		19/10/2021 10:38 AM	Soil	ALS: 1 Non ALS: 0	No	X			
036	BH11_A_2.0		19/10/2021 10:39 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

ALS COC#: **28918** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE: / EP2021HYDCON0003

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TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
037	BH11_A_2.25		19/10/2021 10:40 AM	Soil	ALS: 1 Non ALS: 0	No	X			
038	BH11_A_2.5		19/10/2021 10:40 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
039	BH11_A_2.75		19/10/2021 10:41 AM	Soil	ALS: 1 Non ALS: 0	No	X			
040	BH11_A_3.0		19/10/2021 10:41 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
041	B11_A_3.25		19/10/2021 10:42 AM	Soil	ALS: 1 Non ALS: 0	No	X			
042	BH11_A_3.5		19/10/2021 10:43 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
043	BH11_A_3.75		19/10/2021 10:43 AM	Soil	ALS: 1 Non ALS: 0	No	X			
044	BH11_A_4.0		19/10/2021 10:44 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
045	BH11_A_4.25		19/10/2021 10:45 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 28918 *ALS Laboratory:* EP Perth

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DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS

ORDER NO: 30058301

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WP4A- Suite 2A Acid Sulphates SOIL	WP4B- Suite 2B Chromium Suite SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
046	BH11_A_4.5		19/10/2021 10:45 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
047	BH11_A_4.75		19/10/2021 10:46 AM	Soil	ALS: 1 Non ALS: 0	No	X			
048	BH11_A_5.0		19/10/2021 10:47 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
049	BH11_A_5.25		19/10/2021 10:48 AM	Soil	ALS: 1 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 28918 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH139_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621066402	Green	No	
001	BH139_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621066398	Green	No	
002	BH139_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621066399	Green	No	
003	BH139_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621066400	Green	No	
003	BH139_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621066401	Green	No	
004	BH139_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621066403	Green	No	
005	BH139_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621066404	Green	No	
005	BH139_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621066405	Green	No	
006	BH139_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621066406	Green	No	
007	BH139_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621066408	Green	No	
007	BH139_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621066409	Green	No	
008	BH139_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621066407	Green	No	
009	BH139_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621066410	Green	No	
009	BH139_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621066411	Green	No	
010	BH139_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621066412	Green	No	
011	BH139_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621066413	Green	No	
011	BH139_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621066414	Green	No	
012	BH139_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621066415	Green	No	
013	BH139_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621066416	Green	No	
013	BH139_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621066417	Green	No	
014	BH139_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621066418	Green	No	
015	BH139_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621066419	Green	No	
015	BH139_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621066391	Green	No	
016	BH139_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621066392	Green	No	
017	BH139_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621066393	Green	No	
017	BH139_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621066394	Green	No	

CHAIN OF CUSTODY

ALS COC#: 28918 *ALS Laboratory:* EP Perth

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Nicolas Soenens QUOTE NO: EP/529/21 / EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

018	BH139_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621066395	Green	No	
019	BH139_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621066396	Green	No	
019	BH139_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621066427	Green	No	
020	BH139_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621066397	Green	No	
021	BH139_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621066420	Green	No	
021	BH139_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621066421	Green	No	
022	BH139_A_5.25	Snap Lock Bag - frozen	1 Medium	00130621066422	Green	No	
023	BH139_A_5.5	Snap Lock Bag - frozen	1 Medium	00130621066423	Green	No	
023	BH139_A_5.5	Snap Lock Bag - frozen	1 Small	00130621066428	Green	No	
024	BH139_A_5.75	Snap Lock Bag - frozen	1 Medium	00130621066424	Green	No	
025	BH139_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621066425	Green	No	
025	BH139_A_6.0	Snap Lock Bag - frozen	1 Medium	00130621066426	Green	No	
026	SQC047_A	Snap Lock Bag - frozen	1 Medium	00130621066429	Green	No	
026	SQC047_A	Snap Lock Bag - frozen	1 Medium	00130621066430	Green	No	
027	SQC051_A	Snap Lock Bag - frozen	1 Medium	00130621066462	Green	No	
027	SQC051_A	Snap Lock Bag - frozen	1 Medium	00130621066463	Green	No	
028	BH11_A_0.0	Snap Lock Bag - frozen	1 Medium	00130621066460	Green	No	
028	BH11_A_0.0	Snap Lock Bag - frozen	1 Medium	0013062102z46z	Green	No	
029	BH11_A_0.25	Snap Lock Bag - frozen	1 Medium	00130621066464	Green	No	
030	BH11_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621066465	Green	No	
030	BH11_A_0.5	Snap Lock Bag - frozen	1 Medium	00130621066466	Green	No	
031	BH11_A_0.75	Snap Lock Bag - frozen	1 Medium	00130621066467	Green	No	
032	BH11_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621066468	Green	No	
032	BH11_A_1.0	Snap Lock Bag - frozen	1 Medium	00130621066469	Green	No	
033	BH11_A_1.25	Snap Lock Bag - frozen	1 Medium	00130621066470	Green	No	
034	BH11_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621066471	Green	No	
034	BH11_A_1.5	Snap Lock Bag - frozen	1 Medium	00130621066472	Green	No	

CHAIN OF CUSTODY

COC#: **28918** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: HYDCON - ARCADIS AUSTRALIA PACIFIC PTY LTD

PROJECT: Great Eastern Highway Bypass Interchange

SITE: GEHBI - WP4 19/11 ASS

ORDER NO: 30058301

PROJECT MANAGER: Bronwyn Vanvalkengoed

PRIMARY SAMPLER: Nicolas Soenens

CONTACT PH:

QUOTE NO: EP/529/21

SAMPLER MOBILE:

/ EP2021HYDCON0003

EMAIL REPORTS TO: bronwyn.vanvalkengoed@arcadis.com

EMAIL INVOICES TO: bronwyn.vanvalkengoed@arcadis.com, au.accounts.payable@arcadis.com, nixon.edwards@arcadis.com

TURNAROUND REQUIREMENTS : 7 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

035	BH11_A_1.75	Snap Lock Bag - frozen	1 Medium	00130621066473	Green	No	
036	BH11_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621066474	Green	No	
036	BH11_A_2.0	Snap Lock Bag - frozen	1 Medium	00130621066475	Green	No	
037	BH11_A_2.25	Snap Lock Bag - frozen	1 Medium	00130621066476	Green	No	
038	BH11_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621066477	Green	No	
038	BH11_A_2.5	Snap Lock Bag - frozen	1 Medium	00130621066478	Green	No	
039	BH11_A_2.75	Snap Lock Bag - frozen	1 Medium	00130621066479	Green	No	
040	BH11_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621066480	Green	No	
040	BH11_A_3.0	Snap Lock Bag - frozen	1 Medium	00130621066481	Green	No	
041	B11_A_3.25	Snap Lock Bag - frozen	1 Medium	00130621066482	Green	No	
042	BH11_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621066483	Green	No	
042	BH11_A_3.5	Snap Lock Bag - frozen	1 Medium	00130621066484	Green	No	
043	BH11_A_3.75	Snap Lock Bag - frozen	1 Medium	00130621066485	Green	No	
044	BH11_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621066486	Green	No	
044	BH11_A_4.0	Snap Lock Bag - frozen	1 Medium	00130621066487	Green	No	
045	BH11_A_4.25	Snap Lock Bag - frozen	1 Medium	00130621066488	Green	No	
046	BH11_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621066489	Green	No	
046	BH11_A_4.5	Snap Lock Bag - frozen	1 Medium	00130621066431	Green	No	
047	BH11_A_4.75	Snap Lock Bag - frozen	1 Medium	00130621066432	Green	No	
048	BH11_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621066433	Green	No	
048	BH11_A_5.0	Snap Lock Bag - frozen	1 Medium	00130621066459	Green	No	
049	BH11_A_5.25	Snap Lock Bag - frozen	1 Medium	00130621066434	Green	No	

Total Bottle Count: ALS: 75, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2112530**		
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bronwyn.vanvalkengoed@arcadis.com	E-mail	: rhiannon.steere@alsglobal.com
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: Great Eastern Highway Bypass Interchange	Page	: 1 of 3
Order number	: 30058301	Quote number	: EP2021HYDCON0003_V4 (EP/529/21_V4)
C-O-C number	: 28918	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: GEHBI - WP4 19/11 ASS		
Sampler	: BRONWYN VAN VALKENGOED, NICOLAS SOENENS		

Dates

Date Samples Received	: 19-Oct-2021 18:00	Issue Date	: 19-Oct-2021
Client Requested Due Date	: 03-Nov-2021	Scheduled Reporting Date	: **03-Nov-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 6	Temperature	: 5.6 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 50 / 50

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2112530-001	19-Oct-2021 08:05	BH139_A_0.0	✓	✓
EP2112530-002	19-Oct-2021 08:12	BH139_A_0.25		✓
EP2112530-003	19-Oct-2021 08:12	BH139_A_0.5	✓	✓
EP2112530-004	19-Oct-2021 08:13	BH139_A_0.75		✓
EP2112530-005	19-Oct-2021 08:14	BH139_A_1.0	✓	✓
EP2112530-006	19-Oct-2021 08:15	BH139_A_1.25		✓
EP2112530-007	19-Oct-2021 08:16	BH139_A_1.5	✓	✓
EP2112530-008	19-Oct-2021 08:17	BH139_A_1.75		✓
EP2112530-009	19-Oct-2021 08:17	BH139_A_2.0	✓	✓
EP2112530-010	19-Oct-2021 08:19	BH139_A_2.25		✓
EP2112530-011	19-Oct-2021 08:19	BH139_A_2.5	✓	✓
EP2112530-012	19-Oct-2021 08:20	BH139_A_2.75		✓
EP2112530-013	19-Oct-2021 08:21	BH139_A_3.0	✓	✓
EP2112530-014	19-Oct-2021 08:22	BH139_A_3.25		✓
EP2112530-015	19-Oct-2021 08:22	BH139_A_3.5	✓	✓
EP2112530-016	19-Oct-2021 08:23	BH139_A_3.75		✓
EP2112530-017	19-Oct-2021 08:24	BH139_A_4.0	✓	✓
EP2112530-018	19-Oct-2021 08:24	BH139_A_4.25		✓
EP2112530-019	19-Oct-2021 08:25	BH139_A_4.5	✓	✓
EP2112530-020	19-Oct-2021 08:27	BH139_A_4.75		✓
EP2112530-021	19-Oct-2021 08:27	BH139_A_5.0	✓	✓
EP2112530-022	19-Oct-2021 08:29	BH139_A_5.25		✓
EP2112530-023	19-Oct-2021 08:30	BH139_A_5.5	✓	✓
EP2112530-024	19-Oct-2021 08:31	BH139_A_5.75		✓
EP2112530-025	19-Oct-2021 08:32	BH139_A_6.0	✓	✓
EP2112530-026	19-Oct-2021 08:40	SQC047_A	✓	✓
EP2112530-027	19-Oct-2021 10:31	SQC051_A	✓	✓
EP2112530-028	19-Oct-2021 10:32	BH11_A_0.0	✓	✓
EP2112530-029	19-Oct-2021 10:33	BH11_A_0.25		✓
EP2112530-030	19-Oct-2021 10:34	BH11_A_0.5	✓	✓
EP2112530-031	19-Oct-2021 10:35	BH11_A_0.75		✓
EP2112530-032	19-Oct-2021 10:36	BH11_A_1.0	✓	✓
EP2112530-033	19-Oct-2021 10:37	BH11_A_1.25		✓
EP2112530-034	19-Oct-2021 10:37	BH11_A_1.5	✓	✓
EP2112530-035	19-Oct-2021 10:38	BH11_A_1.75		✓

			SOIL - EA033-WA WA - Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EP2112530-036	19-Oct-2021 10:39	BH11_A_2.0	✓	✓
EP2112530-037	19-Oct-2021 10:40	BH11_A_2.25		✓
EP2112530-038	19-Oct-2021 10:40	BH11_A_2.5	✓	✓
EP2112530-039	19-Oct-2021 10:41	BH11_A_2.75		✓
EP2112530-040	19-Oct-2021 10:41	BH11_A_3.0	✓	✓
EP2112530-041	19-Oct-2021 10:42	B11_A_3.25		✓
EP2112530-042	19-Oct-2021 10:43	BH11_A_3.5	✓	✓
EP2112530-043	19-Oct-2021 10:43	BH11_A_3.75		✓
EP2112530-044	19-Oct-2021 10:44	BH11_A_4.0	✓	✓
EP2112530-045	19-Oct-2021 10:45	BH11_A_4.25		✓
EP2112530-046	19-Oct-2021 10:45	BH11_A_4.5	✓	✓
EP2112530-047	19-Oct-2021 10:46	BH11_A_4.75		✓
EP2112530-048	19-Oct-2021 10:47	BH11_A_5.0	✓	✓
EP2112530-049	19-Oct-2021 10:48	BH11_A_5.25		✓
EP2112530-050	19-Oct-2021 00:00	SQA052		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	AU.Accounts.Payable@arcadis.com

BRONWYN VAN VALKENGOED

- *AU Certificate of Analysis - NATA (COA)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bronwyn.vanvalkengoed@arcadis.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bronwyn.vanvalkengoed@arcadis.com
- A4 - AU Tax Invoice (INV)	Email	bronwyn.vanvalkengoed@arcadis.com
- Chain of Custody (CoC) (COC)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ENMRG (ENMRG)	Email	bronwyn.vanvalkengoed@arcadis.com
- EDI Format - ESDAT (ESDAT)	Email	bronwyn.vanvalkengoed@arcadis.com

Nixon Edward

- A4 - AU Tax Invoice (INV)	Email	Nixon.Edward@arcadis.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2112530**	Page	: 1 of 13
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 19-Oct-2021 18:00
Order number	: 30058301	Date Analysis Commenced	: 21-Oct-2021
C-O-C number	: 28918	Issue Date	: 03-Nov-2021 17:21
Sampler	: BRONWYN VAN VALKENGOED, NICOLAS SOENENS		
Site	: GEHBI - WP4 19/11 ASS		
Quote number	: EP/529/21_V4		
No. of samples received	: 50		
No. of samples analysed	: 50		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)			Sample ID	**BH139_A_2.75**	**----**	**----**	**----**	**----**
			Sampling date / time	19-Oct-2021 08:20	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EP2112530-012**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.1**	**----**	**----**	**----**	**----**
pH (Fox)	----	0.1	pH Unit	**4.7**	**----**	**----**	**----**	**----**
Reaction Rate	----	1	-	**Slight**	**----**	**----**	**----**	**----**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH139_A_0.0	BH139_A_0.25	BH139_A_0.5	BH139_A_0.75	BH139_A_1.0
			Sampling date / time	19-Oct-2021 08:05	19-Oct-2021 08:12	19-Oct-2021 08:12	19-Oct-2021 08:13	19-Oct-2021 08:14
Compound	CAS Number	LOR	Unit	EP2112530-001	EP2112530-002	EP2112530-003	EP2112530-004	EP2112530-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.2**	**----**	**9.0**	**----**	**7.9**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.009**	**----**	**0.008**	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**6.30**	**----**	**1.19**	**----**	**0.15**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**1260**	**----**	**238**	**----**	**30**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**2.02**	**----**	**0.38**	**----**	**0.05**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.9**	**7.7**	**7.8**	**7.8**	**7.8**
pH (Fox)	----	0.1	pH Unit	**5.8**	**5.9**	**5.9**	**6.0**	**6.1**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH139_A_1.25	BH139_A_1.5	BH139_A_1.75	BH139_A_2.0	BH139_A_2.25
			Sampling date / time	19-Oct-2021 08:15	19-Oct-2021 08:16	19-Oct-2021 08:17	19-Oct-2021 08:17	19-Oct-2021 08:19
Compound	CAS Number	LOR	Unit	EP2112530-006	EP2112530-007	EP2112530-008	EP2112530-009	EP2112530-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.8	----	6.2	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	5	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.005	----	0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	0.20	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	40	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.06	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.6	7.6	7.4	7.2	6.5
pH (Fox)	----	0.1	pH Unit	6.0	6.0	6.3	5.7	5.0
Reaction Rate	----	1	-	Moderate	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH139_A_2.5	BH139_A_3.0	BH139_A_3.25	BH139_A_3.5	BH139_A_3.75
			Sampling date / time	19-Oct-2021 08:19	19-Oct-2021 08:21	19-Oct-2021 08:22	19-Oct-2021 08:22	19-Oct-2021 08:23
Compound	CAS Number	LOR	Unit	EP2112530-011	EP2112530-013	EP2112530-014	EP2112530-015	EP2112530-016
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.8**	**6.4**	**----**	**5.6**	**----**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**16**	**4**	**----**	**27**	**----**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.03**	<0.02	**----**	**0.04**	**----**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	**----**	**0.005**	**----**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**----**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S	**0.03**	<0.02	**----**	**0.05**	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	**19**	<10	**----**	**31**	**----**
Liming Rate	----	1	kg CaCO3/t	**1**	<1	**----**	**2**	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.03**	<0.02	**----**	**0.05**	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**19**	<10	**----**	**31**	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	<1	**----**	**2**	**----**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.3**	**5.7**	**5.6**	**5.8**	**5.7**
pH (Fox)	----	0.1	pH Unit	**4.9**	**4.6**	**4.4**	**4.5**	**4.5**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH139_A_4.0	BH139_A_4.25	BH139_A_4.5	BH139_A_4.75	BH139_A_5.0
			Sampling date / time	19-Oct-2021 08:24	19-Oct-2021 08:24	19-Oct-2021 08:25	19-Oct-2021 08:27	19-Oct-2021 08:27
Compound	CAS Number	LOR	Unit	EP2112530-017	EP2112530-018	EP2112530-019	EP2112530-020	EP2112530-021
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.7**	**----**	**5.4**	**----**	**6.3**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**29**	**----**	**4**	**----**	**4**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.05**	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.006**	**----**	<0.005	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.05**	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	**33**	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	**2**	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.05**	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**33**	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	**2**	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.9**	**5.7**	**5.8**	**5.7**	**5.9**
pH (Fox)	----	0.1	pH Unit	**4.6**	**4.5**	**4.5**	**4.6**	**4.4**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH139_A_5.25	BH139_A_5.5	BH139_A_5.75	BH139_A_6.0	SQC047_A
			Sampling date / time	19-Oct-2021 08:29	19-Oct-2021 08:30	19-Oct-2021 08:31	19-Oct-2021 08:32	19-Oct-2021 08:40
Compound	CAS Number	LOR	Unit	EP2112530-022	EP2112530-023	EP2112530-024	EP2112530-025	EP2112530-026
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.4	----	6.3	6.4
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	2	----	5	2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	----	0.005	0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	<10
Liming Rate	----	1	kg CaCO3/t	----	<1	----	1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	1	<1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.7	5.9	6.0	5.9	5.8
pH (Fox)	----	0.1	pH Unit	4.3	4.4	4.4	4.4	4.4
Reaction Rate	----	1	-	Slight	Slight	Slight	Slight	Slight

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SQC051_A	BH11_A_0.0	BH11_A_0.25	BH11_A_0.5	BH11_A_0.75
			Sampling date / time	19-Oct-2021 10:31	19-Oct-2021 10:32	19-Oct-2021 10:33	19-Oct-2021 10:34	19-Oct-2021 10:35
Compound	CAS Number	LOR	Unit	EP2112530-027	EP2112530-028	EP2112530-029	EP2112530-030	EP2112530-031
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.2	5.9	----	6.0	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	6	10	----	14	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	0.02	----	0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	0.006	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	0.02	0.02	----	0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	10	14	----	15	----
Liming Rate	----	1	kg CaCO3/t	1	1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.02	0.02	----	0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	10	14	----	15	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.3	6.1	6.4	6.6	6.2
pH (Fox)	----	0.1	pH Unit	4.2	3.8	4.2	4.3	3.7
Reaction Rate	----	1	-	Moderate	Moderate	Moderate	Moderate	Moderate

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH11_A_1.0	BH11_A_1.25	BH11_A_1.5	BH11_A_1.75	BH11_A_2.0
			Sampling date / time	19-Oct-2021 10:36	19-Oct-2021 10:37	19-Oct-2021 10:37	19-Oct-2021 10:38	19-Oct-2021 10:39
Compound	CAS Number	LOR	Unit	EP2112530-032	EP2112530-033	EP2112530-034	EP2112530-035	EP2112530-036
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.4	----	5.8	----	6.0
Titratable Actual Acidity (23F)	----	2	mole H+ / t	40	----	15	----	9
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.06	----	0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.014	----	0.005	----	0.008
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.08	----	0.03	----	0.02
Net Acidity (acidity units)	----	10	mole H+ / t	49	----	18	----	14
Liming Rate	----	1	kg CaCO3/t	4	----	1	----	1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.08	----	0.03	----	0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	49	----	18	----	14
Liming Rate excluding ANC	----	1	kg CaCO3/t	4	----	1	----	1
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.9	6.3	6.3	6.3	6.1
pH (Fox)	----	0.1	pH Unit	3.1	4.2	5.3	6.6	5.9
Reaction Rate	----	1	-	Moderate	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH11_A_2.25	BH11_A_2.5	BH11_A_2.75	BH11_A_3.0	B11_A_3.25
			Sampling date / time	19-Oct-2021 10:40	19-Oct-2021 10:40	19-Oct-2021 10:41	19-Oct-2021 10:41	19-Oct-2021 10:42
Compound	CAS Number	LOR	Unit	EP2112530-037	EP2112530-038	EP2112530-039	EP2112530-040	EP2112530-041
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.7	----	5.5	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	14	----	14	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.02	----	0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.006	----	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.03	----	0.03	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	18	----	16	----
Liming Rate	----	1	kg CaCO3/t	----	1	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.03	----	0.03	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	18	----	16	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	----	1	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.1	6.1	5.9	5.9	5.7
pH (Fox)	----	0.1	pH Unit	5.2	5.6	5.5	6.0	4.3
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Strong

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH11_A_3.5	BH11_A_3.75	BH11_A_4.0	BH11_A_4.25	BH11_A_4.5
			Sampling date / time	19-Oct-2021 10:43	19-Oct-2021 10:43	19-Oct-2021 10:44	19-Oct-2021 10:45	19-Oct-2021 10:45
Compound	CAS Number	LOR	Unit	EP2112530-042	EP2112530-043	EP2112530-044	EP2112530-045	EP2112530-046
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.1**	**----**	**5.2**	**----**	**5.4**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**19**	**----**	**32**	**----**	**24**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.03**	**----**	**0.05**	**----**	**0.04**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.005**	**----**	**0.013**	**----**	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.04**	**----**	**0.06**	**----**	**0.04**
Net Acidity (acidity units)	----	10	mole H+ / t	**22**	**----**	**40**	**----**	**25**
Liming Rate	----	1	kg CaCO3/t	**2**	**----**	**3**	**----**	**2**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.04**	**----**	**0.06**	**----**	**0.04**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**22**	**----**	**40**	**----**	**25**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**2**	**----**	**3**	**----**	**2**
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**6.2**	**6.2**	**6.2**	**6.1**	**6.4**
pH (Fox)	----	0.1	pH Unit	**4.1**	**4.2**	**3.5**	**3.9**	**3.9**
Reaction Rate	----	1	-	**Extreme**	**Extreme**	**Extreme**	**Extreme**	**Extreme**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH11_A_4.75	BH11_A_5.0	BH11_A_5.25	SQA052	----
			Sampling date / time	19-Oct-2021 10:46	19-Oct-2021 10:47	19-Oct-2021 10:48	19-Oct-2021 00:00	----
Compound	CAS Number	LOR	Unit	EP2112530-047	EP2112530-048	EP2112530-049	EP2112530-050	--------
				Result	Result	Result	Result	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.6	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	18	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.03	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.006	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.03	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	21	----	----	----
Liming Rate	----	1	kg CaCO3/t	----	2	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.03	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	21	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	2	----	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.3	6.4	6.5	6.4	----
pH (Fox)	----	0.1	pH Unit	3.8	3.7	3.8	4.1	----
Reaction Rate	----	1	-	Extreme	Extreme	Extreme	Extreme	----

QUALITY CONTROL REPORT

Work Order	: **EP2112530**	Page	: 1 of 4
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Contact	: Rhiannon Steere
Address	: LEVEL 5 225 ST GEORGES TERRACE PERTH Western Australia 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9213 6700	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 19-Oct-2021
Order number	: 30058301	Date Analysis Commenced	: 21-Oct-2021
C-O-C number	: 28918	Issue Date	: 03-Nov-2021
Sampler	: BRONWYN VAN VALKENGOED, NICOLAS SOENENS		
Site	: GEHBI - WP4 19/11 ASS		
Quote number	: EP/529/21_V4		
No. of samples received	: 50		
No. of samples analysed	: 50		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 3982721)									
EP2112530-001	BH139_A_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.2	9.2	0.0	0% - 20%
EP2112530-021	BH139_A_5.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	4	4	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.3	6.3	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 3982722)									
EP2112530-038	BH11_A_2.5	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.02	0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	14	14	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.7	5.6	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3982721)									
EP2112530-001	BH139_A_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.009	0.008	11.8	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2112530-021	BH139_A_5.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 3982722)									
EP2112530-038	BH11_A_2.5	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	<0.005	18.2	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3982721)									
EP2112530-001	BH139_A_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	6.30	6.34	0.6	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-C: Acid Neutralising Capacity (QC Lot: 3982721) - continued									
EP2112530-001	BH139_A_0.0	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	2.02	2.03	0.5	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1260	1270	0.7	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 3982721)									
EP2112530-001	BH139_A_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2112530-021	BH139_A_5.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 3982722)									
EP2112530-038	BH11_A_2.5	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.03	0.02	40.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.03	0.02	40.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	18	15	18.2	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	18	15	18.2	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3977202)									
EP2112530-001	BH139_A_0.0	EA037: pH (F)	----	0.1	pH Unit	7.9	7.9	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.8	5.9	0.0	0% - 20%
EP2112530-010	BH139_A_2.25	EA037: pH (F)	----	0.1	pH Unit	6.5	6.4	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.0	5.0	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3977203)									
EP2112530-021	BH139_A_5.0	EA037: pH (F)	----	0.1	pH Unit	5.9	6.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.4	4.4	0.0	0% - 20%
EP2112530-030	BH11_A_0.5	EA037: pH (F)	----	0.1	pH Unit	6.6	6.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.3	4.3	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3977204)									
EP2112530-041	B11_A_3.25	EA037: pH (F)	----	0.1	pH Unit	5.7	5.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.3	4.3	0.0	0% - 20%
EP2112530-050	SQA052	EA037: pH (F)	----	0.1	pH Unit	6.4	6.4	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.1	4.0	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3982721)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	96.4	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 3982722)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	96.4	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3982721)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	105	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3982722)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	103	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3982721)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3982721)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 3982722)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2112530**	Page	: 1 of 6
Client	: **ARCADIS AUSTRALIA PACIFIC PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS BRONWYN VAN VALKENGOED	Telephone	: 08 9406 1306
Project	: Great Eastern Highway Bypass Interchange	Date Samples Received	: 19-Oct-2021
Site	: GEHBI - WP4 19/11 ASS	Issue Date	: 03-Nov-2021
Sampler	: BRONWYN VAN VALKENGOED, NICOLAS SOENENS	No. of samples received	: 50
Order number	: 30058301	No. of samples analysed	: 50

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
BH139_A_0.0,	BH139_A_0.5,	**19-Oct-2021**	**03-Nov-2021**	19-Oct-2022	✓	**03-Nov-2021**	01-Feb-2022	✓
BH139_A_1.0,	BH139_A_1.5,							
BH139_A_2.0,	BH139_A_2.5,							
BH139_A_3.0,	BH139_A_3.5,							
BH139_A_4.0,	BH139_A_4.5,							
BH139_A_5.0,	BH139_A_5.5,							
BH139_A_6.0,	SQC047_A,							
SQC051_A,	BH11_A_0.0,							
BH11_A_0.5,	BH11_A_1.0,							
BH11_A_1.5,	BH11_A_2.0,							
BH11_A_2.5,	BH11_A_3.0,							
BH11_A_3.5,	BH11_A_4.0,							
BH11_A_4.5,	BH11_A_5.0							
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
BH139_A_0.0,	BH139_A_0.5,	**19-Oct-2021**	**03-Nov-2021**	19-Oct-2022	✓	**03-Nov-2021**	01-Feb-2022	✓
BH139_A_1.0,	BH139_A_1.5,							
BH139_A_2.0,	BH139_A_2.5,							
BH139_A_3.0,	BH139_A_3.5,							
BH139_A_4.0,	BH139_A_4.5,							
BH139_A_5.0,	BH139_A_5.5,							
BH139_A_6.0,	SQC047_A,							
SQC051_A,	BH11_A_0.0,							
BH11_A_0.5,	BH11_A_1.0,							
BH11_A_1.5,	BH11_A_2.0,							
BH11_A_2.5,	BH11_A_3.0,							
BH11_A_3.5,	BH11_A_4.0,							
BH11_A_4.5,	BH11_A_5.0							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033)								
BH139_A_0.0,	BH139_A_0.5,	**19-Oct-2021**	**03-Nov-2021**	19-Oct-2022	✓	**03-Nov-2021**	01-Feb-2022	✓
BH139_A_1.0,	BH139_A_1.5,							
BH139_A_2.0,	BH139_A_2.5,							
BH139_A_3.0,	BH139_A_3.5,							
BH139_A_4.0,	BH139_A_4.5,							
BH139_A_5.0,	BH139_A_5.5,							
BH139_A_6.0,	SQC047_A,							
SQC051_A,	BH11_A_0.0,							
BH11_A_0.5,	BH11_A_1.0,							
BH11_A_1.5,	BH11_A_2.0,							
BH11_A_2.5,	BH11_A_3.0,							
BH11_A_3.5,	BH11_A_4.0,							
BH11_A_4.5,	BH11_A_5.0							
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033)								
BH139_A_0.0,	BH139_A_0.5,	**19-Oct-2021**	**03-Nov-2021**	19-Oct-2022	✓	**03-Nov-2021**	01-Feb-2022	✓
BH139_A_1.0,	BH139_A_1.5,							
BH139_A_2.0,	BH139_A_2.5,							
BH139_A_3.0,	BH139_A_3.5,							
BH139_A_4.0,	BH139_A_4.5,							
BH139_A_5.0,	BH139_A_5.5,							
BH139_A_6.0,	SQC047_A,							
SQC051_A,	BH11_A_0.0,							
BH11_A_0.5,	BH11_A_1.0,							
BH11_A_1.5,	BH11_A_2.0,							
BH11_A_2.5,	BH11_A_3.0,							
BH11_A_3.5,	BH11_A_4.0,							
BH11_A_4.5,	BH11_A_5.0							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033)								
BH139_A_0.0,	BH139_A_0.5,	**19-Oct-2021**	**03-Nov-2021**	19-Oct-2022	✓	**03-Nov-2021**	01-Feb-2022	✓
BH139_A_1.0,	BH139_A_1.5,							
BH139_A_2.0,	BH139_A_2.5,							
BH139_A_3.0,	BH139_A_3.5,							
BH139_A_4.0,	BH139_A_4.5,							
BH139_A_5.0,	BH139_A_5.5,							
BH139_A_6.0,	SQC047_A,							
SQC051_A,	BH11_A_0.0,							
BH11_A_0.5,	BH11_A_1.0,							
BH11_A_1.5,	BH11_A_2.0,							
BH11_A_2.5,	BH11_A_3.0,							
BH11_A_3.5,	BH11_A_4.0,							
BH11_A_4.5,	BH11_A_5.0							
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH139_A_0.0,	BH139_A_0.25,	**19-Oct-2021**	**21-Oct-2021**	17-Apr-2022	✓	**21-Oct-2021**	17-Apr-2022	✓
BH139_A_0.5,	BH139_A_0.75,							
BH139_A_1.0,	BH139_A_1.25,							
BH139_A_1.5,	BH139_A_1.75,							
BH139_A_2.0,	BH139_A_2.25,							
BH139_A_2.5,	BH139_A_2.75,							
BH139_A_3.0,	BH139_A_3.25,							
BH139_A_3.5,	BH139_A_3.75,							
BH139_A_4.0,	BH139_A_4.25,							
SQC047_A,								
BH139_A_4.5,	BH139_A_4.75,							
BH139_A_5.0,	BH139_A_5.25,							
BH139_A_5.5,	BH139_A_5.75,							
BH139_A_6.0,	SQC051_A, BH11_A_0.0,							
BH11_A_0.25,	BH11_A_0.5,							
BH11_A_0.75,	BH11_A_1.0,							
BH11_A_1.25,	BH11_A_1.5,							
BH11_A_1.75,	BH11_A_2.0,							
BH11_A_2.25,	BH11_A_2.5,							
BH11_A_3.0,								
BH11_A_2.75,	B11_A_3.25, BH11_A_3.5,							
BH11_A_3.75,	BH11_A_4.0,							
BH11_A_4.25,	BH11_A_4.5,							
BH11_A_4.75,	BH11_A_5.0,							
BH11_A_5.25,	SQA052							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	6	50	**12.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	26	**11.54**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

APPENDIX E – ASS BORE LOGS

E-1 WP4_ASS_Bore Logs

Borehole BH06

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	1.5	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	12.38	Drilling Method:	Hand Auger and Push Tube
Date Started:	18/08/2021	Northings:	268271.541	Logger:	S.B & J.H
Date Completed:	18/08/2021	Eastings:	68904.583	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH06_A_0.0		SAND: Dark brown, coarse sand	D		
				BH06_A_0.25		Shades to grey			
		0.5		BH06_A_0.5		Gravelly clayey SAND: Brown with dark brown mottling, fine to coarse sand, low plasticity	M/D		
				BH06_A_0.75					
		1.0		BH06_A_1.0 SQC017_A		SAND: Black with organic staining, organic matter (tree roots), fine to coarse sand, poorly sorted	M/W		
Pushtube				BH06_A_1.25					
		1.5		BH06_A_1.5		Shades to grey, reduced root content (trace)	W		
				BH06_A_1.75					
		2.0		BH06_A_2.0		CLAY: Grey with some organic materials, low to medium plasticity	W		
				BH06_A_2.25					
		2.5		BH06_A_2.5					
				BH06_A_2.75					
		3.0		BH06_A_3.0				Backfill	
				BH06_A_3.25					
		3.5		BH06_A_3.5					
				BH06_A_3.75					
		4.0		BH06_A_4.0		Clayey SAND: Grey, fine to coarse sand, low plasticity	W		
				BH06_A_4.25					
		4.5		BH06_A_4.5		Silty SAND: Grey, fine to coarse sand (more coarse sand), well sorted	W		
				BH06_A_4.75					
		5.0		BH06_A_5.0					
				BH06_A_5.25					
		5.5		BH06_A_5.5		Silty CLAY: Black fine to coarse sand, low to medium plasticity, stiff, sticky	W		
				BH06_A_5.75		SAND: Grey, fine to coarse sand (more coarse sand)	W		
		6.0		BH06_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH08

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	3.1	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	10.02	Drilling Method:	Hand Auger and Push Tube
Date Started:	13/09/2021	Northings:	268513.907	Logger:	S.B & J.H
Date Completed:	13/09/2021	Eastings:	69006.273	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH08_A_0.0		SAND: Dark brown, fine to coarse sand, some trace gravels	D		
				BH08_A_0.25					
		0.5		BH08_A_0.5 SQC053_A		Shades to brown/red, fine to coarse, well sorted			
				BH08_A_0.75					
		1.0		BH08_A_1.0					
				BH08_A_1.25					
		1.5		BH08_A_1.5					
				BH08_A_1.75					
Pushtube		2.0		BH08_A_2.0					
				BH08_A_2.25					
		2.5		BH08_A_2.5				Backfill	
				BH08_A_2.75					
		3.0		BH08_A_3.0		Shades to light brown/yellow	M		
				BH08_A_3.25					
		3.5		BH08_A_3.5					
				BH08_A_3.75					
		4.0		BH08_A_4.0		Clayey SAND: Grey with brown mottling, low plasticity	W		
				BH08_A_4.25					
		4.5		BH08_A_4.5		Shades to grey			
				BH08_A_4.75					
		5.0		BH08_A_5.0		End of hole at target depth 5.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH09

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	2.2	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	8.31	Drilling Method:	Hand Auger and Push Tube
Date Started:	14/09/2021	Northings:	268566.981	Logger:	S.B & J.H
Date Completed:	14/09/2021	Eastings:	69044.268	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger				BH09_A_0.0		SAND: Light brown, fine to coarse sand, organic matter	D		
				BH09_A_0.25		Shades to dark brown			
		0.5		BH09_A_0.5 SQC036_A		Shades to light brown/orange			
				BH09_A_0.75					
		1.0		BH09_A_1.0		Shades to dark brown	M		
				BH09_A_1.25					
		1.5		BH09_A_1.5					
Pushtube				BH09_A_1.75		Shades to light brown with orange mottling			
		2.0		BH09_A_2.0		Grades to coarse sand, grey mottling			
				BH09_A_2.25					
		2.5		BH09_A_2.5		Grades to increased clay content Grades to decreased clay content		Backfill	
				BH09_A_2.75		Grades to large/coarse sand, shades to grey/brown	W		
		3.0		BH09_A_3.0					
				BH09_A_3.25					
		3.5		BH09_A_3.5					
				BH09_A_3.75					
		4.0		BH09_A_4.0					
				BH09_A_4.25					
		4.5		BH09_A_4.5					
				BH09_A_4.75		Shades to yellow/orange			
		5.0		BH09_A_5.0		End of hole at target depth 5.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH10

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	N/A	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	21.66	Drilling Method:	Hand Auger and Push Tube
Date Started:	18/10/2021	Northings:	267333.5	Logger:	S.B & J.H
Date Completed:	18/10/2021	Eastings:	68694.359	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
				BH10_A_0.0 SQC056		Silty PEAT: Black with some vegetation			
				BH10_A_0.25					
		0.5		BH10_A_0.5		SAND: Fine to medium sand			
				BH10_A_0.75					
		1.0		BH10_A_1.0		Silty CLAY: Black with minor fine sand			
						Silty CLAY: Black, high plasticity			
				BH10_A_1.25					
		1.5		BH10_A_1.5		SAND: Dark grey, medium sand			
				BH10_A_1.75					
		2.0		BH10_A_2.0					
				BH10_A_2.25					
		2.5		BH10_A_2.5					
				BH10_A_2.75					
		3.0		BH10_A_3.0					
				BH10_A_3.25					
		3.5		BH10_A_3.5		Grades to coarse sand and shades to light brown			
				BH10_A_3.75					
		4.0		BH10_A_4.0					
				BH10_A_4.25					
		4.5		BH10_A_4.5					
				BH10_A_4.75					
		5.0		BH10_A_5.0					
				BH10_A_5.25 SQC057					
		5.5		BH10_A_5.5					
				BH10_A_5.75					
		6.0		BH10_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH11

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	0.5	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	8.10	Drilling Method:	Hand Auger and Push Tube
Date Started:	18/10/2021	Northings:	268718.661	Logger:	S.B & J.H
Date Completed:	18/10/2021	Eastings:	69096.963	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH11_A_0.0 SQC051_A		SAND: Medium sand, top soil			
				BH11_A_0.25		SILT: Dark brown	W		
		0.5		BH11_A_0.5					
				BH11_A_0.75					
		1.0		BH11_A_1.0					
				BH11_A_1.25					
		1.5		BH11_A_1.5					
Push Tube				BH11_A_1.75					
		2.0		BH11_A_2.0					
				BH11_A_2.25					
		2.5		BH11_A_2.5					
				BH11_A_2.75					
		3.0		BH11_A_3.0				Backfill	
				BH11_A_3.25					
		3.5		BH11_A_3.5					
				BH11_A_3.75					
		4.0		BH11_A_4.0					
				BH11_A_4.25					
		4.5		BH11_A_4.5					
				BH11_A_4.75					
		5.0		BH11_A_5.0					
				BH11_A_5.25					
		5.5		BH11_A_5.5					
				BH11_A_5.75					
		6.0		BH11_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH12

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	8.38	Drilling Method:	Hand Auger and Push Tube
Date Started:	18/10/2021	Northings:	268754.412	Logger:	S.B & J.H
Date Completed:	18/10/2021	Eastings:	69228.546	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH12_A_0.0		Sandy CLAY: Light brown, medium sand with some vegetatation, well rounded gravel, medium plasticity	D		
				BH12_A_0.25					
		0.5		BH12_A_0.5		Silty CLAY: Dark brown, high plasticity	D/M		
				BH12_A_0.75					
		1.0		BH12_A_1.0		Shades to black			
				BH12_A_1.25					
		1.5		BH12_A_1.5		Silty CLAY: Dark brown, high plasticity, with red mottling	M		
Push Tube				BH12_A_1.75					
		2.0		BH12_A_2.0					
				BH12_A_2.25		Silty CLAY: Grey with red mottling, minor gravels, medium plasticity	D/M		
		2.5		BH12_A_2.5				Backfill	
				BH12_A_2.75					
		3.0		BH12_A_3.0					
				BH12_A_3.25					
		3.5		BH12_A_3.5					
				BH12_A_3.75					
		4.0		BH12_A_4.0					
				BH12_A_4.25		SAND: Light grey, medium sand with minor clay	M		
		4.5		BH12_A_4.5					
				BH12_A_4.75		CLAY: Light grey, high plasticity	M		
		5.0		BH12_A_5.0		End of hole at target depth 5.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH13

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	16.22	Drilling Method:	Hand Auger and Push Tube
Date Started:	15/09/2021	Northings:	269160.205	Logger:	S.B & J.H
Date Completed:	15/09/2021	Eastings:	69595.576	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger				BH13_A_0.0		FILL: Oragnic mulch			
				BH13_A_0.25		SAND: Dark grey, fine to coarse sand, well sorted	D		
		0.5		BH13_A_0.5		Gravelly SAND: Brown/grey, sub-angualr, sub-rounded, gravels (5 - 10 mm)			
				BH13_A_0.75		Shades to orange/brown			
		1.0		BH13_A_1.0		SAND: Orange/brown, trace gravels		Backfill	
						Increasing clay content			
				BH13_A_1.25		Shades to yellow/orange with grey mottling	D		
		1.5		BH13_A_1.5					
				BH13_A_1.75		Shades to yellow/brown with red mottling	D		
		2.0		BH13_A_2.0		End of hole at target depth 2.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH14

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	5.5	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	16.60	Drilling Method:	Hand Auger and Push Tube
Date Started:	15/09/2021	Northings:	269094.592	Logger:	S.B & J.H
Date Completed:	15/09/2021	Eastings:	69536.960	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH14_A_0.0		FILL: Gravelly sand, dark brown, organic matter	D		
				BH14_A_0.25		Shades to orange/grey			
		0.5		BH14_A_0.5 SQC43_A		Shades to orange/brown, grades to increasing sand content and trace gravels	M		
				BH14_A_0.75		Grades to increasing clay content			
		1.0		BH14_A_1.0		Shades to red mottling			
				BH14_A_1.25		Shades to dark grey with trace gravels			
		1.5		BH14_A_1.5					
				BH14_A_1.75					
		2.0		BH14_A_2.0		Sandy CLAY: red/grey mottling, low plasticity	M		
				BH14_A_2.25					
		2.5		BH14_A_2.5		Shades to light brown, grades to decreasing clay content			
				BH14_A_2.75					
		3.0		BH14_A_3.0		Clayey SAND: light brown/grey with orange mottling		Backfill	
				BH14_A_3.25		Shades to light grey, grades to fine, well sorted sand	W		
Pushtube		3.5		BH14_A_3.5		SAND: light grey/orange, fine to coarse sand	D		
				BH14_A_3.75					
		4.0		BH14_A_4.0					
				BH14_A_4.25					
		4.5		BH14_A_4.5		Shades to grey/orange			
				BH14_A_4.75					
		5.0		BH14_A_5.0					
				BH14_A_5.25					
		5.5		BH14_A_5.5		Shades to red mottling	M		
				BH14_A_5.75					
		6.0		BH14_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH15

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	16.93	Drilling Method:	Hand Auger and Push Tube
Date Started:	15/09/2021	Northings:	269128.223	Logger:	S.B & J.H
Date Completed:	15/09/2021	Eastings:	69553.935	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger				BH15_A_0.0		FILL: Dark brown, fine to coarse sand, organic matter	D		
				BH15_A_0.25					
		0.5		BH15_A_0.5 SQC042_A		Shades to light brown			
				BH15_A_0.75		Shades to grey			
		1.0		BH15_A_1.0					
				BH15_A_1.25		Shades to orange/brown with trace limestone cobbles			
Pushtube						Gravelly SAND: Dark brown/grey			
		1.5		BH15_A_1.5		Grades to decreased gravels			
				BH15_A_1.75		Shades to grey, orange mottling			
		2.0		BH15_A_2.0		Shades to light brown with orange mottling	M		
				BH15_A_2.25					
		2.5		BH15_A_2.5				Backfill	
				BH15_A_2.75		Grades to coarse sand, yellow/brown			
		3.0		BH15_A_3.0					
				BH15_A_3.25		Red mottling			
						Grades to increasing clay content	W		
		3.5		BH15_A_3.5		Clayey SAND: Grey, low plasticity with organic matter			
		4.0		BH15_A_4.0		SAND: Grey/light brown, fine to coarse sand, trace gravels			
		4.5		BH15_A_4.5					
						Shades to light brown			
		5.0		BH15_A_5.0		End of hole at target depth 5.0 mbgl			

Remarks: 3.75 m, 4.25 m, 4.75 m samples were not collected due to refusal. N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH17

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	N/A	Drilling Method:	Hand Auger and Push Tube
Date Started:	02/09/2021	Northings:	268124.1927	Logger:	S.B & J.H
Date Completed:	02/09/2021	Eastings:	68896.0674	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH17_A_0.0		FILL: Dark brown, fine to coarse sand	D		
				BH17_A_0.25					
		0.5		BH17_A_0.5 SQC_019_A					
				BH17_A_0.75		Trace weathered rock (1-5 mm)			
		1.0		BH17_A_1.0		Sandy CLAY: Dark brown with black mottling, coarse grained, low plasticity, red and orange deposits	D		
				BH17_A_1.25					
		1.5		BH17_A_1.5					
				BH17_A_1.75		Shades to yellow/orange			
		2.0		BH17_A_2.0					
				BH17_A_2.25					
		2.5		BH17_A_2.5					
				BH17_A_2.75		SAND: Creamy/grey, fine to coarse sand			
		3.0		BH17_A_3.0					
				BH17_A_3.25					
		3.5		BH17_A_3.5					
				BH17_A_3.75					
Pushtube		4.0		BH17_A_4.0		Gravelly SAND: Yellow with red mottling, fine to coarse sand, sub-angular, sub-rounded, small to large pebbles (1-5 cm)		Backfill	
				BH17_A_4.25					
		4.5		BH17_A_4.5		Shades to light grey with orange mottling and trace Coffee Rock			
				BH17_A_4.75					
		5.0		BH17_A_5.0		Clayey SAND: Grey with light brown/red mottling, fine sand, low plasticity			
				BH17_A_5.25					
		5.5		BH17_A_5.5		Shades to orange with red mottling			
				BH17_A_5.75					
		6.0		BH17_A_6.0		Shades to grey with red mottling			
				BH17_A_6.25					
		6.5		BH17_A_6.5		Grades to decreasing clay content			
				BH17_A_6.75		SAND: Orange with grey mottling			
		7.0		BH17_A_7.0		Shades to grey with orange mottling			
				BH17_A_7.25					
		7.5		BH17_A_7.5		Shades to light brown			
				BH17_A_7.75		Shades to grey, grades to increased clay content			
		8.0		BH17_A_8.0		CLAY: Grey, low plasticity			
						End of hole at target depth 8.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH18

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	6.4	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	15.30	Drilling Method:	Hand Auger and Push Tube
Date Started:	02/09/2021	Northings:	268042.428	Logger:	S.B & J.H
Date Completed:	02/09/2021	Eastings:	68858.959	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.5		BH18_A_0.0 BH18_A_0.25 BH18_A_0.5 SQC020_A BH18_A_0.75 SQC021_A		FILL: Dark brown, fine to coarse sand, organic matter Shades to orange/brown	D		
		1.0		BH18_A_1.0 BH18_A_1.25					
		1.5		BH18_A_1.5		SAND: Grey, orange/brown, fine to coarse sand			
Pushtube		2.0		BH18_A_1.75 BH18_A_2.0 BH18_A_2.25		5 cm layer of silt stone			
		2.5		BH18_A_2.5 BH18_A_2.75					
		3.0		BH18_A_3.0 BH18_A_3.25					
		3.5		BH18_A_3.5 BH18_A_3.75					
		4.0		BH18_A_4.0 BH18_A_4.25					
		4.5		BH18_A_4.5 BH18_A_4.75				Backfill	
		5.0		BH18_A_5.0 BH18_A_5.25					
		5.5		BH18_A_5.5 BH18_A_5.75					
		6.0		BH18_A_6.0		COFFEE ROCK			
		6.5		BH18_A_6.25 BH18_A_6.5		SAND: Light brown/red, fine to coarse sand Grades to increased clay content Clayey SAND: light brown/grey, low plasticity			
		7.0		BH18_A_6.75 BH18_A_7.0		Shades to grey			
		7.5		BH18_A_7.25 BH18_A_7.5					
		8.0		BH18_A_7.75 BH18_A_8.0					
		8.5		BH18_A_8.25 BH18_A_8.5					
		9.0		BH18_A_8.75 BH18_A_9.0		End of hole at target depth 9.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH16

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):		Drilling Co.:	
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	
Location:	WP4 - Roe Highway	Relative Level (mAHD):	17.21	Drilling Method:	
Date Started:	02/09/2021	Northings:	269147.211	Logger:	CMW Geosciences
Date Completed:	02/09/2021	Eastings:	69566.728	Editor:	

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
				BH16_A_0.0		Silty SAND: Dark brown, fine to medium sand, subangular to subrounded, trace gravel, with organics			
				BH16_A_0.25		Gravelly SAND: Fine to coarse sand, subangular to subrounded, trace silt			
		0.5		BH16_A_0.5					
				BH16_A_0.75					
		1.0		BH16_A_1.0		SAND: Pale grey brown mottled yellow, fine to medium sand, trace silt			
				BH16_A_1.25					
		1.5		BH16_A_1.5		Clayey gravelly SAND: Dark brown to red, fine to medium sand, subangular to subrounded			
				BH16_A_1.75					
		2.0		BH16_A_2.0					
				BH16_A_2.25					
		2.5		BH16_A_2.5					
				BH16_A_2.75					
		3.0		BH16_A_3.0		CLAY: Pale grey orange, mottled bronwn, high plasticity			
				BH16_A_3.25					
		3.5		BH16_A_3.5					
				BH16_A_3.75					
		4.0		BH16_A_4.0		CLAY: Dark grey mottled brow to red, low plasticity			
				BH16_A_4.25					
		4.5		BH16_A_4.5 SQC018_A					
				BH16_A_4.75					
		5.0		BH16_A_5.0					
		5.5							
		6.0				End of sampling at 6.0 mngl. Borehole advanced to 35 mbgl for geotechnical investigation.			

Remarks: Refer to CMW log (samples collected from CWM rig)

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Borehole BH19

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	3.3	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	17.95	Drilling Method:	Hand Auger and Push Tube
Date Started:	02/09/2021	Northings:	267968.748	Logger:	S.B & J.H
Date Completed:	02/09/2021	Eastings:	68863.719	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.5		BH19_A_0.0 BH19_A_0.25 BH19_A_0.5 SQC022_A BH19_A_0.75		FILL: Light brown, fine to coarse sand, well sortedm trace gravel (1-2 cm) Shades to light grey	D		
		1.0		BH19_A_1.0 SQC023_A BH19_A_1.25		COFFEE ROCK			
Pushtube		1.5		BH19_A_1.5 BH19_A_1.75		Clayey SAND: Light orange/yellow, fine to coarse sand, low plasticity			
		2.0		BH19_A_2.0 BH19_A_2.25		Shades to light grey			
		2.5		BH19_A_2.5 BH19_A_2.75					
		3.0		BH19_A_3.0		COFFEE ROCK: Brown/orange			
		3.5		BH19_A_3.25 BH19_A_3.5		Clayey SAND: Light grey with orange mottling, fine to coarse sand, low plasticity	W		
		4.0		BH19_A_3.75 BH19_A_4.0					
		4.5		BH19_A_4.25 BH19_A_4.5		Shades to grey/blue		Backfill	
		5.0		BH19_A_4.75 BH19_A_5.0					
		5.5		BH19_A_5.25 BH19_A_5.5					
		6.0		BH19_A_5.75 BH19_A_6.0		Grades to decreased clay content			
		6.5		BH19_A_6.25 BH19_A_6.5		SAND: Grey/blue, fine to coarse sand			
		7.0		BH19_A_6.75 BH19_A_7.0					
		7.5		BH19_A_7.25 BH19_A_7.5		Shades to light brown/grey			
		8.0		BH19_A_7.75 BH19_A_8.0					
		8.5		BH19_A_8.25 BH19_A_8.5		Shades to grey/blue			
		9.0		BH19_A_8.75 BH19_A_9.0		Grades to increased clay content End of hole at target depth 9.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH20

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	2.4	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	16.08	Drilling Method:	Hand Auger and Push Tube
Date Started:	02/09/2021	Northings:	267886.161	Logger:	S.B & J.H
Date Completed:	02/09/2021	Eastings:	68833.995	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH20_A_0.0		FILL: Dark brown, fine to coarse sand, organic material	D		
				BH20_A_0.25 SQC24_A		Shades to light tbown			
		0.5		BH20_A_0.5					
				BH20_A_0.75 SQC025_A		Shades to grey/white			
		1.0		BH20_A_1.0					
				BH20_A_1.25					
		1.5		BH20_A_1.5					
				BH20_A_1.75					
		2.0		BH20_A_2.0					
				BH20_A_2.25					
		2.5		BH20_A_2.5		Gravelly SAND: Dark brown, fine to coarse sand with gravels (1 cm)			
				BH20_A_2.75					
		3.0				BITUMEN: Black, 0.5 to 2 cm pieces			
		3.5		BH20_A_3.5		SAND: Dark brown, coarse grained			
				BH20_A_3.75					
		4.0		BH20_A_4.0		Shades to light brown	W	Backfill	
				BH20_A_4.25					
Pushtube		4.5		BH20_A_4.5		Shades to grey, grades to increased clay content			
				BH20_A_4.75					
		5.0		BH20_A_5.0					
				BH20_A_5.25					
		5.5		BH20_A_5.5		Clayey SAND: Grey, fine to coarse sand, low plasticity			
				BH20_A_5.75					
		6.0		BH20_A_6.0					
				BH20_A_6.25					
		6.5		BH20_A_6.5					
				BH20_A_6.75					
		7.0		BH20_A_7.0		SAND: Grey/blue coarse grained	D		
				BH20_A_7.25					
		7.5		BH20_A_7.5					
				BH20_A_7.75					
		8.0		BH20_A_8.0		End of hole at target depth 8.0 mbgl			

Remarks: Samples not taken at 3.0 and 3.25 mbgl due to bitumen layer. N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum

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Borehole BH21

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	N/A	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	16.21	Drilling Method:	Hand Auger and Push Tube
Date Started:	03/09/2021	Northings:	267794.424	Logger:	S.B & J.H
Date Completed:	03/09/2021	Eastings:	68815.702	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH21_A_0.0		FILL: Fine sand, well sorted			
				BH21_A_0.25		Shades to light grey/cream	D		
		0.5		BH21_A_0.5					
				BH21_A_0.75					
		1.0		BH21_A_1.0					
				BH21_A_1.25					
		1.5		BH21_A_1.5					
				BH21_A_1.75					
		2.0		BH21_A_2.0				Backfill	
				BH21_A_2.25					
		2.5		BH21_A_2.5					
Pushtube				BH21_A_2.75		COFFEE ROCK: 1 cm to 4 cm in size	D		
		3.0		BH21_A_3.0		SAND: Grey, coarse, well sorted	D		
				BH21_A_3.25		Grades to slightly increased clay content			
		3.5		BH21_A_3.5					
				BH21_A_3.75					
		4.0		BH21_A_4.0		End of hole at target depth 4.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH22

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	N/A	Drilling Method:	Hand Auger and Push Tube
Date Started:	03/09/2021	Northings:	267713.6626	Logger:	S.B & J.H
Date Completed:	03/09/2021	Eastings:	68840.6532	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger				BH22_A_0.0		FILL: Dark brown, fine to coarse sand, oragnic material	D		
				BH22_A_0.25 SQC026_A					
		0.5		BH22_A_0.5					
				BH22_A_0.75					
		1.0		BH22_A_1.0					
				BH22_A_1.25					
		1.5		BH22_A_1.5		Black staining (5 cm)			
				BH22_A_1.75					
		2.0		BH22_A_2.0				Backfill	
				BH22_A_2.25					
Pushtube		2.5		BH22_A_2.5					
				BH22_A_2.75					
		3.0		BH22_A_3.0		Shades to brown			
				BH22_A_3.25					
		3.5		BH22_A_3.5		COFFEE ROCK: Dark brown, weathered, cobbles (1-2 cm)			
				BH22_A_3.75		SAND: Light brown, fine to coarse sand, trace gravels			
		4.0		BH22_A_4.0		End of hole at target depth 4.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH23

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	2.5	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	N/A	Drilling Method:	Hand Auger and Push Tube
Date Started:	03/09/2021	Northings:	N/A	Logger:	S.B & J.H
Date Completed:	03/09/2021	Eastings:	N/A	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger				BH23_A_0.0		FILL: Dark brown, fine to coarse sand, organic material			
				BH23_A_0.25 SQC027_A					
		0.5		BH23_A_0.5		Shades to light grey/cream			
				BH23_A_0.75					
		1.0		BH23_A_1.0					
				BH23_A_1.25					
		1.5		BH23_A_1.5					
				BH23_A_1.75					
		2.0		BH23_A_2.0		Shades to light brown		Backfill	
				BH23_A_2.25		COFFEE ROCK: Dark brown, weathered, cobbles (1-3 cm)	M		
		2.5		BH23_A_2.5					
Pushtube				BH23_A_2.75		SAND: Dark brown, fine to coarse sand	W		
		3.0		BH23_A_3.0		Shades to light grey/cream			
				BH23_A_3.25					
		3.5		BH23_A_3.5		Grades to increased clay content			
				BH23_A_3.75					
		4.0		BH23_A_4.0		End of hole at target depth 4.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH24

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	1.2	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	18.21	Drilling Method:	Hand Auger and Push Tube
Date Started:	11/08/2021	Northings:	267627.510	Logger:	S.B & J.H
Date Completed:	11/08/2021	Eastings:	68737.846	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH24_A_0.0		FILL: Dark brown, fine to coarse sand with grass			
				BH24_A_0.25					
		0.5		BH24_A_0.5		SAND: Creamy/grey, fine to coarse sand	D		
				BH24_A_0.75					
		1.0		BH24_A_1.0 SQC005_A		COFFEE ROCK/SAND: Yellow/brown			
				BH24_A_1.25					
		1.5		BH24_A_1.5		Silty SAND: Light grey, fine to coarse sand, well sorted	M/W		
				BH24_A_1.75					
		2.0		BH24_A_2.0					
				BH24_A_2.25					
		2.5		BH24_A_2.5					
				BH24_A_2.75					
Pushtube		3.0		BH24_A_3.0			W	Backfill	
				BH24_A_3.25					
		3.5		BH24_A_3.5					
				BH24_A_3.75					
		4.0		BH24_A_4.0					
				BH24_A_4.25					
		4.5		BH24_A_4.5					
				BH24_A_4.75					
		5.0		BH24_A_5.0					
				BH24_A_5.25					
		5.5		BH24_A_5.5					
				BH24_A_5.75					
		6.0		BH24_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: Hand Auger refusal at 0.7 mbgl on Coffee Rock. N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH25

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	1.7	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	18.83	Drilling Method:	Hand Auger and Push Tube
Date Started:	11/08/2021	Northings:	267559.845	Logger:	S.B & J.H
Date Completed:	11/08/2021	Eastings:	68723.799	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH25_A_0.0		FILL: Dark brown sand, natural			
				BH25_A_0.25		SAND: Yellow/brown, fine to coarse sand			
		0.5		BH25_A_0.5 SQC006_A					
				BH25_A_0.75					
		1.0		BH25_A_1.0					
				BH25_A_1.25					
		1.5		BH25_A_1.5 SQC007_A		COFFEE ROCK/SAND: Cream with brown fine to coarse sand, sub-angular, sub-rounded, gravel			
Pushtube				BH25_A_1.75					
		2.0		BH25_A_2.0		Silty SAND: Light grey, fine to coarse sand, well sorted			
				BH25_A_2.25					
		2.5		BH25_A_2.5					
				BH25_A_2.75					
		3.0		BH25_A_3.0				Backfill	
				BH25_A_3.25					
		3.5		BH25_A_3.5					
				BH25_A_3.75					
		4.0		BH25_A_4.0					
				BH25_A_4.25					
		4.5		BH25_A_4.5					
				BH25_A_4.75					
		5.0		BH25_A_5.0		Grades to increased coarse sand content			
				BH25_A_5.25					
		5.5		BH25_A_5.5					
				BH25_A_5.75					
		6.0		BH25_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH26

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	2.2	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	20.08	Drilling Method:	Hand Auger and Push Tube
Date Started:	12/08/2021	Northings:	267485.404	Logger:	S.B & J.H
Date Completed:	12/08/2021	Eastings:	68711.665	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH26_A_0.0		FILL: Dark brown sand with grass			
				BH26_A_0.25		SAND: Light brown, fine to coarse grained, poorly sorted	M		
		0.5		BH26_A_0.5					
				BH26_A_0.75					
		1.0		BH26_A_1.0					
				BH26_A_1.25					
		1.5		BH26_A_1.5 SQC004_A		Gravelly SAND: Light brown, fine to coarse sand, fine to coarse, sub-angular, sub-rounded, gravel	W		
Pushtube				BH26_A_1.75					
		2.0		BH26_A_2.0		Silty SAND: Light grey, fine to coarse sand			
				BH26_A_2.25					
		2.5		BH26_A_2.5					
				BH26_A_2.75					
		3.0		BH26_A_3.0				Backfill	
				BH26_A_3.25					
		3.5		BH26_A_3.5					
				BH26_A_3.75					
		4.0		BH26_A_4.0					
				BH26_A_4.25					
		4.5		BH26_A_4.5					
				BH26_A_4.75					
		5.0		BH26_A_5.0		Grades to increased coarse sand content			
				BH26_A_5.25					
		5.5		BH26_A_5.5					
				BH26_A_5.75					
		6.0		BH26_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH27

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	N/A	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	N/A	Drilling Method:	Hand Auger and Push Tube
Date Started:	03/09/2021	Northings:	N/A	Logger:	S.B & J.H
Date Completed:	03/09/2021	Eastings:	N/A	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.5		BH27_A_0.0 SQC029_A BH27_A_0.25 BH27_A_0.5 BH27_A_0.75 SQC030_A		FILL: Grey/brown sand, fine to coarse	D		
		1.0		BH27_A_1.0 BH27_A_1.25		Shades to light brown			
		1.5		BH27_A_1.5 BH27_A_1.75					
		2.0		BH27_A_2.0 BH27_A_2.25					
		2.5		BH27_A_2.5 BH27_A_2.75					
		3.0		BH27_A_3.0 BH27_A_3.25				Backfill	
Pushtube		3.5		BH27_A_3.5 BH27_A_3.75		SAND: Grey, fine to coarse sand, well sorted			
		4.0		BH27_A_4.0 BH27_A_4.25					
		4.5		BH27_A_4.5 BH27_A_4.75					
		5.0		BH27_A_5.0 BH27_A_5.25		Grades to slight increase in clay content, still predominantly clay, shades to orange mottling	D		
		5.5		BH27_A_5.5 BH27_A_5.75					
		6.0		BH27_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH28

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	3.0	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	20.78	Drilling Method:	Hand Auger and Push Tube
Date Started:	09/08/2021	Northings:	267326.273	Logger:	S.B & J.H
Date Completed:	09/08/2021	Eastings:	68741.497	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger				BH28_A_0.0		FILL: Dark brown natural sand with grass	D		
				BH28_A_0.25		LIMESTONE SAND: Light brown fine to coarse sand, fine to coarse sub-rounded, sub-angular gravel	D		
		0.5		BH28_A_0.5 SQC001_A					
				BH28_A_0.75					
		1.0		BH28_A_1.0					
				BH28_A_1.25					
		1.5		BH28_A_1.5		SAND: Cream/light brown	D/M		
				BH28_A_1.75					
		2.0		BH28_A_2.0		Clayey SAND: Light grey, fine to coarse sand, low plasticity	M/W		
				BH28_A_2.25					
		2.5		BH28_A_2.5					
				BH28_A_2.75					
		3.0		BH28_A_3.0				Backfill	
Pushtube				BH28_A_3.25		Silty SAND: Light grey, fine sand, well sorted	W		
		3.5		BH28_A_3.5					
				BH28_A_3.75					
		4.0		BH28_A_4.0					
				BH28_A_4.25					
		4.5		BH28_A_4.5					
				BH28_A_4.75					
		5.0		BH28_A_5.0					
				BH28_A_5.25					
		5.5		BH28_A_5.5					
				BH28_A_5.75					
		6.0		BH28_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: Hand Auger refusal at 0.8 mbgl. N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH29

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	24.24	Drilling Method:	Hand Auger and Push Tube
Date Started:	16/08/2021	Northings:	267039.173	Logger:	S.B & J.H
Date Completed:	16/08/2021	Eastings:	68764.962	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH29_A_0.0		SAND: Dark grey, fine to coarse sand, natural			
				BH29_A_0.25					
		0.5		BH29_A_0.5		Shades to light grey			
				BH29_A_0.75					
		1.0		BH29_A_1.0 SQC009_A					
				BH29_A_1.25					
		1.5		BH29_A_1.5					
				BH29_A_1.75					
		2.0		BH29_A_2.0		COFFEE ROCK/SAND: Brown, fine to coarse sand, fine to coarse sub-rounded, sub-angular gravel			
				BH29_A_2.25					
		2.5		BH29_A_2.5					
				BH29_A_2.75					
		3.0		BH29_A_3.0		Clayey Silty SAND: Brown with grey mottling, fine to coarse sands, low plasticity		Backfill	
Pushtube				BH29_A_3.25					
		3.5		BH29_A_3.5					
				BH29_A_3.75					
		4.0		BH29_A_4.0		Shades to grey with red mottling, grades to decreased clay content			
				BH29_A_4.25					
		4.5		BH29_A_4.5		Silty SAND: Grey with some red, fine to coarse sand (more fine)			
				BH29_A_4.75					
		5.0		BH29_A_5.0					
				BH29_A_5.25					
		5.5		BH29_A_5.5					
				BH29_A_5.75					
		6.0		BH29_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH30

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	26.13	Drilling Method:	Hand Auger and Push Tube
Date Started:	16/08/2021	Northings:	266884.915	Logger:	S.B & J.H
Date Completed:	16/08/2021	Eastings:	68798.263	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH30_A_0.0		SAND: Dark grey, fine to coarse sand with some oragnic material	D		
				BH30_A_0.25					
		0.5		BH30_A_0.5		Shades to grey			
				BH30_A_0.75					
		1.0		BH30_A_1.0		Gravelly SAND: Brown, fine to coarse sand, fine to coarse sub-rounded, sub-angular gravel	D		
				BH30_A_1.25					
Pushtube		1.5		BH30_A_1.5 SQC011_A		COFFEE ROCK/SAND: Brown with red mottling, fine to coarse sand, sub-angular, sub-rounded gravel	D		
				BH30_A_1.75					
		2.0		BH30_A_2.0					
				BH30_A_2.25					
		2.5		BH30_A_2.5					
				BH30_A_2.75					
		3.0		BH30_A_3.0		Clayey SAND: Grey with red mottling, fine to coarse sand, low to medium plasticity, stiff	D	Backfill	
				BH30_A_3.25					
		3.5		BH30_A_3.5					
				BH30_A_3.75					
		4.0		BH30_A_4.0		CLAY: Grey with red mottling, low plasticity, stiff	D/M		
				BH30_A_4.25					
		4.5		BH30_A_4.5					
				BH30_A_4.75					
		5.0		BH30_A_5.0		SAND: Yellow/brown, fine to coarse sand, poorly sorted	M		
				BH30_A_5.25					
		5.5		BH30_A_5.5					
				BH30_A_5.75					
		6.0		BH30_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH31

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	27.52	Drilling Method:	Hand Auger and Push Tube
Date Started:	17/08/2021	Northings:	266786.050	Logger:	S.B & J.H
Date Completed:	17/08/2021	Eastings:	68823.598	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH31_A_0.0		SAND: Dark brown, fine to coarse sand	D		
				BH31_A_0.25					
		0.5		BH31_A_0.5 SQC01_A		Shades to yellow brown	D		
				BH31_A_0.75					
		1.0		BH31_A_1.0					
				BH31_A_1.25					
		1.5		BH31_A_1.5		Gravelly SAND: Yelow brown, fine to coarse sand, sub-angular, sub-round, fine to coarse coffee rock gravel	D		
				BH31_A_1.75					
Pushtube		2.0		BH31_A_2.0		COFFEE ROCK/SAND: Brown/yellow with red mottling, fine to coarse sand, trace low plasticity clay	D		
				BH31_A_2.25					
		2.5		BH31_A_2.5					
				BH31_A_2.75					
		3.0		BH31_A_3.0		Clayey SAND: Grey with red mottling, fine to coarse sand, low plasticity	D	Backfill	
				BH31_A_3.25					
		3.5		BH31_A_3.5					
				BH31_A_3.75					
		4.0		BH31_A_4.0					
				BH31_A_4.25					
		4.5		BH31_A_4.5		SAND: Grey, fine to coarse sand	D		
				BH31_A_4.75					
		5.0		BH31_A_5.0					
				BH31_A_5.25					
		5.5		BH31_A_5.5		Shades to yellow/brown	D/M		
				BH31_A_5.75					
		6.0		BH31_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH32

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	3.0	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	29.66	Drilling Method:	Hand Auger and Push Tube
Date Started:	17/08/2021	Northings:	266583.908	Logger:	S.B & J.H
Date Completed:	17/08/2021	Eastings:	68873.792	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH32_A_0.0		SAND: Dark brown, fine to coarse sand, natural with organic material			
				BH32_A_0.25					
		0.5		BH32_A_0.5		Shades to yellow/brown			
				BH32_A_0.75					
		1.0		BH32_A_1.0 SQC013_A					
				BH32_A_1.25					
		1.5		BH32_A_1.5				Backfill	
Pushtube				BH32_A_1.75					
		2.0		BH32_A_2.0		COFFEE ROCK/SAND: Brown, fine to coarse sand, fine to coarse sub-rounded, sub-angular gravel			
				BH32_A_2.25					
		2.5		BH32_A_2.5					
				BH32_A_2.75					
		3.0		BH32_A_3.0		End of hole at target depth 3.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH33

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	3.5	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	22.10	Drilling Method:	Hand Auger and Push Tube
Date Started:	17/08/2021	Northings:	267399.291	Logger:	S.B & J.H
Date Completed:	17/08/2021	Eastings:	68682.406	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH33_A_0.0		LST: Cream, fine to coarse sand, sub-angular, sub-round, fine to coarse gravel	D		
				BH33_A_0.25		SAND: Dark brown, fine to coarse sand, poorly sorted	D		
		0.5		BH33_A_0.5 SQC014_A		Shades to light grey	D/M		
				BH33_A_0.75		Shades to yellow brown			
		1.0		BH33_A_1.0					
				BH33_A_1.25					
		1.5		BH33_A_1.5					
Pushtube				BH33_A_1.75					
		2.0		BH33_A_2.0					
				BH33_A_2.25		Gravelly SAND: Light brown with dark brown mottling, fine to coarse sand, loosely packed, fine to coarse, sub-angular, sub-round, gravel	M/W		
		2.5		BH33_A_2.5					
				BH33_A_2.75					
		3.0		BH33_A_3.0				Backfill	
				BH33_A_3.25					
		3.5		BH33_A_3.5					
				BH33_A_3.75					
		4.0		BH33_A_4.0					
				BH33_A_4.25					
		4.5		BH33_A_4.5		SAND: Light grey, fine to coarse sand	M/W		
				BH33_A_4.75					
		5.0		BH33_A_5.0					
				BH33_A_5.25					
		5.5		BH33_A_5.5		Silty SAND: Light grey, fine to coarse sand, well sorted	W		
				BH33_A_5.75					
		6.0		BH33_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH34

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	4.6	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	22.46	Drilling Method:	Hand Auger and Push Tube
Date Started:	17/08/2021	Northings:	267386.698	Logger:	S.B & J.H
Date Completed:	17/08/2021	Eastings:	68610.075	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH34_A_0.0		SAND: Grey, fine to coarse sand, poorly sorted	D/M		
				BH34_A_0.25					
		0.5		BH34_A_0.5					
				BH34_A_0.75					
		1.0		BH34_A_1.0 SQC015_A					
				BH34_A_1.25		Shades to light grey	M/W		
		1.5		BH34_A_1.5					
				BH34_A_1.75					
		2.0		BH34_A_2.0					
				BH34_A_2.25					
		2.5		BH34_A_2.5				Backfill	
				BH34_A_2.75					
Pushtube		3.0		BH34_A_3.0		COFFEE ROCK/SAND: Dakr brown with yellow brown fine to coarse sand, sub-angular, sub-round, fine to coarse gravel	W		
				BH34_A_3.25					
		3.5		BH34_A_3.5					
				BH34_A_3.75					
		4.0		BH34_A_4.0					
				BH34_A_4.25					
		4.5		BH34_A_4.5		SAND: Grey, fine to coarse sand, loosley pakced	W		
				BH34_A_4.75					
		5.0		BH34_A_5.0		End of hole at target depth 5.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH35

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	2.8	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	21.89	Drilling Method:	Hand Auger and Push Tube
Date Started:	18/08/2021	Northings:	267402.617	Logger:	S.B & J.H
Date Completed:	18/08/2021	Eastings:	68548.977	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH35_A_0.0		SAND: Dark brown, fine to coarse sand, loosely packed	D		
				BH35_A_0.25					
		0.5		BH35_A_0.5 SQC016_A		Shades to yellow/brown	D		
				BH35_A_0.75					
		1.0		BH35_A_1.0		Shades to light grey	M/W		
				BH35_A_1.25					
		1.5		BH35_A_1.5					
Pushtube				BH35_A_1.75					
		2.0		BH35_A_2.0					
				BH35_A_2.25					
		2.5		BH35_A_2.5				Backfill	
				BH35_A_2.75					
		3.0		BH35_A_3.0					
				BH35_A_3.25					
		3.5		BH35_A_3.5					
				BH35_A_3.75					
		4.0		BH35_A_4.0		COFFEE ROCK/SAND: Yellow/brown, fine to coarse sand, sa-sr, fine to coarse gravel	W		
				BH35_A_4.25		Shades to dark brown, grades to increasing gravel content	W		
		4.5		BH35_A_4.5		SAND: Grey, fine to coarse sand, poorly sorted	W		
				BH35_A_4.75					
		5.0		BH35_A_5.0		End of hole at target depth 5.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH92

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	21.40	Drilling Method:	Hand Auger and Push Tube
Date Started:	03/09/2021	Northings:	267259.187	Logger:	S.B & J.H
Date Completed:	03/09/2021	Eastings:	68741.341	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH92_A_0.0		FILL: Dark brown, fine to coarse sand, organic material	D		
				BH92_A_0.25 SQC028_A		Shades to light grey/cream with black tinge			
		0.5		BH92_A_0.5					
				BH92_A_0.75					
		1.0		BH92_A_1.0					
				BH92_A_1.25					
		1.5		BH92_A_1.5		COFFEE ROCK: Orange/light brown fine to coarse sand, cobbles (2 cm)			
				BH92_A_1.75					
		2.0		BH92_A_2.0					
Pushtube				BH92_A_2.25		SAND: Light brown, fine to coarse sand, well sorted	D		
		2.5		BH92_A_2.5					
				BH92_A_2.75					
		3.0		BH92_A_3.0				Backfill	
				BH92_A_3.25					
		3.5		BH92_A_3.5					
				BH92_A_3.75					
		4.0		BH92_A_4.0		Shades to light grey/cream with red mottling	D		
				BH92_A_4.25					
		4.5		BH92_A_4.5					
				BH92_A_4.75					
		5.0		BH92_A_5.0					
				BH92_A_5.25					
		5.5		BH92_A_5.5		Shades to light grey			
				BH92_A_5.75					
		6.0		BH92_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH93

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	5.5	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	22.31	Drilling Method:	Hand Auger and Push Tube
Date Started:	10/08/2021	Northings:	267193.617	Logger:	S.B & J.H
Date Completed:	10/08/2021	Eastings:	68740.813	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH93_A_0.0		FILL: Dark brown sand, natural with grass	D		
				BH93_A_0.25		SAND: Cream, fine to coarse sand, poorly sorted			
		0.5		BH93_A_0.5 SQC002_A					
				BH93_A_0.75					
		1.0		BH93_A_1.0		LIMESTONE SAND: Light brown fine to coarse sand, fine to coarse sub-rounded, sub-angular gravel	D/M		
				BH93_A_1.25					
Pushtube		1.5		BH93_A_1.5		COFFEE ROCK/SAND: Brown with dark red mottling, fine to coarse sand, fine to coarse sub-rounded, sub-angular gravel			
				BH93_A_1.75					
		2.0		BH93_A_2.0					
				BH93_A_2.25					
		2.5		BH93_A_2.5					
				BH93_A_2.75					
		3.0		BH93_A_3.0				Backfill	
				BH93_A_3.25					
		3.5		BH93_A_3.5		Silty SAND: Grey, fine sand, well sorted	W		
				BH93_A_3.75					
		4.0		BH93_A_4.0					
				BH93_A_4.25					
		4.5		BH93_A_4.5					
				BH93_A_4.75					
		5.0		BH93_A_5.0 SQC003_A		Coarse sand noted	W		
				BH93_A_5.25					
		5.5		BH93_A_5.5					
				BH93_A_5.75					
		6.0		BH93_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: Hand Auger refusal at 1.3 mbgl. N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH94

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	5.8	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	N/A	Drilling Method:	Hand Auger and Push Tube
Date Started:	16/08/2021	Northings:	N/A	Logger:	S.B & J.H
Date Completed:	16/08/2021	Eastings:	N/A	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH94_A_0.0		SAND: Grey fine to coarse sand, natural	D		
				BH94_A_0.25					
		0.5		BH94_A_0.5		Shades to light grey	D		
				BH94_A_0.75					
		1.0		BH94_A_1.0		COFFEE ROCK/SAND: Brown, fine to coarse sand, fine to coarse sub-rounded, sub-angular gravel	D		
				BH94_A_1.25					
		1.5		BH94_A_1.5 SQC002_A					
				BH94_A_1.75					
		2.0		BH94_A_2.0		Clayey SAND: Grey with brown mottling, fine to coarse sand, low plasticity, stiff	D/M		
				BH94_A_2.25					
		2.5		BH94_A_2.5					
				BH94_A_2.75					
		3.0		BH94_A_3.0		Silty SAND: Grey, fine to coarse sand		Backfill	
Pushtube				BH94_A_3.25					
		3.5		BH94_A_3.5					
				BH94_A_3.75					
		4.0		BH94_A_4.0					
				BH94_A_4.25					
		4.5		BH94_A_4.5					
				BH94_A_4.75					
		5.0		BH94_A_5.0					
				BH94_A_5.25					
		5.5		BH94_A_5.5					
				BH94_A_5.75		Grades to increased coarse sand content			
		6.0		BH94_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH95

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	25.64	Drilling Method:	Hand Auger and Push Tube
Date Started:	13/09/2021	Northings:	266937.770	Logger:	S.B & J.H
Date Completed:	13/09/2021	Eastings:	68787.646	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH95_A_0.0		FILL: Dark grey, fine to coarse sand, well sorted	D		
				BH95_A_0.25					
		0.5		BH95_A_0.5 SQC031_A					
				BH95_A_0.75					
		1.0		BH95_A_1.0		Shades to light grey/white			
				BH95_A_1.25					
		1.5		BH95_A_1.5					
Pushtube				BH95_A_1.75		Shades to dark grey			
		2.0		BH95_A_2.0		Shades to light grey/white			
				BH95_A_2.25					
		2.5		BH95_A_2.5					
				BH95_A_2.75					
		3.0		BH95_A_3.0				Backfill	
				BH95_A_3.25					
		3.5		BH95_A_3.5					
				BH95_A_3.75					
		4.0		BH95_A_4.0					
				BH95_A_4.25		Shades to cream			
		4.5		BH95_A_4.5		Shades to yellow			
				BH95_A_4.75					
		5.0		BH95_A_5.0					
				BH95_A_5.25		Weathered COFFEE ROCK: Light brown/red, gravel (1-3 cm)			
		5.5		BH95_A_5.5					
				BH95_A_5.75		Grades to coarse, tace gravel			
		6.0		BH95_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH96

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	N/A	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	8.21	Drilling Method:	Hand Auger and Push Tube
Date Started:	18/10/2021	Northings:	268642.558	Logger:	S.B & J.H
Date Completed:	18/10/2021	Eastings:	69149.763	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH96_A_0.0 SQC045_A		CLAY: Black, fine peaty clay, medium plasticity	D		
				BH96_A_0.25					
		0.5		BH96_A_0.5					
				BH96_A_0.75					
		1.0		BH96_A_1.0					
				BH96_A_1.25					
		1.5		BH96_A_1.5					
				BH96_A_1.75					
		2.0		BH96_A_2.0					
				BH96_A_2.25					
		2.5		BH96_A_2.5				Backfill	
Push Tube				BH96_A_2.75		Silty CLAY: Brown to grey, medium plasticity	M		
		3.0		BH96_A_3.0					
				BH96_A_3.25					
		3.5		BH96_A_3.5		Clayey SAND: Grey with red mottling, fine to medium sand	M		
				BH96_A_3.75					
		4.0		BH96_A_4.0		Sandy CLAY: Brown medium to coarse sand	W		
				BH96_A_4.25					
		4.5		BH96_A_4.5					
				BH96_A_4.75		Clayey SAND: Grey with red mottlingm fine to medium clayey sand with minor gravel	M		
		5.0		BH96_A_5.0		End of hole at target depth 5.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH97

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	N/A	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	8.22	Drilling Method:	Hand Auger and Push Tube
Date Started:	18/10/2021	Northings:	268707.938	Logger:	S.B & J.H
Date Completed:	18/10/2021	Eastings:	69206.703	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH97_A_0.0		Silty clayey SAND: Brown, fine to medium sand with some gravel, medium plasticity, some vegetation	D		
				BH97_A_0.25		Silty CLAY: Black, high plasticity with some vegetation			
		0.5		BH97_A_0.5					
				BH97_A_0.75					
		1.0		BH97_A_1.0					
				BH97_A_1.25					
		1.5		BH97_A_1.5					
				BH97_A_1.75					
		2.0		BH97_A_2.0					
				BH97_A_2.25					
		2.5		BH97_A_2.5		Silty CLAY: Dark brown transitioning to light gret, fine with some organic matter		Backfill	
				BH97_A_2.75					
		3.0		BH97_A_3.0					
Push Tube				BH97_A_3.25		Sandy silty CLAY: Brown to red, fine to medium sand			
		3.5		BH97_A_3.5					
				BH97_A_3.75					
		4.0		BH97_A_4.0					
				BH97_A_4.25					
		4.5		BH97_A_4.5		Sandy silty CLAY: Grey	W		
				BH97_A_4.75					
		5.0		BH97_A_5.0		End of hole at target depth 5.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH98

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	N/A	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	7.79	Drilling Method:	Hand Auger and Push Tube
Date Started:	18/10/2021	Northings:	268600.392	Logger:	S.B & J.H
Date Completed:	18/10/2021	Eastings:	69118.704	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH98_A_0.0 SQC046_A		CLAY: Black, fine peaty clay, medium plasticity	D		
				BH98_A_0.25					
		0.5		BH98_A_0.5					
				BH98_A_0.75					
		1.0		BH98_A_1.0					
Push Tube				BH98_A_1.25					
		1.5		BH98_A_1.5		High plasticity	M		
				BH98_A_1.75					
		2.0		BH98_A_2.0					
				BH98_A_2.25					
		2.5		BH98_A_2.5				Backfill	
				BH98_A_2.75					
		3.0		BH98_A_3.0					
				BH98_A_3.25					
		3.5		BH98_A_3.5		Clayey SAND: Grey with red mottling, fine to medium sand	W		
				BH98_A_3.75					
		4.0		BH98_A_4.0					
				BH98_A_4.25					
		4.5		BH98_A_4.5		Sandy CLAY: Brown, medium to coarse sand			
				BH98_A_4.75					
		5.0		BH98_A_5.0		End of hole at target depth 5.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH99

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	2.8	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	9.63	Drilling Method:	Hand Auger and Push Tube
Date Started:	13/09/2021	Northings:	268541.973	Logger:	S.B & J.H
Date Completed:	13/09/2021	Eastings:	69033.245	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger				BH99_A_0.0		SAND: Light brown/grey, organic material, trace gravel	W		
				BH99_A_0.25		Clayey SAND: Red/brown, fine to coarse sand, trace gravel			
		0.5		BH99_A_0.5 SQC034_A					
				BH99_A_0.75					
		1.0		BH99_A_1.0		Grades to increased clay content			
				BH99_A_1.25					
		1.5		BH99_A_1.5					
				BH99_A_1.75		Grades to decreased clay content	M		
		2.0		BH99_A_2.0					
				BH99_A_2.25					
		2.5		BH99_A_2.5				Backfill	
Pushtube				BH99_A_2.75					
		3.0		BH99_A_3.0		Shades to brown with grey mottling	W		
				BH99_A_3.25		Grades to increased sand content, shades to light brown/grey			
		3.5		BH99_A_3.5		Shades to yellow/brown			
				BH99_A_3.75					
		4.0		BH99_A_4.0					
				BH99_A_4.25					
		4.5		BH99_A_4.5		Clayey SAND: Grey, fine to coarse sand, well sorted			
				BH99_A_4.75					
		5.0		BH99_A_5.0		End of hole at target depth 5.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH100

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	10.84	Drilling Method:	Hand Auger and Push Tube
Date Started:	14/09/2021	Northings:	268414.162	Logger:	S.B & J.H
Date Completed:	14/09/2021	Eastings:	68966.309	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Pushtube				BH100_A_0.0		SAND: Dark brown/red, fine to coarse sand, some organic material	D		
				BH100_A_0.25					
		0.5		BH100_A_0.5 SQC035_A		Shades to light brown/yellow with dark brown mottling			
				BH100_A_0.75					
		1.0		BH100_A_1.0		Shades to light brown with orange mottling and some organic material	D		
				BH100_A_1.25					
		1.5		BH100_A_1.5					
				BH100_A_1.75					
		2.0		BH100_A_2.0					
				BH100_A_2.25					
		2.5		BH100_A_2.5				Backfill	
				BH100_A_2.75					
		3.0		BH100_A_3.0		Grades to increased clay content, shades to grey			
				BH100_A_3.25					
		3.5		BH100_A_3.5					
				BH100_A_3.75					
		4.0		BH100_A_4.0		Shades to cream, coffee rock (1-5 cm)			
				BH100_A_4.25		Grades to increasing clay content and trace gravel			
		4.5		BH100_A_4.5					
				BH100_A_4.75		Shades to yellow			
		5.0		BH100_A_5.0		End of hole at target depth 5.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH101

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	5.8	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	21.06	Drilling Method:	Hand Auger and Push Tube
Date Started:	17/08/2021	Northings:	267346.137	Logger:	S.B & J.H
Date Completed:	17/08/2021	Eastings:	68692.676	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH101_A_0.0		SAND: Dark grey, fine to coarse sand with some oragnic material			
				BH101_A_0.25		Shades to yellow/brown, no organic material	D		
		0.5		BH101_A_0.5					
				BH101_A_0.75					
		1.0		BH101_A_1.0					
				BH101_A_1.25					
		1.5		BH101_A_1.5 SQC005_A		COFFEE ROCK/SAND: Yellow with brown gravel, fine to coarse sand, sub-angular, sub-rounded, fine to coarse gravel	D/M		
Pushtube				BH101_A_1.75					
		2.0		BH101_A_2.0					
				BH101_A_2.25					
		2.5		BH101_A_2.5					
				BH101_A_2.75					
		3.0		BH101_A_3.0		SAND: Light brown, fine to coarse sand	W	Backfill	
				BH101_A_3.25					
		3.5		BH101_A_3.5					
				BH101_A_3.75					
		4.0		BH101_A_4.0					
				BH101_A_4.25		Clayey SAND: Grey with light brown/red mottling, fine to coarse sand, very low plasticity	W		
		4.5		BH101_A_4.5					
				BH101_A_4.75					
		5.0		BH101_A_5.0		Silty SAND: Grey, fine to coarse sand, well sorted	W		
				BH101_A_5.25					
		5.5		BH101_A_5.5					
				BH101_A_5.75					
		6.0		BH101_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH102

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	3.8	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	22.09	Drilling Method:	Hand Auger and Push Tube
Date Started:	10/08/2021	Northings:	267265.101	Logger:	S.B & J.H
Date Completed:	10/08/2021	Eastings:	68690.369	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH102_A_0.0		SAND: Dark brown, fine to coarse sand with organic material	D/M		
				BH102_A_0.25		Shades to light grey			
		0.5		BH102_A_0.5					
				BH102_A_0.75					
		1.0		BH102_A_1.0					
				BH102_A_1.25					
		1.5		BH102_A_1.5					
				BH102_A_1.75		Gravelly SAND: Yellow/brown, fine to coarse sand, sub-angular to sub-rounded, fine to coarse gravel	M		
		2.0		BH102_A_2.0					
				BH102_A_2.25					
		2.5		BH102_A_2.5					
				BH102_A_2.75					
Pushtube		3.0		BH102_A_3.0		Silty SAND: Grey, fine to coarse sand	M/W	Backfill	
				BH102_A_3.25					
		3.5		BH102_A_3.5					
				BH102_A_3.75					
		4.0		BH102_A_4.0					
				BH102_A_4.25					
		4.5		BH102_A_4.5					
				BH102_A_4.75					
		5.0		BH102_A_5.0		Grades to fine sand	W		
				BH102_A_5.25					
		5.5		BH102_A_5.5					
				BH102_A_5.75					
		6.0		BH102_A_6.0		End of hole at target depthg 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH139

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	17.27	Drilling Method:	Hand Auger and Push Tube
Date Started:	18/10/2021	Northings:	268859.138	Logger:	S.B & J.H
Date Completed:	18/10/2021	Eastings:	69211.61	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger				BH139_A_0.0 SQC048_A		SAND: Brown, fine to coarse sand with some vegetation and gravel			
				BH139_A_0.25		FILL: Yellow sand			
		0.5		BH139_A_0.5					
				BH139_A_0.75					
		1.0		BH139_A_1.0					
				BH139_A_1.25					
		1.5		BH139_A_1.5		Grades to increasing clay content			
Push Tube						Silty CLAY: Brown with red mottling	D		
				BH139_A_1.75					
		2.0		BH139_A_2.0					
				BH139_A_2.25					
		2.5		BH139_A_2.5					
				BH139_A_2.75		Silty CLAY: Light grey	D	Backfill	
		3.0		BH139_A_3.0					
				BH139_A_3.25					
		3.5		BH139_A_3.5					
				BH139_A_3.75					
		4.0		BH139_A_4.0		Sandy CLAY: Yellow to brown, fine to medium sand	D		
				BH139_A_4.25					
		4.5		BH139_A_4.5					
				BH139_A_4.75					
		5.0		BH139_A_5.0 SQC047_A		CLAY: Yellow to brown with red mottling			
				BH139_A_5.25					
		5.5		BH139_A_5.5		Sandy CLAY: Light grey, medium sand	D		
				BH139_A_5.75					
		6.0		BH139_A_6.0		End of hole at target depth 6.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH147

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	Dry	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	28.62	Drilling Method:	Hand Auger and Push Tube
Date Started:	16/08/2021	Northings:	266694.403	Logger:	S.B & J.H
Date Completed:	16/08/2021	Eastings:	68844.529	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.5		BH147_A_0.0 BH147_A_0.25 BH147_A_0.5 BH147_A_0.75 BH147_A_1.0 BH147_A_1.25 BH147_A_1.5 SQA012_A BH147_A_1.75 BH147_A_2.0 BH147_A_2.25 BH147_A_2.5		SAND: Dark brown, fine to coarse, natural sand Shades to yellow/brown			
Pushtube		1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0		BH147_A_2.75 BH147_A_3.0 BH147_A_3.25 BH147_A_3.5 BH147_A_3.75 BH147_A_4.0 BH147_A_4.25 BH147_A_4.5 BH147_A_4.75 BH147_A_5.0 BH147_A_5.25 BH147_A_5.5 BH147_A_5.75 BH147_A_6.0		COFFEE ROCK/SAND: Brown, fine to coarse sand, fine to coarse sub-rounded, sub-angular gravel Some organic material (roots) SAND: Yellow/brown, fine to coarse sands, loosely packed Some silt noted End of hole at target depth 6.0 mbgl		Backfill	

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH148

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	1.5	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	31.12	Drilling Method:	Hand Auger and Push Tube
Date Started:	13/09/2021	Northings:	266239.538	Logger:	S.B & J.H
Date Completed:	13/09/2021	Eastings:	68970.597	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger				BH148_A_0.0		FILL: Black, fine sand with organic material	D		
				BH148_A_0.25		Shades to grey	W		
		0.5		BH148_A_0.5		Shades to cream	M		
				BH148_A_0.75					
						Shades to light brown/yellow	D		
		1.0		BH148_A_1.0				Backfill	
				BH148_A_1.25					
		1.5		BH148_A_1.5					
				BH148_A_1.75					
		2.0		BH148_A_2.0		End of hole at target depth 2.0 mbgl			

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole BH154

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	N/A	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	19.27	Drilling Method:	Hand Auger and Push Tube
Date Started:	12/08/2021	Northings:	267571.618	Logger:	S.B & J.H
Date Completed:	12/08/2021	Eastings:	68735.572	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0	0.0	BH154_A_0.0		BITUMEN: Grey		Backfill	
						Coal tar: Dark brown fine to coarse sand, fine to coarse, sa-sr gravel			
				BH154_A_0.11		LST: Cream			
						SAND: Brown, fine to coarse sand			
			0.0	BH154_A_0.03					
		0.5	0.0	BH154_A_0.5					
			0.0						
		1.0	0.0	BH154_A_1.0		End of hole at target depth 1.0 mbgl			

Remarks: 20.03 m thick bitumen and 20.08 m thick coal tar. N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole GW15/BH112

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	7.0	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	30.61	Drilling Method:	Hand Auger and Push Tube
Date Started:	13/09/2021	Northings:	266384.345	Logger:	S.B & J.H
Date Completed:	13/09/2021	Eastings:	68941.261	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.5		BH112_A_0.0 BH112_A_0.25 BH112_A_0.5		FILL: Black fine to coarse sand, organic matter Shades to grey Shades to cream	D	Riser	
		1.0		BH112_A_0.75 BH112_A_1.0		Trace gravels			
		1.5		BH112_A_1.25 BH112_A_1.5		Weathered COFFEE ROCK: Light brown, coarse sand Red mottling		Cement	
		2.0		BH112_A_1.75 BH112_A_2.0		Shades to red with light brown mottling			
		2.5		BH112_A_2.25 BH112_A_2.5					
		3.0		BH112_A_2.75 BH112_A_3.0		Grades to increasing clay content, shades to red with grey/brown mottling		Bentonite Seal	
		3.5		BH112_A_3.25 BH112_A_3.5					
		4.0		BH112_A_3.75 BH112_A_4.0		Grades to sand, shades to light brown			
		4.5		BH112_A_4.25 BH112_A_4.5		COFFEE ROCK: Brown/orange, gravel (1-2 cm), trace sand			
		5.0		BH112_A_4.75 BH112_A_5.0		Grades to increased quartz (1-5 cm), trace sand		Gravel Pack	
Pushtube		5.5		BH112_A_5.25 BH112_A_5.5		SAND: Grey with orange mottling, fine to coarse sand Red mottling			
		6.0		BH112_A_5.75 BH112_A_6.0		Shades to orange/brown with grey mottling Grades to well sorted sand, shades to grey			
		6.5		BH112_A_6.25 BH112_A_6.5					
		7.0		BH112_A_6.75 BH112_A_7.0			W	Slotted Screen	
		7.5		BH112_A_7.25 BH112_A_7.5					
		8.0		BH112_A_7.75 BH112_A_8.0					
		8.5		BH112_A_8.25 BH112_A_8.5					
		9.0		BH112_A_8.75 BH112_A_9.0					
		9.5		BH112_A_9.25 BH112_A_9.5					
		10.0		BH112_A_9.75 BH112_A_10.0		End of hole at target depth 10.0 mbgl		End Cap	

Remarks: Top of Casing: 31.326 mAHD. N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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Borehole GW03/BH104

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	2.2	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	8.78	Drilling Method:	Hand Auger and Push Tube
Date Started:	18/10/2021	Northings:	268654.854	Logger:	S.B & J.H
Date Completed:	18/10/2021	Eastings:	69048.982	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0	0.0	BH104_A_0.0 SQC052_A		Clayey SAND: Grey, low plasticity		Riser	
				BH104_A_0.25		SAND: Light grey, fine to medium sand			
		0.5	0.0	BH104_A_0.5					
				BH104_A_0.75		Silt: Black		Bentonite Seal	
		1.0	0.0	BH104_A_1.0					
				BH104_A_1.25					
		1.5	0.0	BH104_A_1.5					
				BH104_A_1.75					
		2.0	0.0	BH104_A_2.0				Gravel Pack	
				BH104_A_2.25		Silty SAND: Dark brown			
		2.5	0.0	BH104_A_2.5					
				BH104_A_2.75					
		3.0	0.0	BH104_A_3.0		Silt: Brown			
				BH104_A_3.25					
Pushtube		3.5		BH104_A_3.5				Slotted Screen	
				BH104_A_3.75					
		4.0		BH104_A_4.0					
				BH104_A_4.25					
		4.5		BH104_A_4.5					
				BH104_A_4.75					
		5.0		BH104_A_5.0					
				BH104_A_5.25 SQC053_A					
		5.5		BH104_A_5.5					
				BH104_A_5.75					
		6.0		BH104_A_6.0		End of hole at target depth 6.0 mbgl		End Cap	

Remarks: N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.
Weather: Rain
No odours observed

30058301 - GEHBI_4 \\LAINGOROURKE.SHAREPOINT.COM@SSL\DAV\WWWROOT\SITES\PROJECTDOCUMENTMANAGEMENTAU\10101\ENVIRONMENT\1490 CONTAMINATED SITES\19. GINTWP4\WORKING FILES\WP4_ASS_BORELOGS_ARCADISTEMPLATE.GPJ 10029089_N_MARRICKVILLETRAINSTATION.GPJ 9/2/22

Borehole GW04/BH105

Sheet: 1 of 1

Project Name:	GEHBI - WP4	Water Strike (mBGL):	2.4	Drilling Co.:	DPP
Client:	Greater Connect Alliance	SWL (mBTOC):	N/A	Drill Model:	Geoprobe GG20DT
Location:	WP4 - Roe Highway	Relative Level (mAHD):	8.90	Drilling Method:	Hand Auger and Push Tube
Date Started:	14/09/2021	Northings:	268542.727	Logger:	S.B & J.H
Date Completed:	14/09/2021	Eastings:	68961.087	Editor:	B.V.V

Drill Method	Water Level	Depth (mbgl)	PID (ppm)	Sample ID	USCS Class	Description	Moisture	Well Details	Construction
Hand Auger		0.0		BH105_A_0.0		SAND: Dark brown, shades to light brown, organic matter, trace limestone gravels	D	Riser	
				BH105_A_0.25				Bentonite Seal	
		0.5		BH105_A_0.5		Shades to dark brown Shades to red/brown			
				BH105_A_0.75					
		1.0		BH105_A_1.0					
				BH105_A_1.25					
		1.5		BH105_A_1.5					
				BH105_A_1.75		Grades to fine sand, well sorted	M		
		2.0		BH105_A_2.0		Shades to light brown/yellow	W	Gravel Pack	
				BH105_A_2.25					
		2.5		BH105_A_2.5		Grades to medium to coarse sand, well sorted			
				BH105_A_2.75				Slotted Screen	
		3.0		BH105_A_3.0					
				BH105_A_3.25		Shades to light brown/grey, trace gravels			
Pushtube		3.5		BH105_A_3.5		Shades to grey with dark brown mottling			
				BH105_A_3.75					
		4.0		BH105_A_4.0		Shades to brown with orange mottling			
				BH105_A_4.25					
		4.5		BH105_A_4.5		Grades to increased clay content			
				BH105_A_4.75		Clayey SAND: Brown/grey, low plasticity			
		5.0		BH105_A_5.0				End Cap	
				BH105_A_5.25		SAND: Grey/dark brown, coarse sand, well sorted			
		5.5		BH105_A_5.5		End of hole at target depth 5.5 mbgl			

Remarks: Top of Casing: 9.631 mAHD. N/A = not applicable, mBGL = m below ground level, mBTOC = m below top of casing, mAHD = m Australian Height Datum, ppm = parts per million.

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APPENDIX F – DATA QUALITY OBJECTIVES

The Data Quality Objectives (DQO) process is a systematic planning tool based on the scientific method for establishing criteria for data quality and for developing data collection designs. The DQO define the experimental process required to test a hypothesis. The DQO process has been developed to make sure that efforts relating to data collection are cost effective by eliminating unnecessary, duplicative, or overly precise data whilst at the same time ensuring the data collected is of sufficient quality and quantity to support defensible decision making.

It is recognised that the most efficient way to accomplish these goals is to establish criteria for defensible decision making before data collection begins and develop a data collection design based on these criteria.

The DQO process consists of seven steps, which are designed to clarify the study objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors. The seven-step DQO process adopted for this ASSDMP can be summarised as:

- Step 1: State the Problem – concisely describe the problem to be studied. Review prior studies and existing information to gain a sufficient understanding to define the problem.
- Step 2: Identify the Decision – identify what questions the study will attempt to resolve, and what actions may result.
- Step 3: Identify the Inputs to the Decision – identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statement.
- Step 4: Define the Study Boundaries – specify the time periods and spatial area to which decisions will apply. Determine when and where data should be collected.
- Step 5: Develop a Decision Rule – define the statistical parameter of interest, specify the action level, and integrate the previous DQO outputs into a single statement that describes the logical basis for choosing among alternative actions.
- Step 6: Specify Tolerable Limits on Decision Errors – define the decision maker's tolerable decision error rates based on a consideration of the consequences of making an incorrect decision.
- Step 7: Optimise the Design – evaluate information from the previous steps and generate alternative data collection designs. Choose the most resource-effective design that meets all DQO.

The DQO for the ASS investigation are provided in Table F-1, and were derived in accordance with Australian Standard AS 4482.1-2005. The DQO for the groundwater and surface water contamination investigation are presented in Appendix C of the Contamination Investigation Report (GCA 2022).

Table F-1 Data Quality Objectives

Step	Detail
1. State the Problem	• The site has historically been utilised for commercial/industrial use. • Potential offsite sources of contamination from current and historic activities. • Part of the site will be used to construct infrastructure for the GEHBI project. The uncertainty in respect to contamination status may impact the proposed development.
2. Identify the Decision	If ASS is identified within the soil: • What is the extent of the impact? • Does the ASS occur at levels that have the potential to pose an unacceptable risk to health or the environment? • If so, what is the order of priority to minimise the risk and what additional measures are required to mitigate or manage the risk?
3. Identify the Inputs to the Decision	• Key data required to resolve the project problem includes identification of the presence of AASS/PASS and the structure and depth of the underlying site geology and aquifers. ASS results were based on-site conditions observed during field works. The guidelines adopted by GCA for ASS sampling are presented in detail (Appendix C). • The distribution of areas and toxicity of AASS/ PASS. • DWER endorsed published guidelines for the protection of health under the relevant land use scenario and ASS guidelines appropriate for the protection of aquatic ecosystems.

Step	Detail
	• Field investigation techniques to assess the presence of AASS/ PASS as per GCA's standard field procedures. • Analytical results.
4. Define the Study Boundary	This site investigation is restricted to the site's footprint (Figure 2). ASS sampling locations were based on the locations of potential impacted areas and proposed areas of disturbance i.e. excavation and dewatering. Samples were obtained via bore holes at regular and representative locations along the proposed development. Figure 14 shows the sampling locations. The vertical extent of the study boundary was limited to a maximum depth of 6.0 m. Temporal boundaries of the study were limited to the dates that field works were completed as detailed in Section 11.
5. Develop a Decision Rule	If ASS net acidity is reported to be below the relevant adopted guidelines, then the site will be deemed suitable, and no management options will be proposed for the future land use and current construction plans at the site. If elevated ASS net acidity levels are identified at the site further investigation may be required to delineate the extent of the impact and/or recommendations made for the management of ASS.
6. Specify Tolerable Limits on Decision Errors	The acceptable limits for samples are as follows: Precision is reported using the Relative Percent Difference (%RPD). • Recovery of matrix spikes and surrogate spikes is as per the laboratory's quality assurance targets accepted under their NATA accreditation. Replicate data for field duplicates is expected to be as follows: • RPD criteria of 50% or less, for concentrations > 10 times EQL. • RPD criteria of 75% or less, for concentrations between 5 and 10 times the EQL; and • RPD criteria of 100% or less, for concentrations between 1 and 5 times EQL. Where acceptable limits for field duplicates were not met, a discussion on low biased error will be provided.
7. Optimise the Design	Soil samples were collected at relevant intervals or changes in geology. Sample locations were selected for efficient, accessibility and representative sampling. The sampling locations were modified, if necessary, based on new information or on-site observations.

APPENDIX G – QUALITY ASSURANCE/QUALITY CONTROL AND DATA EVALUATION

Quality Assurance/ Quality Control

Field QA/QC

A summary and assessment of the soil field QA/QC procedures adopted during the ASS investigation are presented below in Table G-1. Summaries and assessments of the groundwater and surface water field QA/QC procedures are presented in Appendix G, Contamination Investigation Report (GCA 2022).

Table G-1 Summary of Soil Field QA/QC Procedures

QA/QC Measure	Assessment / Summary
Cross-sample contamination mitigation	Soil samples were collected using new disposable, powder free, nitrile gloves and laboratory supplied sample bags.
Chain of custody (CoC)	In accordance with the Sampling Plan (GCA, 2021), a digital tracking tool (ALS compass) was used to capture primary and QC soil samples and generate a digital CoC which was released to the primary laboratory (ALS) at the end of each sampling day. A separate, detailed CoC accompanied secondary samples to the secondary laboratory (MPL). Samples and associated CoCs were transported to the laboratories by laboratory supplied couriers. Copies of the CoCs for soil samples are provided in Appendix F.
Sample splitting techniques	Intra-laboratory QC samples were collected by filling the required number of laboratory supplied sample bags concurrently with the primary samples, as best as practically possible, to facilitate that the same soil was being collected in each bag.
Statement of duplicate sample frequency	Intra-laboratory (duplicate) field QC samples were collected at a minimum rate of 1:20 (one QC duplicate soil sample for 20 primary soil samples analysed for the Scr suite in accordance with the Sampling Plan (GCA, 2021) requirements. For this ASS investigation, the following 51 duplicate QC soil samples were collected: QC01_A: intra-laboratory duplicate from primary sample BH32_A_0.5. QC001_A: intra-laboratory duplicate from primary sample BH28_A_0.5. QC002_A: intra-laboratory duplicate from primary sample BH93_A_0.5. QC003_A: intra-laboratory duplicate from primary sample BH93_A_5.0. QC004_A (Lab Report EP2109197): intra-laboratory duplicate from primary sample BH26_A_1.5. QC004_A (Lab Report EP2109463): intra-laboratory duplicate from primary sample BH102_A_1.0. QC005_A (Lab Report EP2109197): intra-laboratory duplicate from primary sample BH24_A_1.0. QC005_A (Lab Report EP2109462): intra-laboratory duplicate from primary sample BH101_A_1.5. QC006_A: intra-laboratory duplicate from primary sample BH25_A_0.5. QC007_A: intra-laboratory duplicate from primary sample BH25_A_1.5. QC008_A: intra-laboratory duplicate from primary sample BH94_A_1.5. QC009_A: intra-laboratory duplicate from primary sample BH29_A_1.0. SQC011_A: intra-laboratory duplicate from primary sample BH30_A_1.5. QA012_A: intra-laboratory duplicate from primary sample BH147_A_1.5. QC013_A: intra-laboratory duplicate from primary sample BH32_A_1.0. QA014_A: intra-laboratory duplicate from primary sample BH33_A_0.5. QC015_A: intra-laboratory duplicate from primary sample BH34_A_1.0.

QA/QC Measure	Assessment / Summary
	QC016_A: intra-laboratory duplicate from primary sample BH35_A_0.5. QA017_A: intra-laboratory duplicate from primary sample BH06_A_1.0. QC018_A: intra-laboratory duplicate from primary sample BH16_A_4.5. QC_019_A: intra-laboratory duplicate from primary sample BH17_A_0.5. QC_020_A: intra-laboratory duplicate from primary sample BH18_A_0.5. QC_021_A: intra-laboratory duplicate from primary sample BH18_A_1.0. QC_022_A: intra-laboratory duplicate from primary sample BH19_A_0.5. QC_023_A: intra-laboratory duplicate from primary sample BH19_A_1.0. QC_024_A: intra-laboratory duplicate from primary sample BH20_A_0.25. QC_025_A: intra-laboratory duplicate from primary sample BH20_A_0.75. QC_026_A: intra-laboratory duplicate from primary sample BH22_A_0.25. QC_027_A: intra-laboratory duplicate from primary sample BH23_A_0.25. QC_028_A (Lab Report EP2108543: intra-laboratory duplicate from primary sample BH92_A_0.25. QC_029_A: intra-laboratory duplicate from primary sample BH27_A_0.00. QC_030_A: intra-laboratory duplicate from primary sample BH27_A_0.75. QC_031_A: intra-laboratory duplicate from primary sample BH95_A_0.5. QC_032_A: intra-laboratory duplicate from primary sample BH112_A_0.5. QC_033_A: intra-laboratory duplicate from primary sample BH08_A_0.5. QC_034_A: intra-laboratory duplicate from primary sample BH99_A_0.5. QC_035_A: intra-laboratory duplicate from primary sample BH100_A_0.5. QC_036_A: intra-laboratory duplicate from primary sample BH09_A_0.5. QC_037_A: intra-laboratory duplicate from primary sample BH105_A_0.5. QC_042_A: intra-laboratory duplicate from primary sample BH15_A_0.5. QC_043_A: intra-laboratory duplicate from primary sample BH14_A_0.5. QC_044_A: intra-laboratory duplicate from primary sample BH12_A_0.0. QC_045_A: intra-laboratory duplicate from primary sample BH96_A_0.0. QC_046_A: intra-laboratory duplicate from primary sample BH98_A_0.0. QC_047_A: intra-laboratory duplicate from primary sample BH139_A_5.0. QC_048_A: intra-laboratory duplicate from primary sample BH139_A_0.0. QC_051_A: intra-laboratory duplicate from primary sample BH11_A_0.0. QA052: intra-laboratory duplicate from primary sample BH104_A_0.0. QC_053_A: intra-laboratory duplicate from primary sample BH104_A_5.25. QA56: intra-laboratory duplicate from primary sample BH10_A_0.0. QA57: intra-laboratory duplicate from primary sample BH10_A_5.25. The following 37 duplicate QC soil samples were analysed for full Scr suite: QC001_A: intra-laboratory duplicate from primary sample BH28_A_0.5. QC004_A (Sample Code EP2109197044): intra-laboratory duplicate from primary sample BH26_A_1.5. QC004_A (Sample Code EP2109463026): intra-laboratory duplicate from primary sample BH102_A_1.0. QC005_A (Sample Code EP2109197045): intra-laboratory duplicate from primary sample BH24_A_1.0. QC006_A: intra-laboratory duplicate from primary sample BH25_A_0.5.

QA/QC Measure	Assessment / Summary
	QC007_A: intra-laboratory duplicate from primary sample BH25_A_1.5. QC008_A: intra-laboratory duplicate from primary sample BH94_A_1.5. QC009_A: intra-laboratory duplicate from primary sample BH29_A_1.0. QC011_A: intra-laboratory duplicate from primary sample BH30_A_1.5. QA012_A: intra-laboratory duplicate from primary sample BH147_A_1.5. QC013_A: intra-laboratory duplicate from primary sample BH32_A_1.0. QC015_A: intra-laboratory duplicate from primary sample BH34_A_1.0. QC016_A: intra-laboratory duplicate from primary sample BH35_A_0.5. QC018_A: intra-laboratory duplicate from primary sample BH16_A_4.5. QC_019_A: intra-laboratory duplicate from primary sample BH17_A_0.5. QC_020_A: intra-laboratory duplicate from primary sample BH18_A_0.5. QC_021_A: intra-laboratory duplicate from primary sample BH18_A_1.0. QC_022_A: intra-laboratory duplicate from primary sample BH19_A_0.5. QC_023_A: intra-laboratory duplicate from primary sample BH19_A_1.0. QC_031_A: intra-laboratory duplicate from primary sample BH95_A_0.5. QC_032_A: intra-laboratory duplicate from primary sample BH112_A_0.5. QC_033_A: intra-laboratory duplicate from primary sample BH08_A_0.5. QC_034_A: intra-laboratory duplicate from primary sample BH99_A_0.5. QC_035_A: intra-laboratory duplicate from primary sample BH100_A_0.5. QC_036_A: intra-laboratory duplicate from primary sample BH09_A_0.5. QC_037_A: intra-laboratory duplicate from primary sample BH105_A_0.5. QC_042_A: intra-laboratory duplicate from primary sample BH15_A_0.5. QC_043_A: intra-laboratory duplicate from primary sample BH14_A_0.5. QC_044_A: intra-laboratory duplicate from primary sample BH12_A_0.0. QC_045_A: intra-laboratory duplicate from primary sample BH96_A_0.0. QC_046_A: intra-laboratory duplicate from primary sample BH98_A_0.0. QC_047_A: intra-laboratory duplicate from primary sample BH139_A_5.0. QC_051_A: intra-laboratory duplicate from primary sample BH11_A_0.0. QC_052_A: intra-laboratory duplicate from primary sample BH104_A_0.0. In total, 615 analyses of the Scr suite were undertaken during this investigation, and 37 intra-laboratory QC soil samples were analysed for the Scr suite. Soil RPDs are presented in Table J-1, J. Six RPD exceedances for acid neutralising capacity were reported. Two exceedances of back-titration (ANC_{BT}) were reported. Four exceedances for sulfidic-acid neutral were reported. One RPD exceedance for titratable actual acidity was reported. These analytes did not report exceedances of the site assessment criteria for any primary samples, and so the RPD exceedances do not affect the outcomes of this investigation.

Laboratory QA/QC

Soil laboratory QC reports are presented in Appendix D. The outcomes of the soil QA/QC undertaken is summarised below in Table G-2. Summaries and assessments of the groundwater and surface water laboratory QA/QC procedures are presented in Appendix G, Contamination Investigation Report (GCA 2022).

Table G-2 Laboratory QA/QC Validation

QA/QC Measure	Assessment/Summary
Holding times	Holding time outliers were not recorded.
NATA accreditation	ALS is NATA accredited for the analyses requested.
Matrix spike recovery	Matrix spike recoveries were within nominated acceptable limits.
Surrogate recovery	Surrogate recoveries were within the nominated acceptable limits.
Laboratory blanks	Laboratory blanks were within the acceptable ranges.
Laboratory Quality Control Frequency	One laboratory QC frequency non-conformance was recorded for the follow laboratory report: • EP2112529: Laboratory QC frequency was not within the specification for acid neutralising capacity.

Data Evaluation

Based on the above QA/QC results, GCA is satisfied that appropriate QA/QC measures were adopted for the ASS investigation to facilitate that interpretation of the results is reliable. A summary of the evaluation criteria is presented in Table G-3 including commentary.

Table G-3 Summary of QA/QC Evaluation Compared to the Set DQO

QA/QC Measure	Assessment
Documentation completeness	The following completed documentation were considered appropriate: • Soil borehole construction drawings. • Chains of custody.
Data completeness	Samples were received by the laboratory and the analytical results reported included laboratory QA/QC analyses.
Data comparability	GCA's standard operating procedures, the Australia Standards and industry recommended practices were followed during the sampling based on the conditions encountered on-site. Standard analytical methods were used by the laboratories for analyses performed. The LORs were considered appropriate.
Accuracy and precision	Field duplicates were collected at a minimum rate of 1:20 primary samples. These rates are within the Australian Standard (AS4482.1 1997) and GCA's QA/QC frequency ranges. A summary of the RPD calculations is presented in J -1. Notable exceedances are summarised above.

APPENDIX H – CONSTRUCTION DRAWINGS

H-1 GEHBI-GCA-DRG-D320-DN-43317

H-2 GEHBI-GCA-DRG-S420-BR-00126

GEHBI-GCA-DRG-S420-BR-00110

H-3 GEHBI-GCA-DRG-S510-RW-04001

GEHBI-GCA-DRG-S510-RW-04015

GEHBI-GCA-DRG-S510-RW-04016

GEHBI-GCA-DRG-S510-RW-04045

GEHBI-GCA-DRG-S510-RW-04046

H-4 GEHBI-GCA-DRG-S510-GN-00001

H-5 GEHBI-GCA-DRG-S510-RW-04030

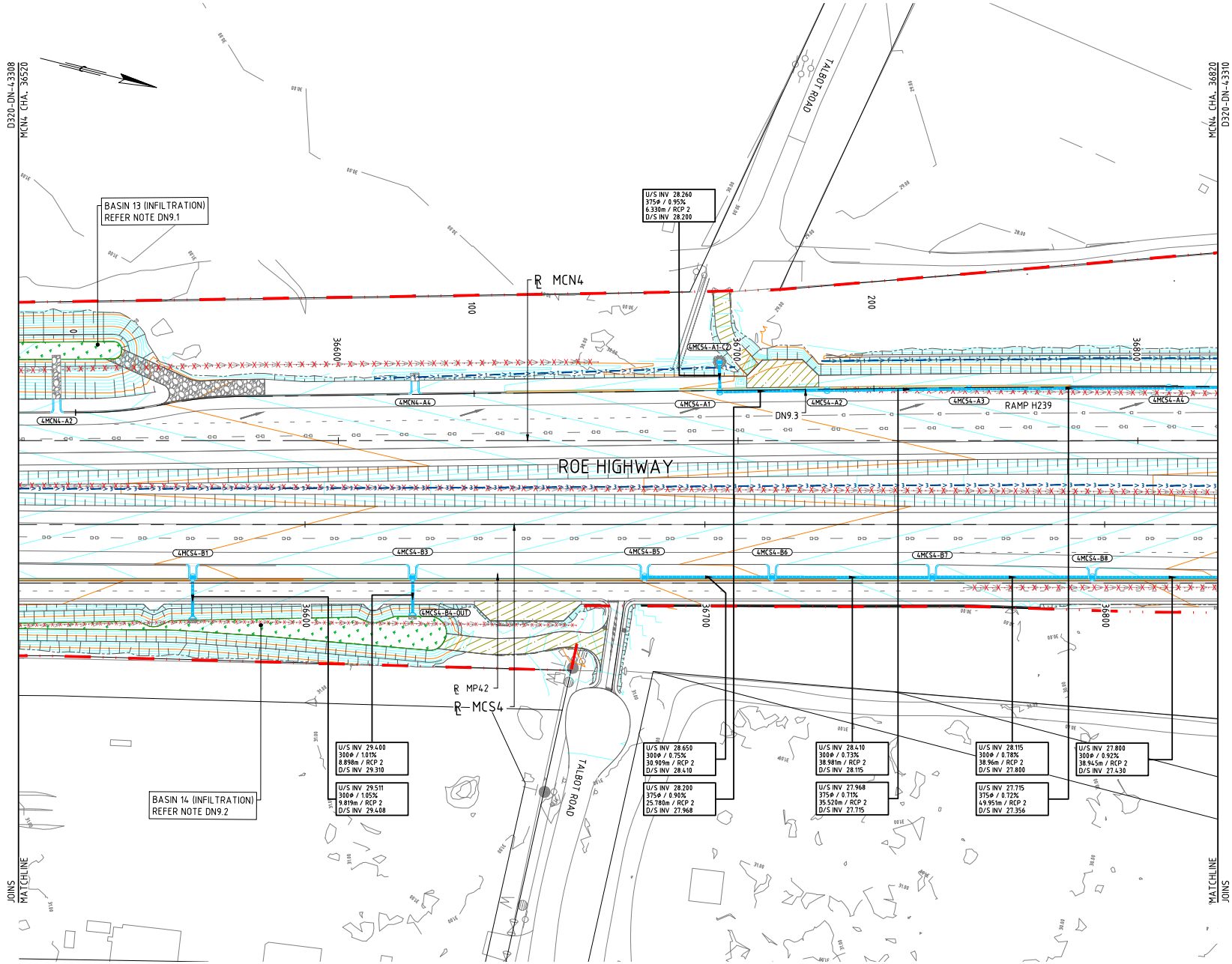
H-6 GEHBI-GCA-DRG-S510-RW-04031

H-7 GEHBI-GCA-DRG-S510-GN-04000

GEHBI-GCA-DRG-S510-GN-00005

GEHBI-GCA-DRG-S510-GN-04001

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NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. REFER TO DRAWING DN-44261 FOR LEGEND AND GENERAL NOTES.
3. REFER TO DRAWING DN-43105 FOR SWALE DETAILS.
4. REFER TO DRAWING DN-43901 TO DN-43908 FOR DRAINAGE SCHEDULES

SHEET 9 NOTES:

DN9.1 BASIN 13 (INFILTRATION)
DESIGN AEP: 1% AEP
BASE LEVEL: RL 28.70 - 29.40m AHD
TWL (1EY): 29.47m AHD
TWL (10%AEP): 29.69m AHD
TWL (1% AEP): 29.97m AHD
VOLUME REQUIRED(1% AEP): 866m³
MAX. 1 IN 3 BATTER SLOPES ON ALL EDGES

DN9.2 BASIN 14 (INFILTRATION)
DESIGN AEP: 1% AEP
BASE LEVEL: RL 29.3 - 29.5m AHD
TWL (1EY): 29.70m AHD
TWL (10% AEP): 20.95m AHD
TWL (1% AEP): 30.28m AHD
VOLUME REQUIRED (1% AEP): 733m³
MAX. 1 IN 3 BATTER SLOPES ON ALL EDGES

DN9.3 SLOTTED CONCRETE BARRIER IN ACCORDANCE WITH MRWA STD DRAWING 201831-0055. REFER CIVIL DRAWINGS FOR DETAILS.

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SCALE 1:500 (A1) / 1:1000 (A3)

Rev.	DATE	DESCRIPTION	APPROVED
0	17.01.23	ISSUED FOR CONSTRUCTION	D.G.

Last saved by MDA20230203-01-20 Last Plotted: 2023-01-20
Filename: C:_PROCESSING_PROJECTWISE\GREAT EASTERN HIGHWAY\18-DRAWINGS\GEHBI-GCA-DRG-D320-DN-43309.DWG

METADATA	
GROUND SURVEY STANDARD:	67-08-43
DATE OF CAPTURE:	VARIES
MAPPING SURVEY STANDARD:	67-08-44
DATE OF CAPTURE:	VARIES
MAIN ROADS PROJECT ZONE:	PCG94
HEIGHT DATUM:	AHD

ALLIANCE: Greater Connect ALLIANCE

VERIFIER: WGA

CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	A. NAYAK M. EUPENA	17.01.23	VERIFIER	D. GROBLER	17.01.23
DRAWN	M. DU TOIT	17.01.23	DESIGN MANAGER APPROVED	D. WATSON	17.01.23
CHECKED	D. BEN-AVRAHAM	17.01.23	ALLIANCE PROJECT MANAGER APPROVED	H. LUN	17.01.23

DRAWING PURPOSE: FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY (H018)
35.40 SLK TO 40.28 SLK
DRAINAGE
PLAN - SHEET 9

SHEET: A1

MRWA DRAWING No.: 202248-01018

LOCAL AUTHORITY: [009] CITY OF SWAN / [102] CITY OF KALAMUNDA / [106] SHIRE OF MUNDARING

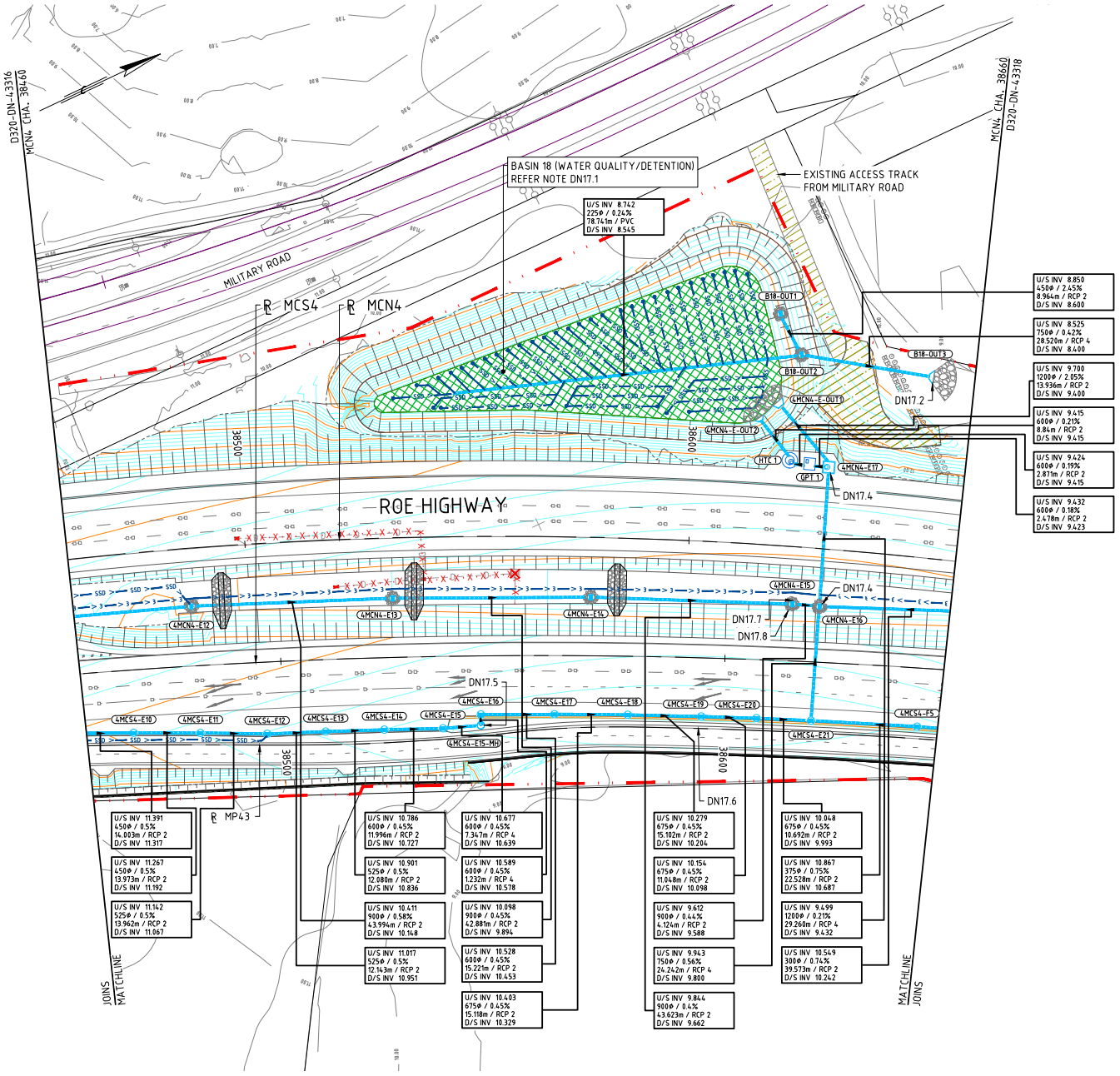
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

STATUS: IFC

DRAWING NUMBER: GEHBI-GCA-DRG-D320-DN-43309

REV: 0

NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED



NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. REFER TO DRAWING DN-44261 FOR LEGEND AND GENERAL NOTES.
3. REFER TO DRAWING DN-43105 FOR SWALE DETAILS.
4. REFER TO DRAWING DN-43901 TO DN-43908 FOR DRAINAGE SCHEDULES

SHEET 17 NOTES:

DN17.1 BASIN 18 (DETENTION/WATER QUALITY)
BASE LEVEL: RL 9.40-9.50m AHD
TWL (1EY): 10.10m AHD
TWL (10%AEP): 10.29m AHD
TWL (1% AEP): 10.57m AHD
VOLUME REQUIRED (1EY): 1170m³
VOLUME REQUIRED (10% AEP): 1620m³
VOLUME REQUIRED (1% AEP): 2260m³

OVERFLOW PIT AT 10.0m AHD, SECONDARY OVERFLOW PIT AT 10.4m AHD. MAX. 1 IN 3 BATTER SLOPE ON ALL EDGES. REFER TO DRAWING SHEET D320-DN-43110 TO DN-43111 FOR BIORETENTION DETAILS AND NOTES.

DN17.2 ENERGY DISSIPATION AND LEVELS SPREADER AT BASIN OUTLET TO DISPERSE FLOWS. (REFER TO OUTLET STRUCTURE IN GEHBI-GCA-D320-DN-43107)

DN17.4 REFER TO CUSTOM PIT DETAILS.

DN17.5 MANHOLE INCLUDED TO PREVENT CLASH BETWEEN STORMWATER PIPE AND BARRIER POSTS.

DN17.6 CONCRETE BARRIER WITH DRAINAGE SLOTS TO DRAIN PSP, IN ACCORDANCE WITH MAIN ROADS WA STD DRAWING 201831-0055 DRAINAGE SLOT TO BE LOCATED AT PSP SAG LOCATION. REFER CIVIL DRAWINGS FOR DETAILS.

DN17.7 BASE OF SWALE TO BE LOCALLY GRADED TOWARDS CATCHPIT LOCATED AT SAG LOW POINT.

DN17.8 PIT AND PIPE ALIGNMENT WITHIN MEDIAN DESIGNED TO SUIT ULTIMATE HIGHWAY WIDENING POSITION.

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SCALE 1:500 (A1) / 1:1000 (A3)

Rev.	DATE	DESCRIPTION	APPROVED
0	17.01.23	ISSUED FOR CONSTRUCTION	D.G.

METADATA

GROUND SURVEY STANDARD:	67-08-43
DATE OF CAPTURE:	VARIES
MAPPING SURVEY STANDARD:	67-08-44
DATE OF CAPTURE:	VARIES
MAIN ROADS PROJECT ZONE:	PCG94
HEIGHT DATUM:	AHD

ALLIANCE: Greater Connect ALLIANCE

VERIFIER: WGA

CLIENT: mainroads WESTERN AUSTRALIA — INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	A. NAYAK M. EUPENA	17.01.23	VERIFIER	D. GROBLER	17.01.23
DRAWN	M. DU TOIT	17.01.23	DESIGN MANAGER APPROVED	D. WATSON	17.01.23
CHECKED	D. BEN-AVRAHAM	17.01.23	ALLIANCE PROJECT MANAGER APPROVED	H. LUN	17.01.23

DRAWING PURPOSE: FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY (H018)
35.40 SLK TO 40.28 SLK
DRAINAGE
PLAN - SHEET 17

SHEET: A1

MRWA DRAWING No.: 202248-01026

LOCAL AUTHORITY: [009] CITY OF SWAN / [102] CITY OF KALAMUNDA / [106] SHIRE OF MUNDARING

MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

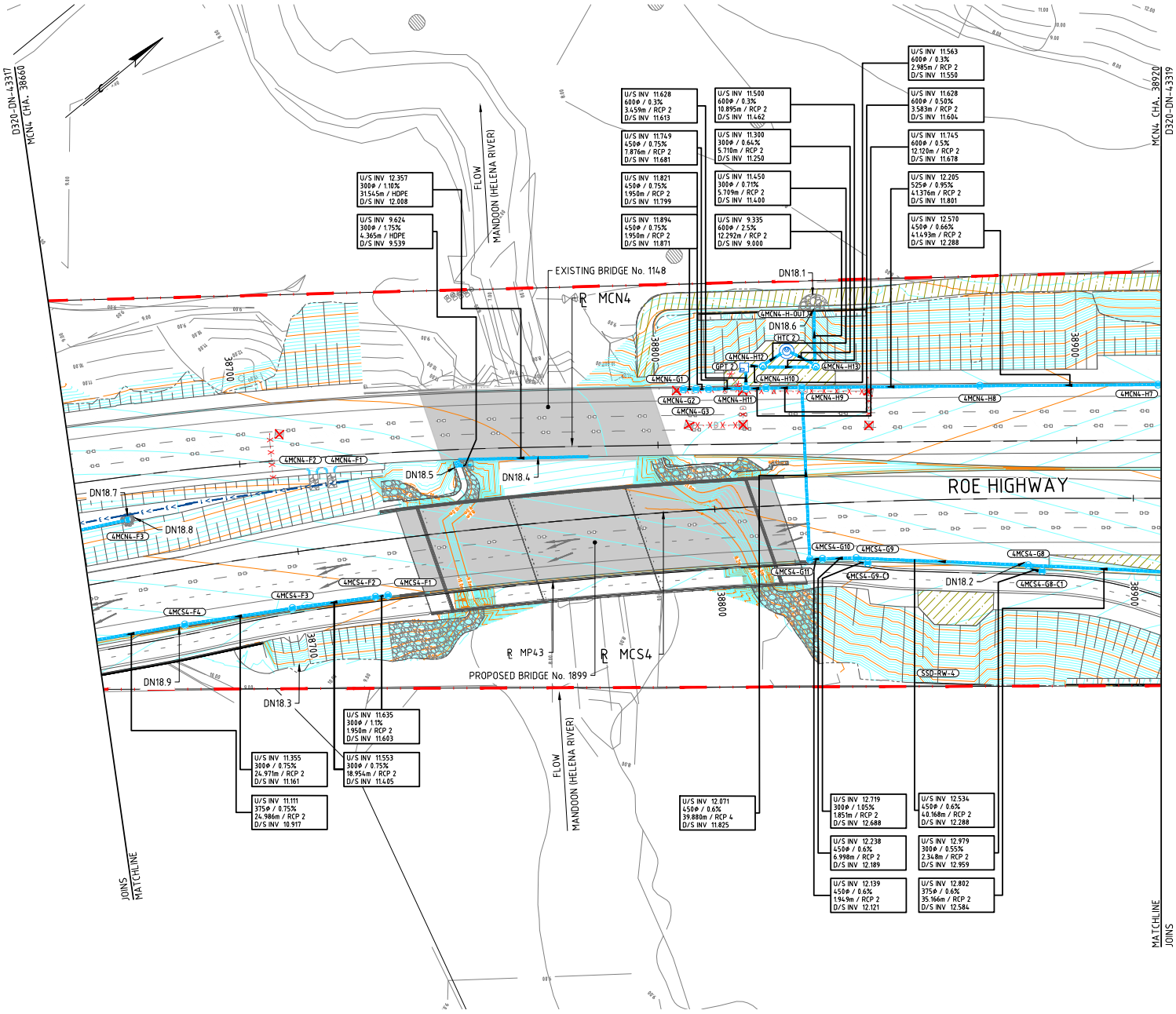
STATUS: IFC

DRAWING NUMBER: GEHBI-GCA-DRG-D320-DN-43317

REV: 0

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NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED



NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. REFER TO DRAWING DN-44261 FOR LEGEND AND GENERAL NOTES.
3. REFER TO DRAWING DN-43105 FOR SWALE DETAILS.
4. REFER TO DRAWING DN-43901 TO DN-43908 FOR DRAINAGE SCHEDULES

SHEET 18 NOTES:

DN18.1 ENERGY DISSIPATION AND LEVEL SPREADER AT PIPE OUTLET TO DISPERSE FLOWS. REFER OUTLET STRUCTURE DN-43107.

DN18.2 GULLY PIT ADJACENT TO CONCRETE BARRIER. REFER TO DETAIL ON DRAWING SHEET DN-43101.

DN18.4 DRAINAGE PIPE SUSPENDED UNDER BRIDGE DECK. REFER TO DN-43102 FOR DETAILS.

DN18.5 250mm DIA HDPE. DOWNPIPE BRACKETED TO ABUTMENT FACE TO DISCHARGE INTO ROCK HEADWALL AND ROCK SCOUR PROTECTION PROPOSED AT TOE OF ABUTMENT.

DN18.6 REFER STRUCTURAL PACKAGE FOR PIPE PENETRATION THROUGH RETAINING WALL.

DN18.7 BASE OF SWALE TO BE LOCALLY GRADED TOWARDS CATCHPIT.

DN18.8 PIT AND PIPE ALIGNMENT WITHIN MEDIAN DESIGNED TO SUIT ULTIMATE HIGHWAY WIDENING POSITION.

DN18.9 CONCRETE BARRIER WITH DRAINAGE SLOTS TO DRAIN PSP, IN ACCORDANCE WITH MAIN ROADS WA STD DRAWING 201831-0055. REFER CIVIL DRAWINGS FOR DETAILS.

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SCALE 1:500 (A1) / 1:1000 (A3)

Rev.	DATE	DESCRIPTION	APPROVED
0	17.01.23	ISSUED FOR CONSTRUCTION	D.G.

METADATA	
GROUND SURVEY STANDARD:	67-08-43
DATE OF CAPTURE:	VARIES
MAPPING SURVEY STANDARD:	67-08-44
DATE OF CAPTURE:	VARIES
MAIN ROADS PROJECT ZONE:	PCG94
HEIGHT DATUM:	AHD

ALLIANCE: Greater Connect ALLIANCE

VERIFIER: WGA WALLBRIDGE GILBERT AZTEC

CLIENT: mainroads WESTERN AUSTRALIA — INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	A. NAYAK M. EUPENA	17.01.23	VERIFIER	D. GROBLER	17.01.23	
DRAWN	M. DU TOIT	17.01.23	DESIGN MANAGER APPROVED	D. WATSON	17.01.23	
CHECKED	D. BEN-AVRAHAM	17.01.23	ALLIANCE PROJECT MANAGER APPROVED	H. LUN	17.01.23	

DRAWING PURPOSE: FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY (H018) 35.40 SLK TO 40.28 SLK DRAINAGE PLAN - SHEET 18

SHEET: A1

MRWA DRAWING No.: 202248-01027

LOCAL AUTHORITY: [009] CITY OF SWAN / [102] CITY OF KALAMUNDA / [106] SHIRE OF MUNDARING

MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

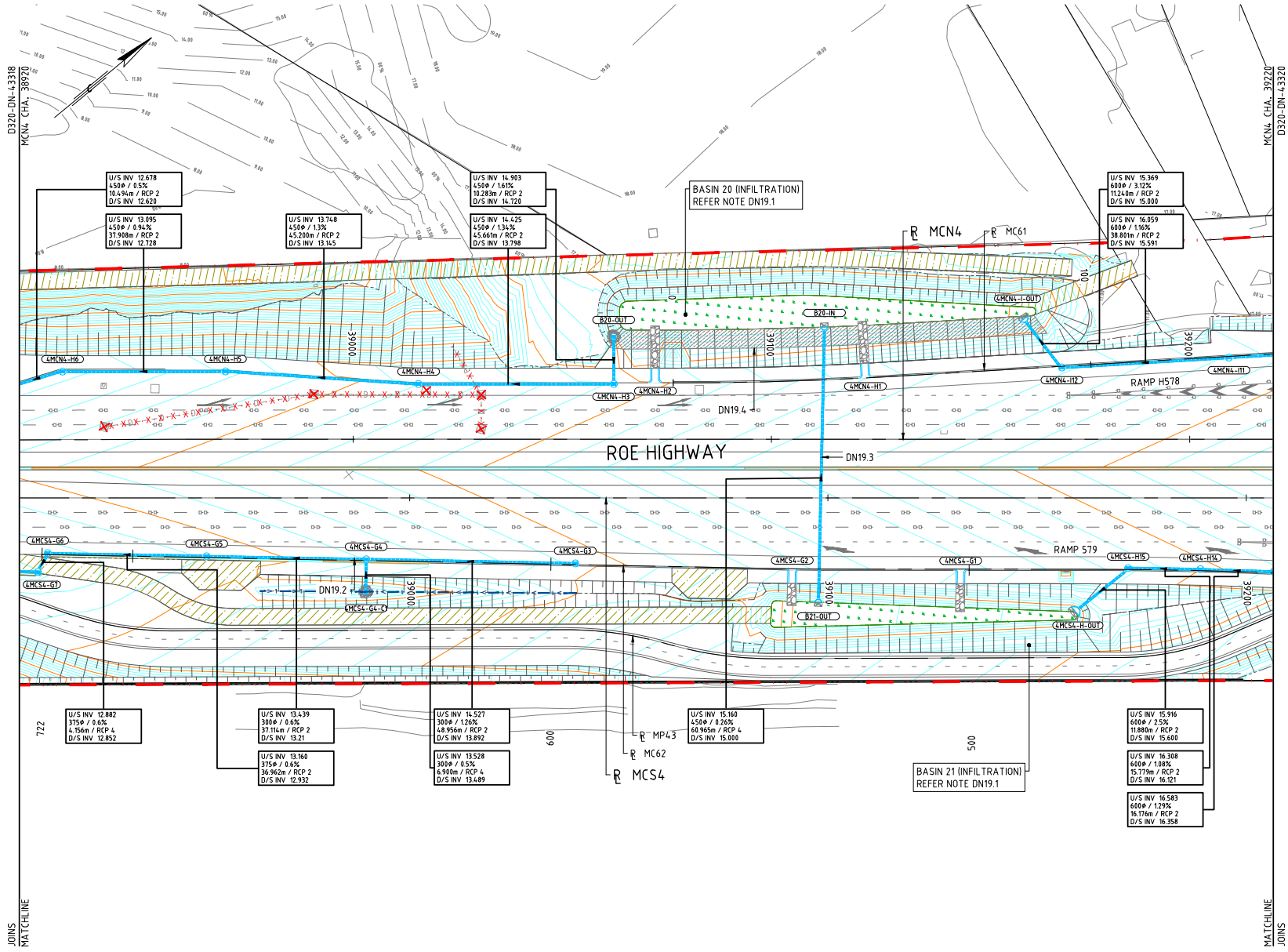
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DRAWING NUMBER: GEHBI-GCA-DRG-D320-DN-43318

REV: 0

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NOTES

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2. REFER TO DRAWING DN-44261 FOR LEGEND AND GENERAL NOTES.
3. REFER TO DRAWING DN-43105 FOR SWALE DETAILS.
4. REFER TO DRAWING DN-43901 TO DN-43908 FOR DRAINAGE SCHEDULES

SHEET 19 NOTES:

DN19.1 BASIN 20 AND 21 (INFILTRATION)
DESIGN ARI: 1% AEP
BASE LEVEL: RL 15.0m AHD
TWL (1EY): 15.38m AHD
TWL (10%AEP): 15.64m AHD
TWL (1% AEP): 16.1m AHD
TOTAL VOLUME REQUIRED(1% AEP): 1489m3
450mm DIA. BALANCING PIPE TO PROVIDE HYDRAULIC CONNECTION BETWEEN TWO BASIN CELLS.
MAX. 1IN3 BATTER SLOPES ON ALL EDGES

DN19.2 GULLY PIT ADJACENT TO CONCRETE BARRIER. REFER TO DETAIL ON DRAWING SHEET D320-DN-43101.

DN19.3 BALANCE PIPE BETWEEN BASIN 20 AND 21.

DN19.4 MIN. 300mm THICK COMPACTED CLAY LINER TO BE INSTALLED ALONG ROAD EMBANKMENT FOR EXTENTS SHOWN TO 15.75m AHD. LINER TO BE INSTALLED TO SATISFACTION OF GEOTECHNICAL SITE REPRESENTATIVE. REFER TO CLAY LINER NOTES ON SHEET DN-43115.

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Rev.	DATE	DESCRIPTION	D.G. APPROVED
0	17.01.23	ISSUED FOR CONSTRUCTION	

METADATA

GROUND SURVEY STANDARD:	67-08-43
DATE OF CAPTURE:	VARIES
MAPPING SURVEY STANDARD:	67-08-44
DATE OF CAPTURE:	VARIES
MAIN ROADS PROJECT ZONE:	PCG94
HEIGHT DATUM:	AHD

ALLIANCE: Greater Connect ALLIANCE

VERIFIER: WGA

CLIENT: mainroads WESTERN AUSTRALIA — INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	A. NAYAK M. EUPENA	17.01.23	VERIFIER	D. GROBLER	17.01.23
DRAWN	M. DU TOIT	17.01.23	DESIGN MANAGER APPROVED	D. WATSON	17.01.23
CHECKED	D. BEN-AVRAHAM	17.01.23	ALLIANCE PROJECT MANAGER APPROVED	H. LUN	17.01.23

DRAWING PURPOSE: FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY (H018)
35.40 SLK TO 40.28 SLK
DRAINAGE
PLAN - SHEET 19

SHEET: A1

MRWA DRAWING No.: 202248-01028

LOCAL AUTHORITY: [009] CITY OF SWAN / [102] CITY OF KALAMUNDA / [106] SHIRE OF MUNDARING

MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

STATUS: IFC

DRAWING NUMBER: GEHBI-GCA-DRG-D320-DN-43319

REV: 0

NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

NOTES:

1. FOR GENERAL NOTES REFER TO DRAWING 00102 AND 00103

TABLE 2	REQUIRED MINIMUM ULS PILE GEOTECHNICAL CAPACITY (ø RUG)	
LOCATION	COMPRESSION (kN)	TENSION (kN)
A1-P1 TO A1-P8	3900	NIL
P1-P1 TO P1-P8	5400	NIL
P2-P1 TO P2-P8	5900	NIL
A2-P1 TO A2-P8	5000	NIL
W1-P1 TO W1-P8	2050	750
W2-P1 TO W2-P12	1950	550

THE FOLLOWING GEOTECHNICAL STRENGTH REDUCTION FACTORS TO BE USED
φg COMPRESSION = 0.72

NOTE: ALL PILES ARE BORED PILES.

THE FOLLOWING PILES ARE REQUIRED TO BE TESTED USING HIGH STRAIN DYNAMIC PILE TEST (REFER TO GEOTECHNICAL REPORT 'GEHBI-CMW-RPT-M906-GE-00001':
W2-P11, A2-P1, P2-P5, P1-P5, A1-P8, W1-P3

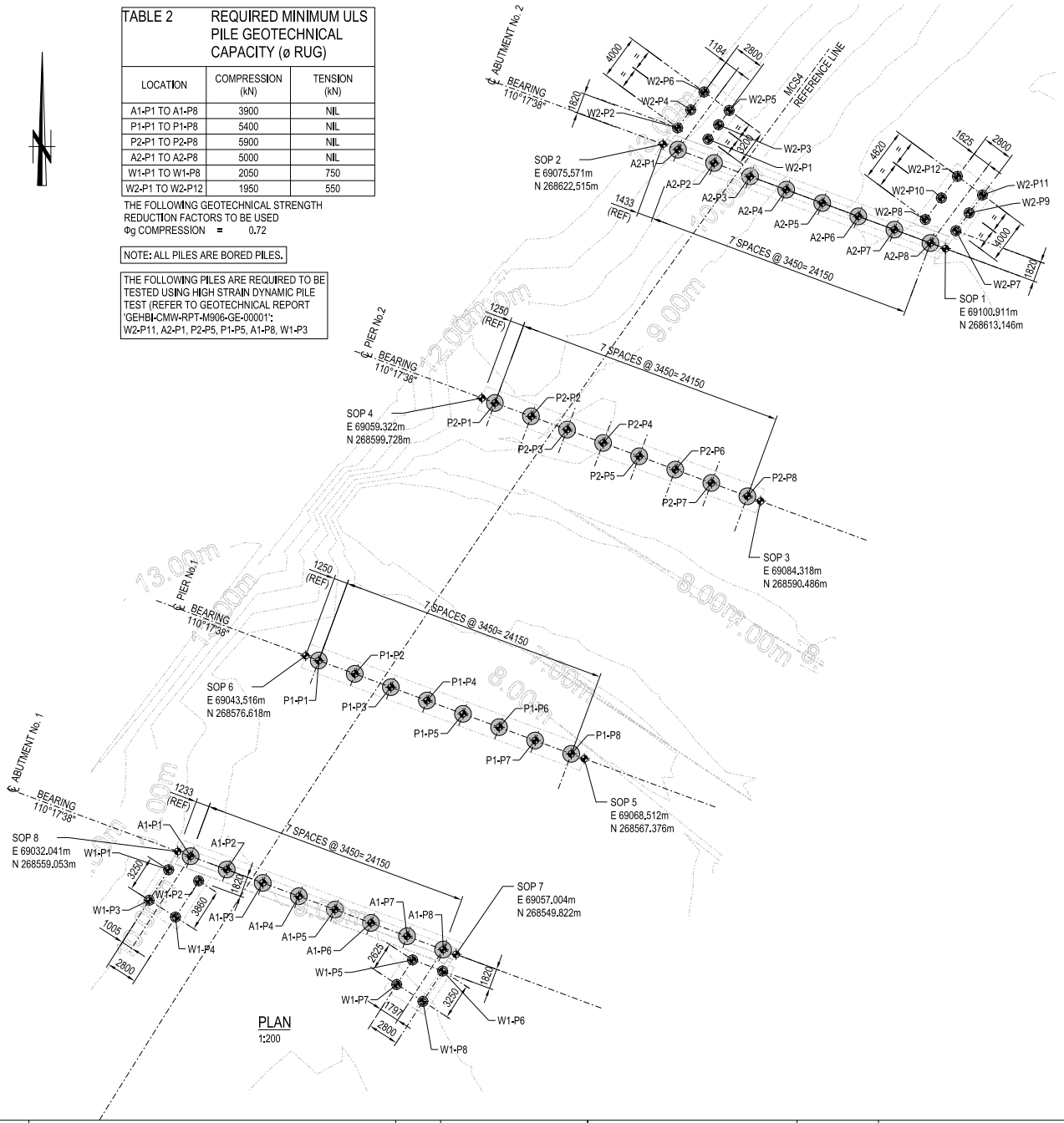


TABLE 1 - PILE DATA

PILE NAME	CO-ORDINATES EASTING	CO-ORDINATES NORTHING	PILE CUT-OFF RL 'A'	TOE OF PILE RL 'B' DESIGN	PILE LENGTH (m) 'L'
A1-P1	69033.197m	268558.626m	9.169m	-8.831m	18
A1-P2	69036.436m	268557.428m	9.074m	-8.926m	18
A1-P3	69039.671m	268556.232m	8.979m	-9.021m	18
A1-P4	69042.905m	268555.036m	8.884m	-9.116m	18
A1-P5	69046.140m	268553.839m	8.790m	-9.210m	18
A1-P6	69049.374m	268552.643m	8.695m	-9.305m	18
A1-P7	69052.609m	268551.447m	8.600m	-9.400m	18
A1-P8	69055.848m	268550.249m	8.505m	-9.495m	18
A2-P1	69076.915m	268622.018m	9.731m	-11.269m	21
A2-P2	69080.151m	268620.821m	9.640m	-11.360m	21
A2-P3	69083.387m	268619.625m	9.548m	-11.452m	21
A2-P4	69086.623m	268618.429m	9.457m	-11.543m	21
A2-P5	69089.859m	268617.232m	9.365m	-11.635m	21
A2-P6	69093.095m	268616.036m	9.273m	-11.727m	21
A2-P7	69096.331m	268614.839m	9.182m	-11.818m	21
A2-P8	69099.566m	268613.643m	9.090m	-11.910m	21
P1-P1	69044.688m	268576.184m	6.032m	-8.968m	15
P1-P2	69047.924m	268574.988m	6.032m	-8.968m	15
P1-P3	69051.160m	268573.792m	6.032m	-8.968m	15
P1-P4	69054.396m	268572.595m	6.032m	-8.968m	15
P1-P5	69057.632m	268571.399m	6.032m	-8.968m	15
P1-P6	69060.868m	268570.203m	6.032m	-8.968m	15
P1-P7	69064.103m	268569.006m	6.032m	-8.968m	15
P1-P8	69067.339m	268567.810m	6.032m	-8.968m	15
P2-P1	69060.494m	268599.294m	6.742m	-11.758m	18.5
P2-P2	69063.730m	268598.098m	6.742m	-11.758m	18.5
P2-P3	69066.966m	268596.901m	6.742m	-11.758m	18.5
P2-P4	69070.202m	268595.705m	6.742m	-11.758m	18.5
P2-P5	69073.438m	268594.509m	6.742m	-11.758m	18.5
P2-P6	69076.674m	268593.312m	6.742m	-11.758m	18.5
P2-P7	69079.910m	268592.116m	6.742m	-11.758m	18.5
P2-P8	69083.146m	268590.919m	6.742m	-11.758m	18.5
W1-P1	69031.229m	268557.413m	9.055m	-7.945m	17
W1-P2	69033.917m	268556.419m	9.055m	-7.945m	17
W1-P3	69029.478m	268554.675m	9.055m	-7.945m	17
W1-P4	69031.837m	268553.166m	9.055m	-7.945m	17
W1-P5	69053.110m	268549.322m	8.425m	-7.575m	17
W1-P6	69055.800m	268548.327m	8.425m	-7.575m	16
W1-P7	69051.685m	268547.116m	8.425m	-7.575m	16
W1-P8	69054.037m	268545.597m	8.425m	-7.575m	16
W2-P1	69079.616m	268622.961m	9.665m	-12.335m	16
W2-P2	69076.884m	268623.971m	9.665m	-12.335m	22
W2-P3	69080.564m	268624.247m	9.665m	-12.335m	22
W2-P4	69078.062m	268625.587m	9.665m	-12.335m	22
W2-P5	69081.512m	268625.534m	9.665m	-12.335m	22
W2-P6	69079.256m	268627.192m	9.665m	-12.335m	22
W2-P7	69101.847m	268614.740m	9.035m	-12.965m	22
W2-P8	69099.110m	268615.752m	9.035m	-12.965m	22
W2-P9	69103.040m	268616.345m	9.035m	-12.965m	22
W2-P10	69100.549m	268617.686m	9.035m	-12.965m	22
W2-P11	69104.234m	268617.950m	9.035m	-12.965m	22
W2-P12	69101.987m	268619.621m	9.035m	-12.965m	22

'L' DENOTES ACTUAL PILE LENGTH MEASURED ALONG THE PILE CENTERLINE ALLOWING FOR ANY RAKE

SCALE 1:200

Rev.	DATE	DESCRIPTION	APPROVED
0A	18/11/2022	ISSUED FOR CONSTRUCTION APPROVAL	D.W

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P.TRAN		VERIFIER	J.MUCCILLO
DRAWN	W.ROSA		DESIGN MANAGER APPROVED	D.WATSON
CHECKED	G.MALATESTA		ALLIANCE PROJECT MANAGER APPROVED	E.GEE

DRAWING PURPOSE: NOT FOR CONSTRUCTION

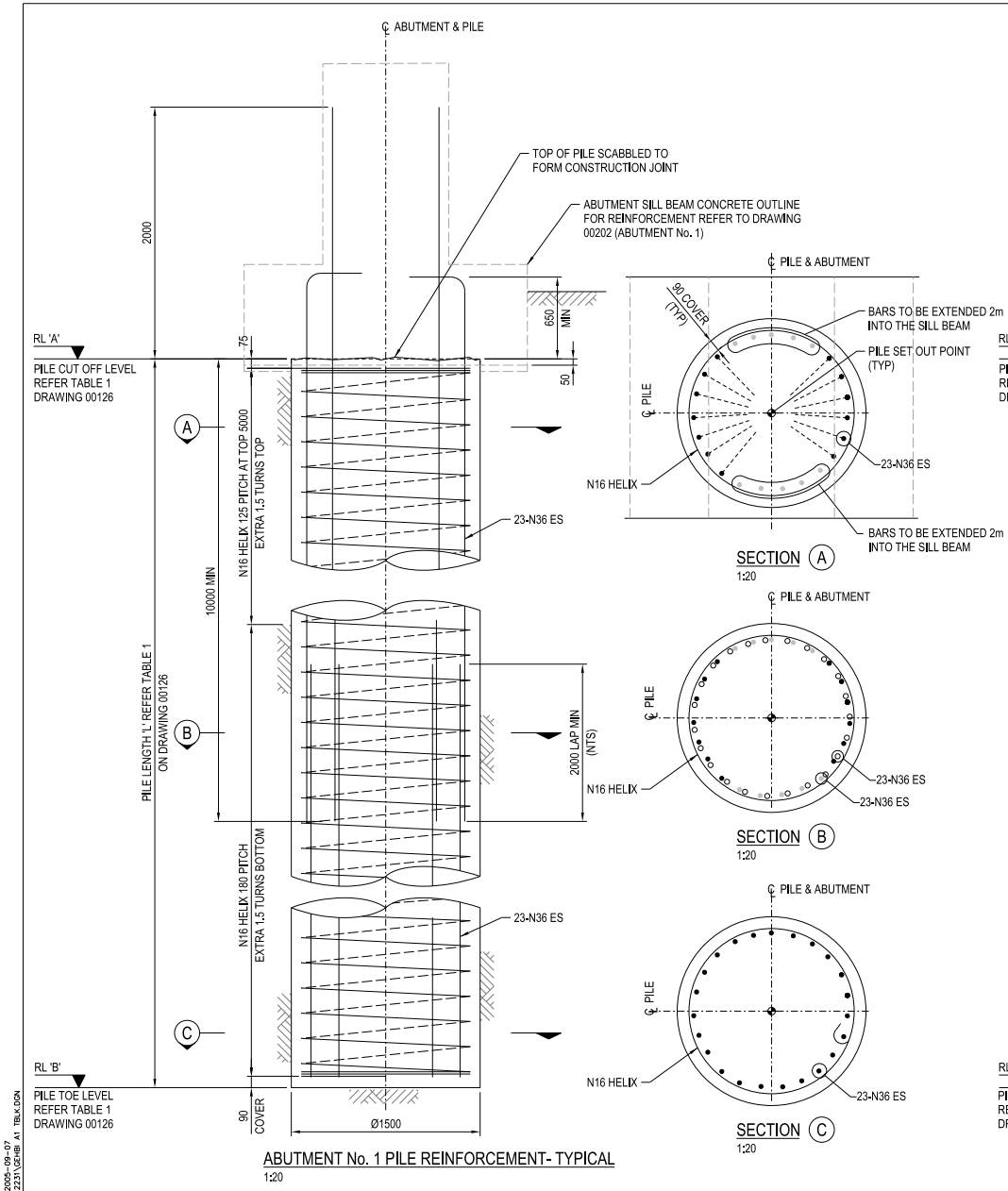
PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES
DRAWING TITLE: ROE HIGHWAY OVER HELENA RIVER BRIDGE No. 1899 PILE SET OUT
SHEET: A1
MRWA DRAWING No.
LOCAL AUTHORITY: (106) SHIRE OF MUNDARING
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN
STATUS: IFCA
DRAWING NUMBER: GEHBI-GCA-DRG-S420-BR-00126
REV: 0A

Last saved by: JW65798(2022-05-04) Last Plotted: 2005-09-07
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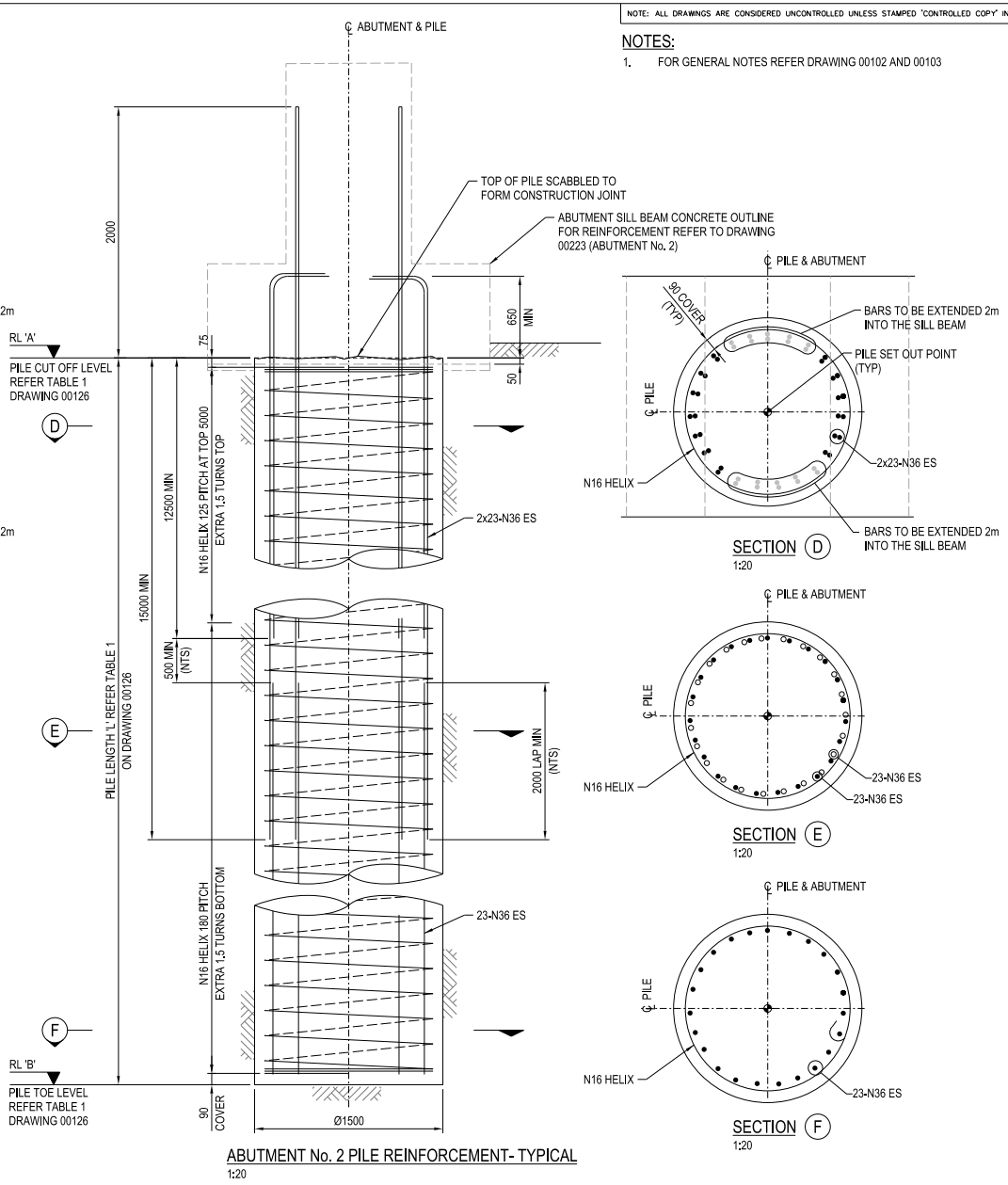
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NOTES:

1. FOR GENERAL NOTES REFER DRAWING 00102 AND 00103



ABUTMENT No. 1 PILE REINFORCEMENT- TYPICAL
1:20



ABUTMENT No. 2 PILE REINFORCEMENT- TYPICAL
1:20

SCALE 1:20

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Rev.	DATE	DESCRIPTION	APPROVED
0A	18/11/2022	ISSUED FOR CONSTRUCTION APPROVAL	D.W

METADATA	
GROUND SURVEY STANDARD:	
DATE OF CAPTURE:	
MAPPING SURVEY STANDARD:	
DATE OF CAPTURE:	
MAIN ROADS PROJECT ZONE:	
HEIGHT DATUM:	AHD

ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P TRAN		VERIFIER	J MUCCILLO
DRAWN	W ROSA		DESIGN MANAGER APPROVED	D WATSON
CHECKED	G MALATESTA		ALLIANCE PROJECT MANAGER APPROVED	E GEE

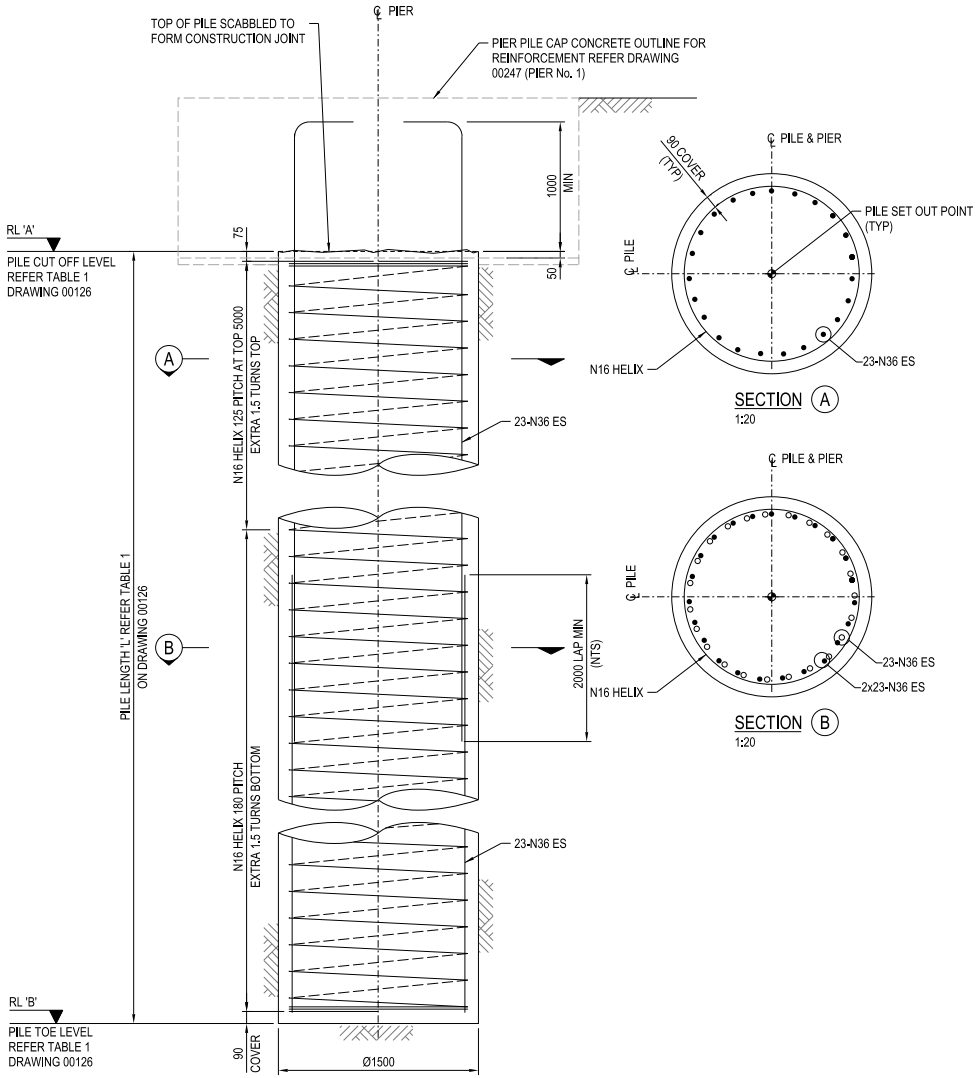
DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES
DRAWING TITLE: ROE HIGHWAY OVER HELENA RIVER BRIDGE No. 1899 ABUTMENT PILES REINFORCEMENT
SHEET: A1
MRWA DRAWING No.
LOCAL AUTHORITY: (106) SHIRE OF MUNDARING
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN
STATUS: IFCA
DRAWING NUMBER: GEHBI-GCA-DRG-S420-BR-00127
REV: 0A

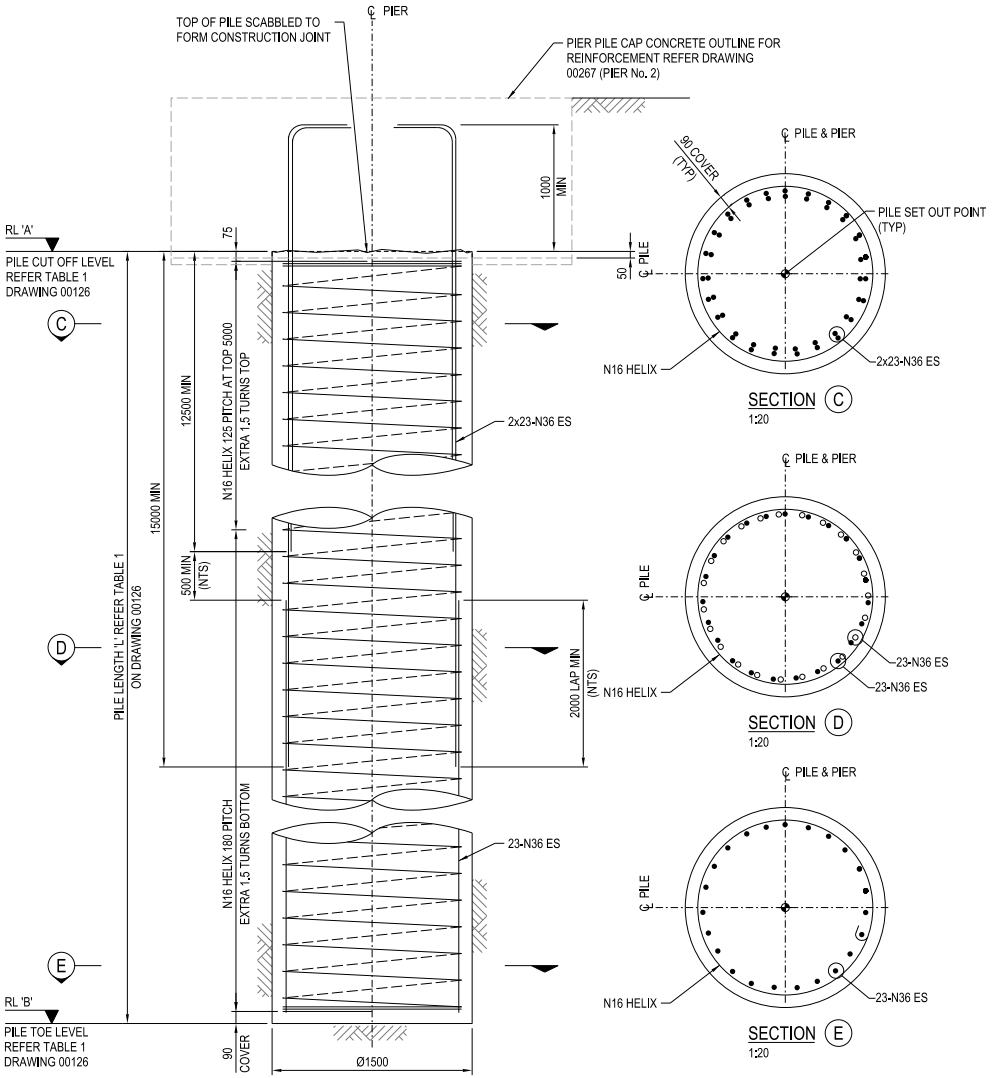
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PIER No. 1 PILE REINFORCEMENT - TYPICAL
1:20



PIER No. 2 PILE REINFORCEMENT - TYPICAL
1:20

SCALE 1:20

Last saved by: JW65798(2022-05-04) Last Plotted: 2005-09-07
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DESIGNED	P TRAN		VERIFIER	J MUCCILLO
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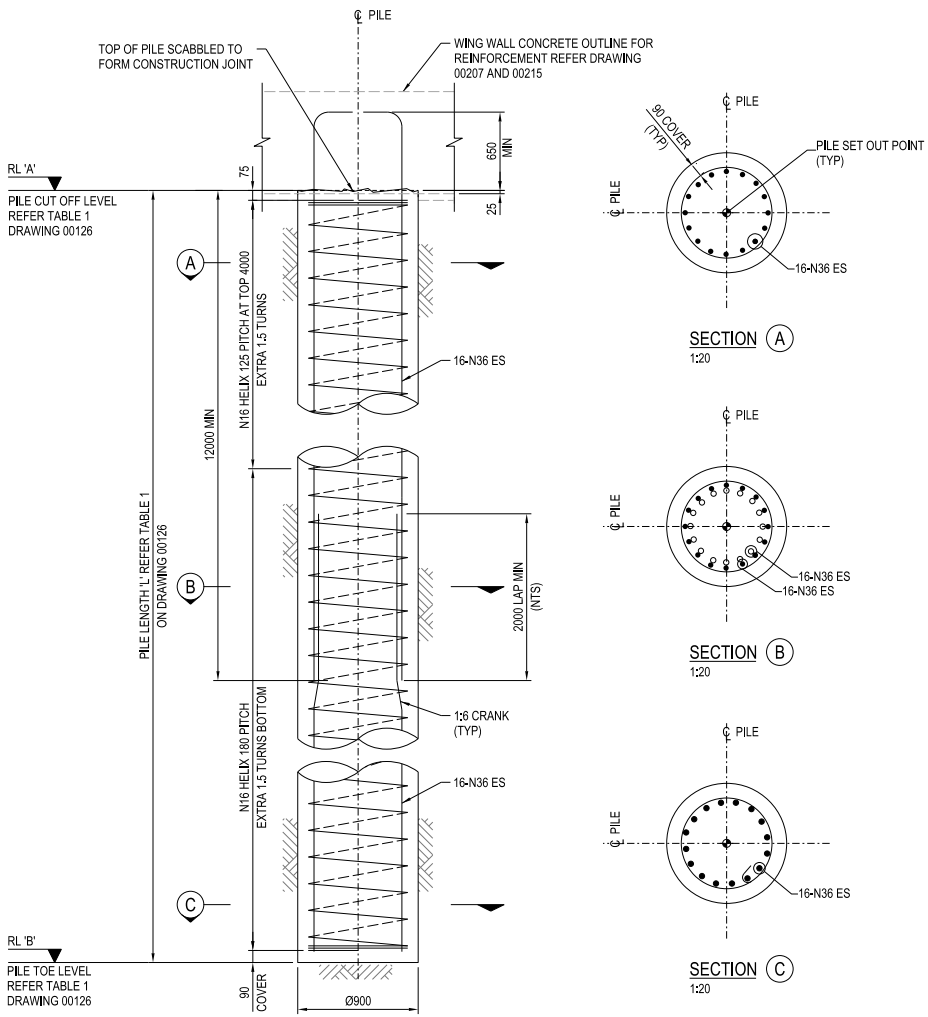
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PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES
DRAWING TITLE: ROE HIGHWAY OVER HELENA RIVER BRIDGE No. 1899 PIER PILES REINFORCEMENT
SHEET: A1
MRWA DRAWING No.
LOCAL AUTHORITY: (106) SHIRE OF MUNDARING
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN
STATUS: IFCA
DRAWING NUMBER: GEHBI-GCA-DRG-S420-BR-00128
REV: 0A

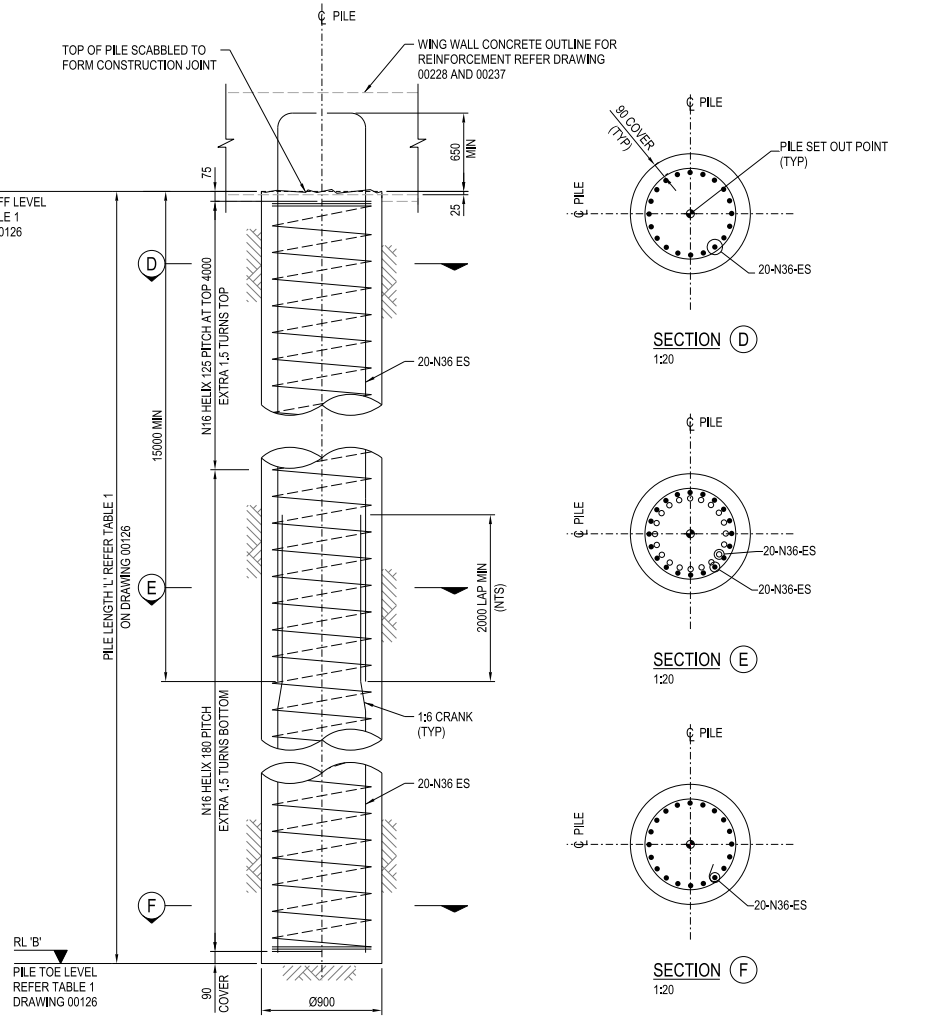
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NOTES:

1. FOR GENERAL NOTES REFER DRAWING 00102 AND 00103



SOUTHERN WING WALL PILES W1-P1 TO W1-P8 REINFORCEMENT
1:20



NORTHERN WING WALL PILES W2-P1 TO W2-P12 REINFORCEMENT
1:20

SCALE 1:20

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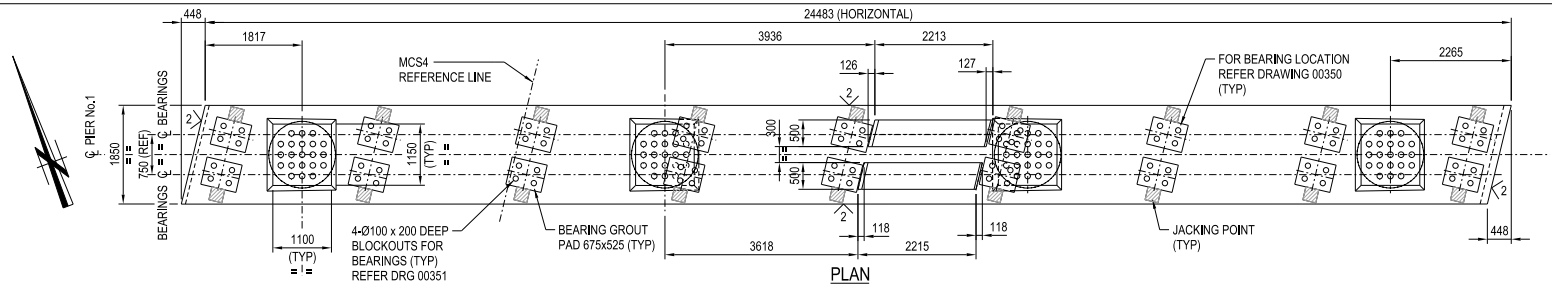
DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES
DRAWING TITLE: ROE HIGHWAY OVER HELENA RIVER BRIDGE No. 1899 WING WALL PILES REINFORCEMENT
SHEET: A1
MRWA DRAWING No.
LOCAL AUTHORITY: (106) SHIRE OF MUNDARING
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN
STATUS: IFCA
DRAWING NUMBER: GEHBI-GCA-DRG-S420-BR-00129
REV: 0A

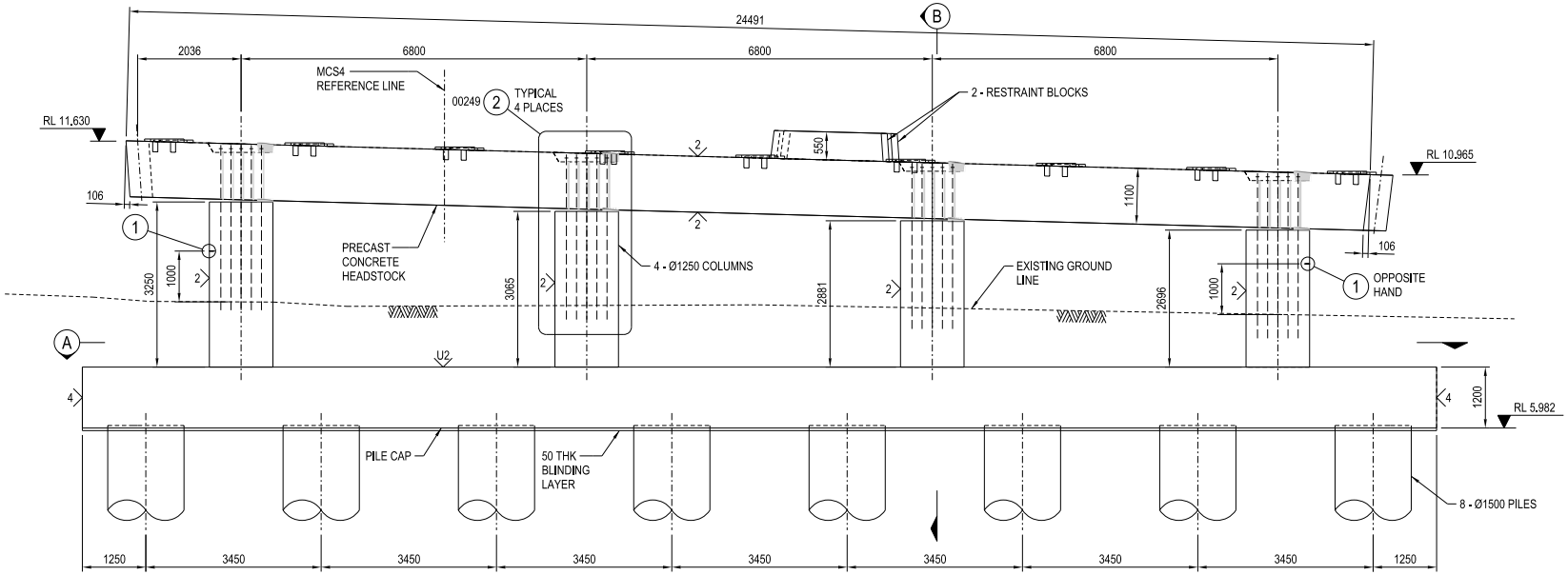
NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

NOTES:

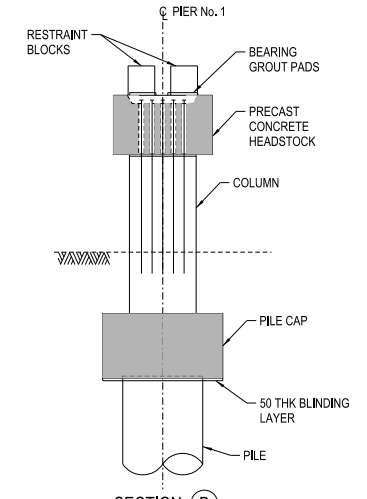
1. FOR GENERAL NOTES REFER DRAWING 00102 AND 00103.
2. FOR JACKING PROVISION NOTES REFER TO DRAWING 00200.
3. THE PRECAST HEADSTOCK AS DOCUMENTED ARE DESIGNED TO CATER FOR THEIR IN-PLACE CONDITION. LIFTING INSERT LOCATIONS AND RIGGING SYSTEM REQUIREMENTS SHALL BE DESIGNED AND SUPPLIED BY THE PRECAST CONTRACTOR TO ENSURE THAT NO CRACKING OF THE BEAMS OCCURS DURING LIFTING,TRANSPORTATION AND ERECTION. LIFTING INSERTS SHALL COMPRISE OF CAST-IN PROPRIETARY ANCHORS.



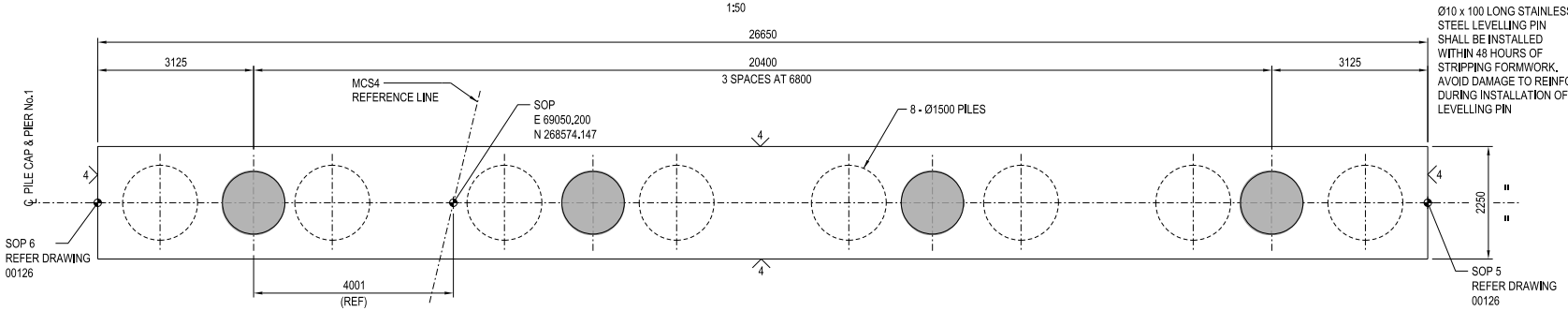
PLAN
HEADSTOCK
1:50



ELEVATION
1:50

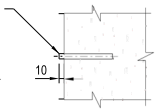


SECTION (B)
1:50



SECTION (A) PILE CAP
1:50

Ø10 x 100 LONG STAINLESS STEEL LEVELLING PIN SHALL BE INSTALLED WITHIN 48 HOURS OF STRIPPING FORMWORK. AVOID DAMAGE TO REINFORCEMENT DURING INSTALLATION OF THE LEVELLING PIN



DETAIL (1)
1:5

Rev.	DATE	DESCRIPTION	APPROVED
0A	18/11/2022	ISSUED FOR CONSTRUCTION APPROVAL	D.W

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P TRAN		VERIFIER	J MUCCILLO
DRAWN	W ROSA		DESIGN MANAGER APPROVED	D WATSON
CHECKED	G MALATESTA		ALLIANCE PROJECT MANAGER APPROVED	E GEE

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES
DRAWING TITLE: ROE HIGHWAY OVER HELENA RIVER BRIDGE No. 1899 PIER No. 1 CONCRETE DETAILS
SHEET: A1
MRWA DRAWING No.
LOCAL AUTHORITY: (106) SHIRE OF MUNDARING
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN
STATUS: IFCA
DRAWING NUMBER: GEHBI-GCA-DRG-S420-BR-00245
REV: 0A

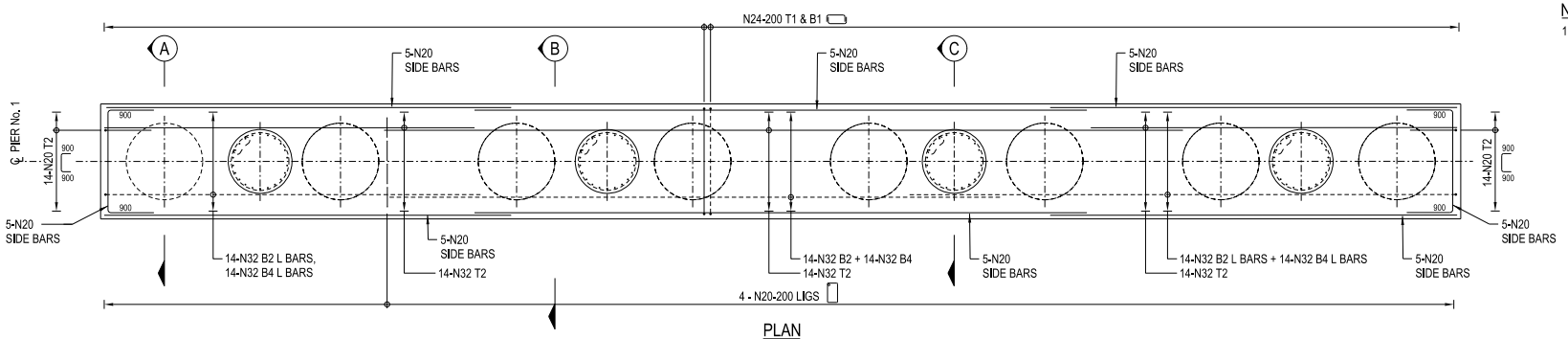
SCALE 1:50

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Filename: C:\PW_WORKING_FOLDER\ARCADIS-AU-DA\DMS2231\GEHBI A1 TBLK.DGN

NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

NOTES:

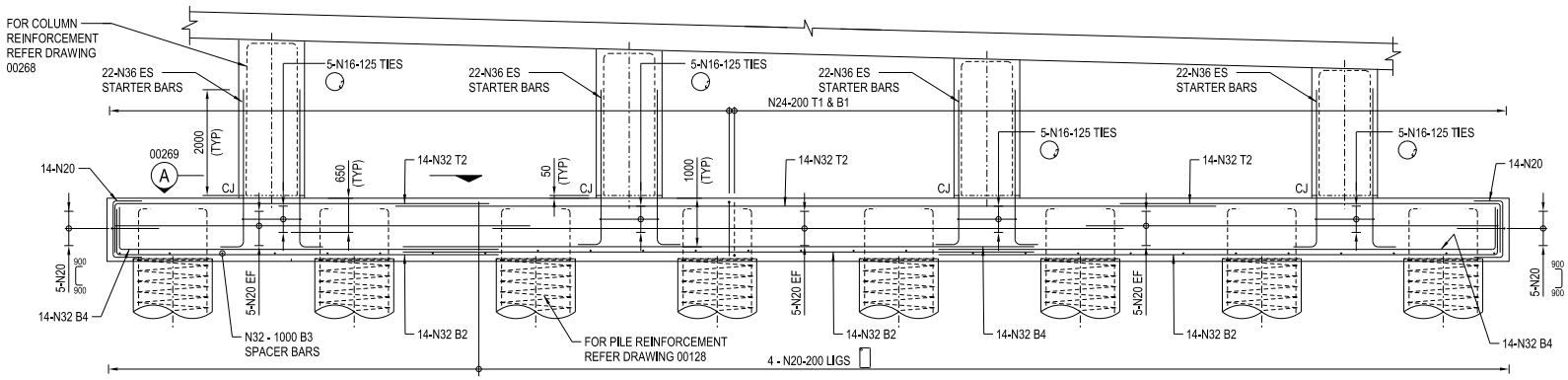
1. FOR GENERAL NOTES REFER DRAWING 00102 AND 00103



PLAN

PILE CAP REINFORCEMENT

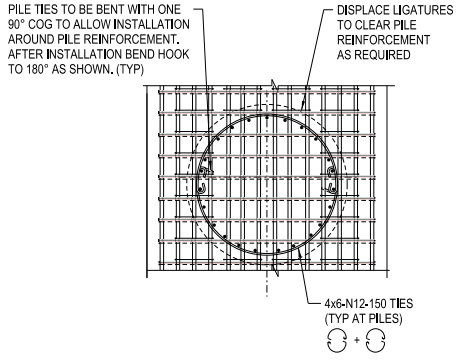
1:50



ELEVATION

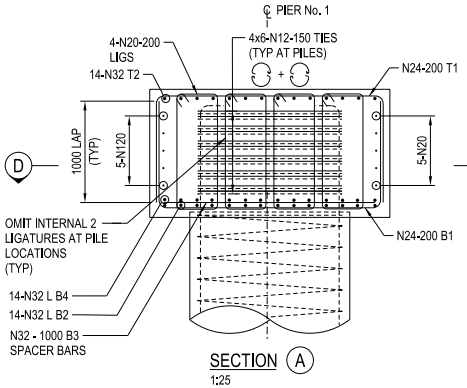
PILE CAP REINFORCEMENT

1:50



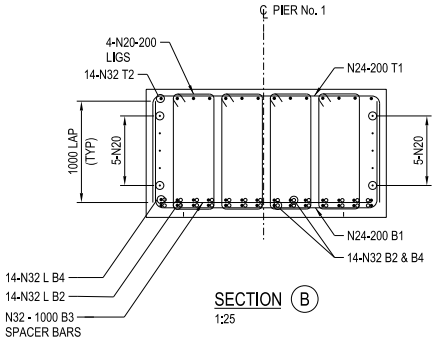
SECTION D

1:25



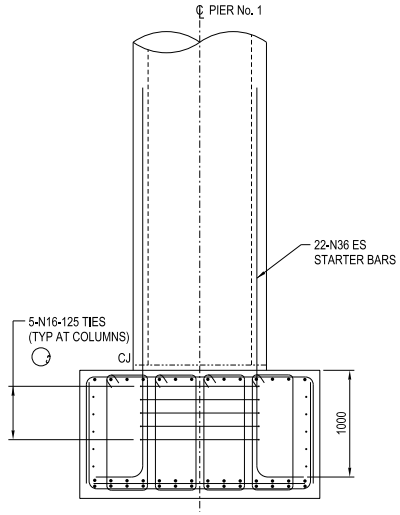
SECTION A

1:25



SECTION B

1:25



SECTION C

1:25

REINFORCEMENT AS PER SECTION B SIMILAR UNO

Rev.	DATE	DESCRIPTION	APPROVED
0A	18/11/2022	ISSUED FOR CONSTRUCTION APPROVAL	D.W

METADATA

GROUND SURVEY STANDARD:

DATE OF CAPTURE:

MAPPING SURVEY STANDARD:

DATE OF CAPTURE:

MAIN ROADS PROJECT ZONE:

HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE

VERIFIER: WGA WALLBRIDGE GILBERT AZTEC

CLIENT: mainroads WESTERN AUSTRALIA

INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P TRAN		VERIFIER	J MUCCILLO
DRAWN	W ROSA		DESIGN MANAGER APPROVED	D WATSON
CHECKED	G MALATESTA		ALLIANCE PROJECT MANAGER APPROVED	E GEE

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY OVER HELENA RIVER BRIDGE No. 1899 PIER No. 1 - PILE CAP REINFORCEMENT DETAILS

SHEET: A1

MRWA DRAWING No.

LOCAL AUTHORITY: (106) SHIRE OF MUNDARING

MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

STATUS: IFCA

DRAWING NUMBER: GEHBI-GCA-DRG-S420-BR-00247

REV: 0A

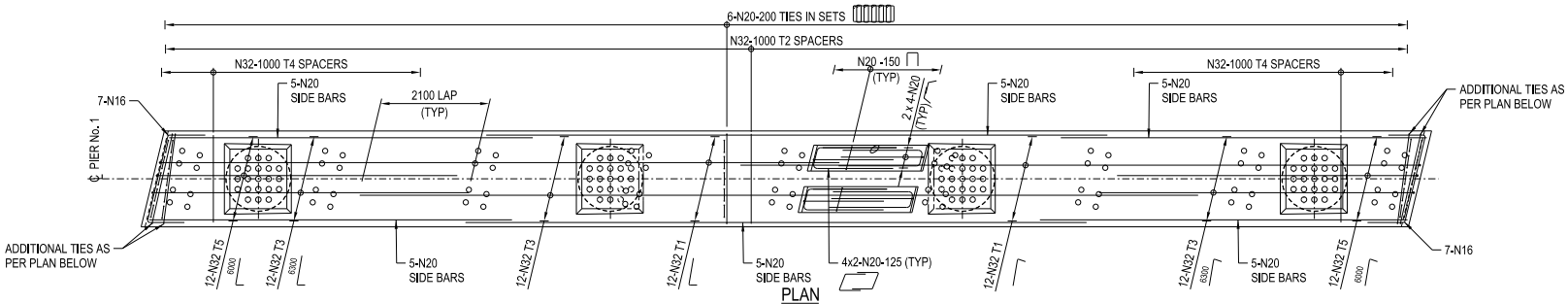
SCALE 1:50

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NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

NOTES:

1. FOR GENERAL NOTES REFER DRAWING 00102 AND 00103

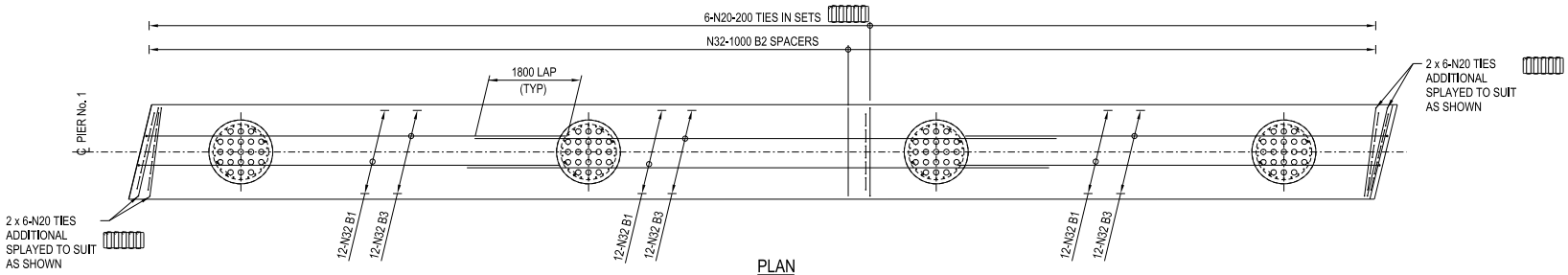


PLAN

HEADSTOCK - TOP REINFORCEMENT

1:50

NOTE:
N32 BAR SPACING TO BE AS PER SECTION Ⓕ ON DRG 00249

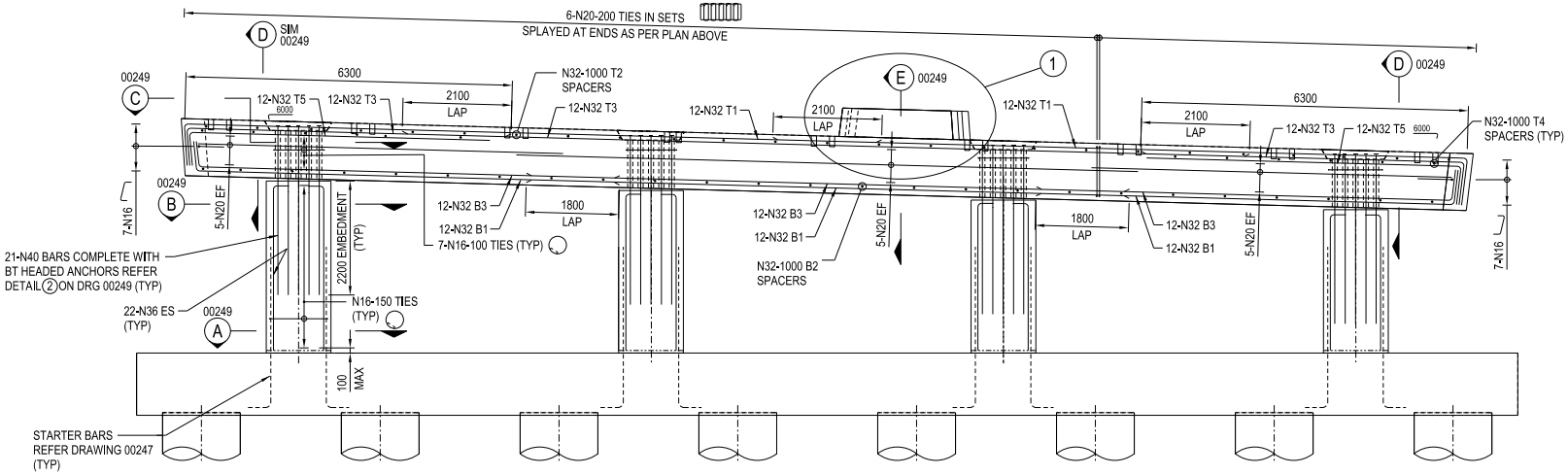


PLAN

HEADSTOCK - BOTTOM REINFORCEMENT

1:50

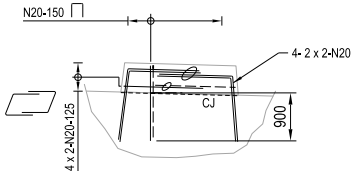
NOTE:
N32 BAR SPACING TO BE AS PER SECTION Ⓕ ON DRG 00249



ELEVATION

HEADSTOCK AND COLUMNS REINFORCEMENT

1:50



DETAIL (1) RESTRAINT BLOCK (TYP)

1:50

SCALE 1:50

Rev.	DATE	DESCRIPTION	APPROVED
0A	18/11/2022	ISSUED FOR CONSTRUCTION APPROVAL	D.W

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P TRAN		VERIFIER	J MUCCILLO
DRAWN	W ROSA		DESIGN MANAGER APPROVED	D WATSON
CHECKED	G MALATESTA		ALLIANCE PROJECT MANAGER APPROVED	E GEE

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY OVER HELENA RIVER
BRIDGE No. 1899
PIER No. 1 - HEADSTOCK
REINFORCEMENT DETAILS - SHEET 1

SHEET: A1

MRWA DRAWING No.

LOCAL AUTHORITY: (106) SHIRE OF MUNDARING

MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

STATUS: IFCA

DRAWING NUMBER: GEHBI-GCA-DRG-S420-BR-00248

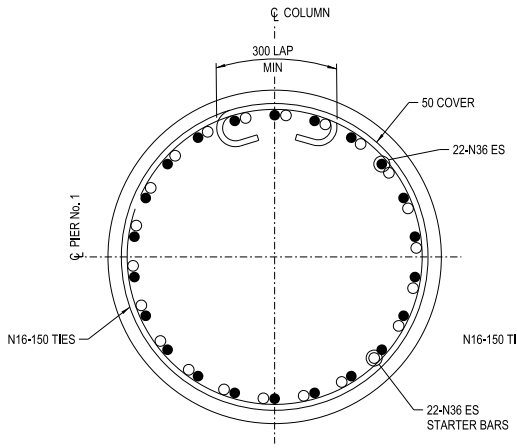
REV: 0A

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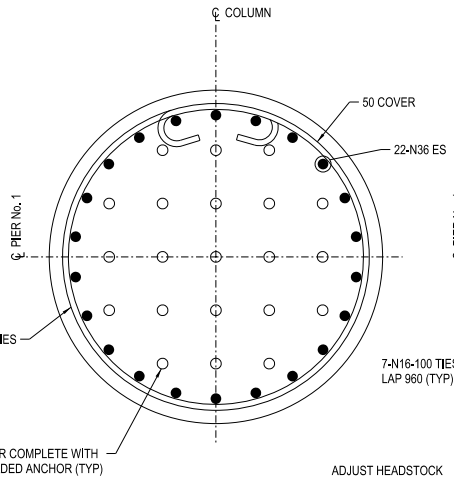
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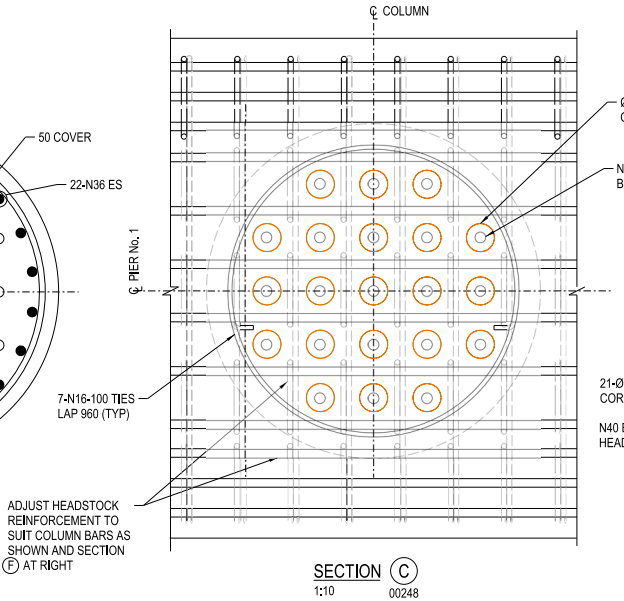
1. FOR GENERAL NOTES REFER DRAWING 00102 AND 00103



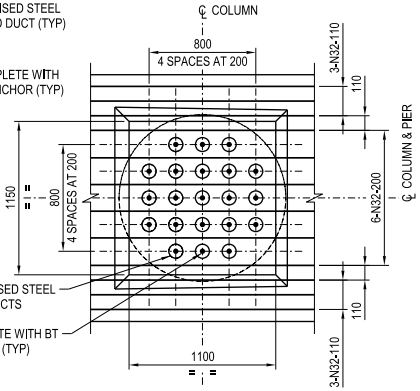
SECTION (A)
1:10 00247 & 00248



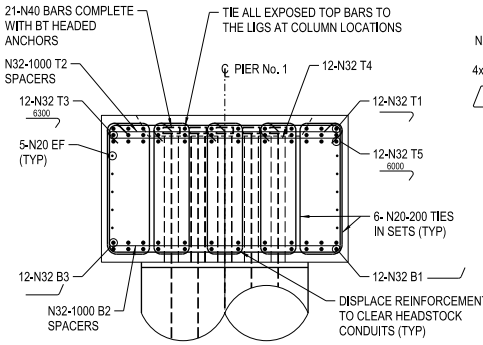
SECTION (B)
1:10 00248



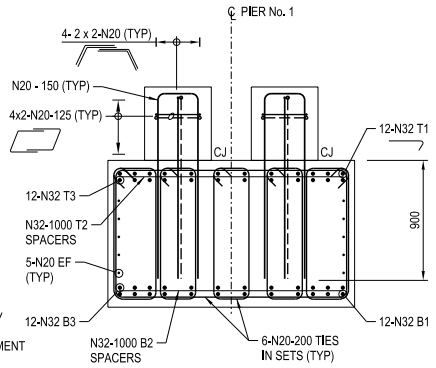
SECTION (C)
1:10 00248



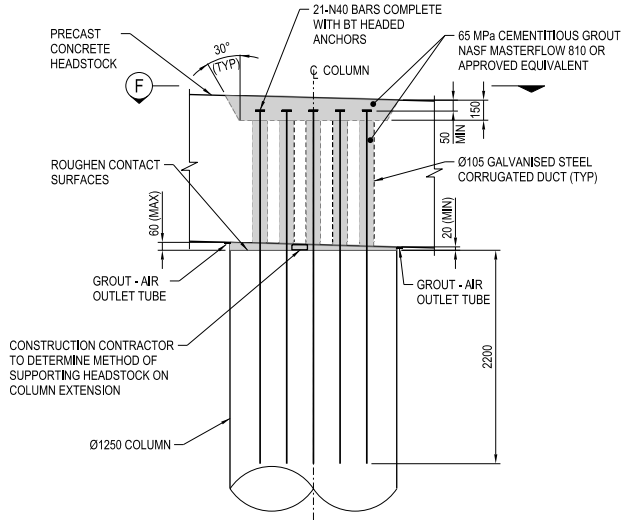
SECTION (F)
1:20



SECTION (D)
1:20 00248



SECTION (E)
1:20 00248



DETAIL (2)
1:20 00245

SCALE 1:10

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY OVER HELENA RIVER
BRIDGE No. 1899
PIER No. 1 - HEADSTOCK
REINFORCEMENT DETAILS - SHEET 2

SHEET: A1

MRWA DRAWING No.

LOCAL AUTHORITY: (106) SHIRE OF MUNDARING

MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

Rev.	DATE	DESCRIPTION	APPROVED
0A	18/11/2022	ISSUED FOR CONSTRUCTION APPROVAL	D.W

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE

VERIFIER: WGA WALLBRIDGE GILBERT AZTEC

CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P TRAN		VERIFIER	J MUCCILLO
DRAWN	W ROSA		DESIGN MANAGER APPROVED	D WATSON
CHECKED	G MALATESTA		ALLIANCE PROJECT MANAGER APPROVED	E GEE

DRAWING PURPOSE: NOT FOR CONSTRUCTION

STATUS: IFCA

DRAWING NUMBER: GEHBI-GCA-DRG-S420-BR-00249

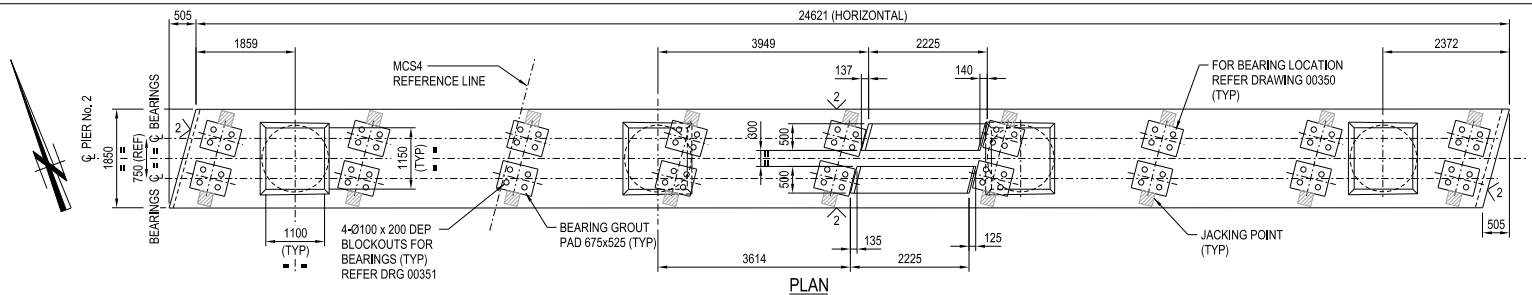
REV: 0A

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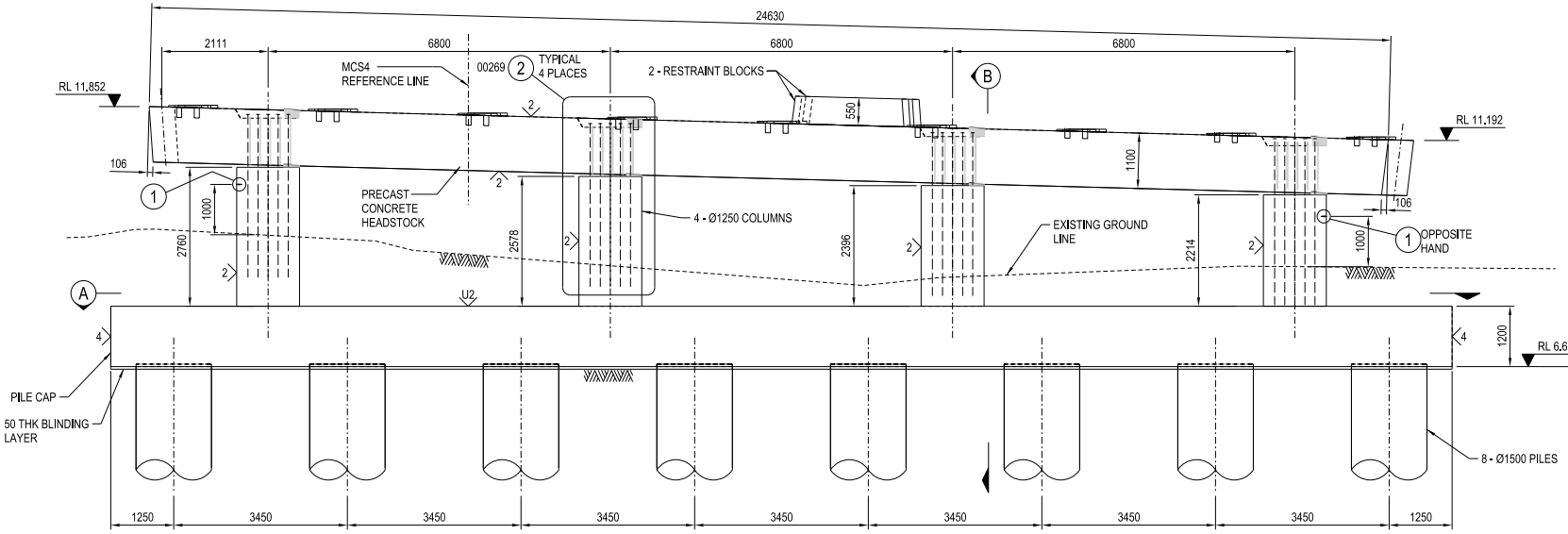
NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

NOTES:

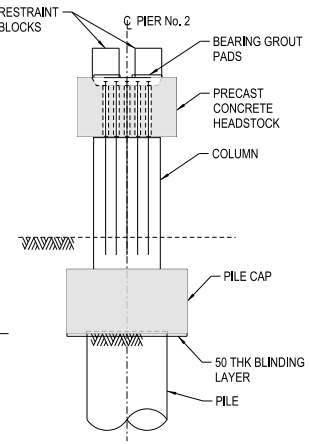
1. FOR GENERAL NOTES REFER DRAWING 00102 AND 00103.
2. FOR JACKING PROVISION NOTES REFER TO DRAWING 00200.
3. THE PRECAST HEADSTOCK AS DOCUMENTED ARE DESIGNED TO CATER FOR THEIR IN-PLACE CONDITION. LIFTING INSERT LOCATIONS AND RIGGING SYSTEM REQUIREMENTS SHALL BE DESIGNED AND SUPPLIED BY THE PRECAST CONTRACTOR TO ENSURE THAT NO CRACKING OF THE BEAMS OCCURS DURING LIFTING,TRANSPORTATION AND ERECTION. LIFTING INSERTS SHALL COMPRISE OF CAST-IN PROPRIETARY ANCHORS.



PLAN
HEADSTOCK
1:50

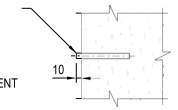


ELEVATION
1:50

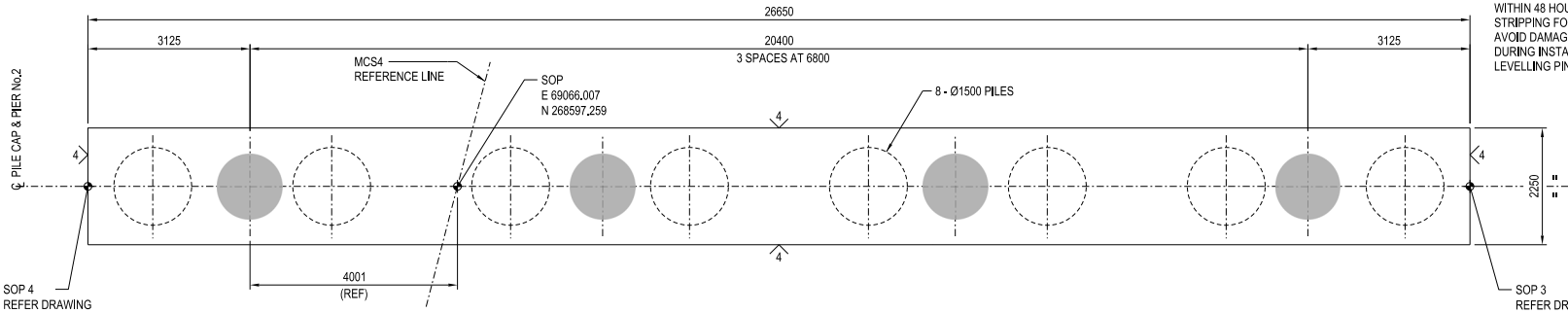


SECTION (B)
1:50

Ø10 x 100 LONG STAINLESS STEEL LEVELLING PIN SHALL BE INSTALLED WITHIN 48 HOURS OF STRIPPING FORMWORK. AVOID DAMAGE TO REINFORCEMENT DURING INSTALLATION OF LEVELLING PIN



DETAIL (1)
1:5



SECTION (A) PILE CAP
1:50

Rev.	DATE	DESCRIPTION	APPROVED
0A	18/11/2022	ISSUED FOR CONSTRUCTION APPROVAL	D.W

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P.TRAN		VERIFIER	J.MUCCILLO
DRAWN	W.ROSA		DESIGN MANAGER APPROVED	D.WATSON
CHECKED	G.MALATESTA		ALLIANCE PROJECT MANAGER APPROVED	E.GEE

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES
DRAWING TITLE: ROE HIGHWAY OVER HELENA RIVER BRIDGE No. 1899 PIER No. 2 CONCRETE DETAILS
SHEET: A1
MRWA DRAWING No.
LOCAL AUTHORITY: (106) SHIRE OF MUNDARING
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN
STATUS: IFCA
DRAWING NUMBER: GEHBI-GCA-DRG-S420-BR-00265
REV: 0A

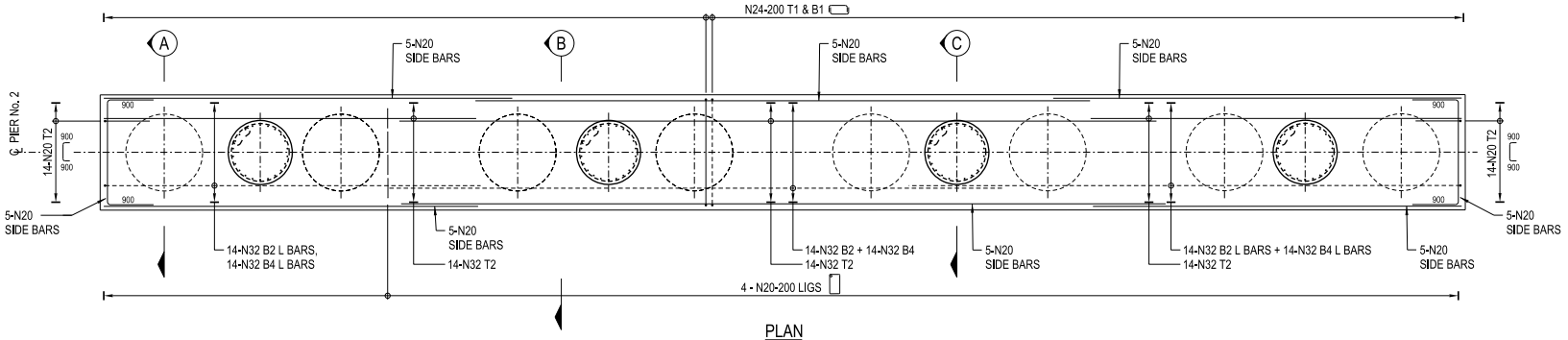
SCALE 1:50

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NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

NOTES:

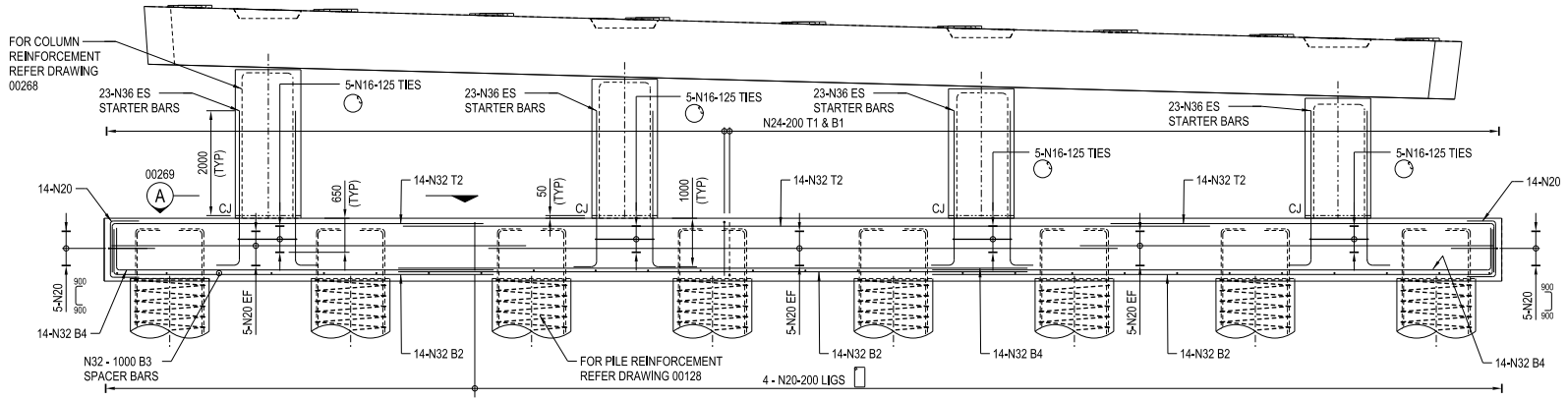
1. FOR GENERAL NOTES REFER DRAWING 00102 AND 00103



PLAN

PILE CAP REINFORCEMENT

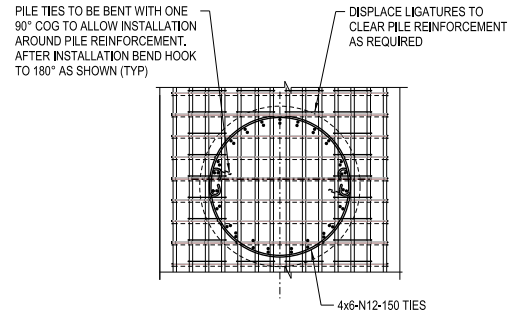
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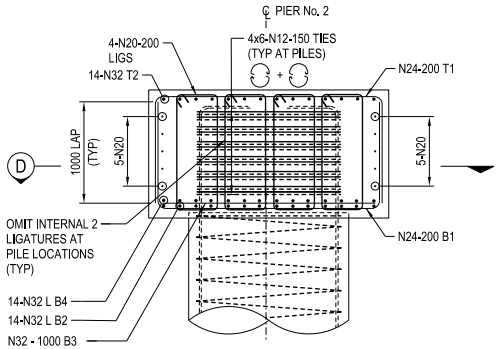
ELEVATION

PILE CAP REINFORCEMENT

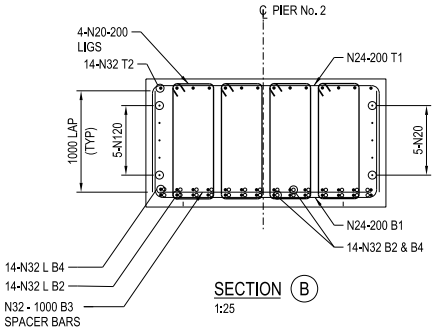
1:50



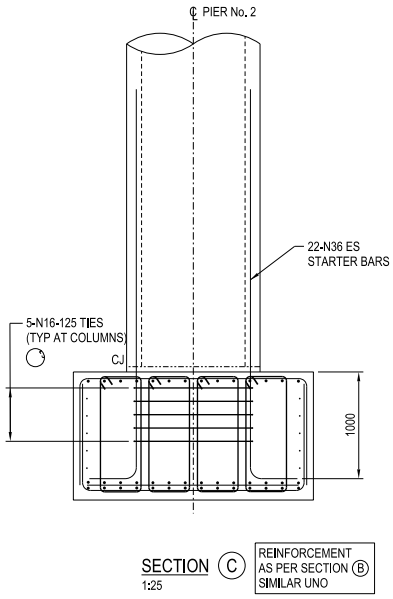
SECTION (D) + + 1:25



SECTION (A) 1:25



SECTION (B) 1:25



SECTION (C) 1:25

REINFORCEMENT AS PER SECTION (B) SIMILAR UNO

SCALE 1:50

Last saved by: JW65789(2022-05-04) Last Plotted: 2005-09-07
Filename: C:\PW_WORKING_FOLDER\ARCADIS-AU-DA\DMS1223\1\GEHBI_A1_TBLK.DGN

Rev.	DATE	DESCRIPTION	APPROVED
0A	18/11/2022	ISSUED FOR CONSTRUCTION APPROVAL	D.W

METADATA

GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE

VERIFIER: WGA WALLBRIDGE GILBERT AZTEC

CLIENT: mainroads WESTERN AUSTRALIA — INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P.TRAN		VERIFIER	J.MUCCILLO
DRAWN	W.ROSA		DESIGN MANAGER APPROVED	D.WATSON
CHECKED	G.MALATESTA		ALLIANCE PROJECT MANAGER APPROVED	E.GEE

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY OVER HELENA RIVER
BRIDGE No. 1899
PIER No. 2 - PILE CAP
REINFORCEMENT DETAILS

SHEET: A1

MRWA DRAWING No.

LOCAL AUTHORITY: (106) SHIRE OF MUNDARING

MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

STATUS: IFCA

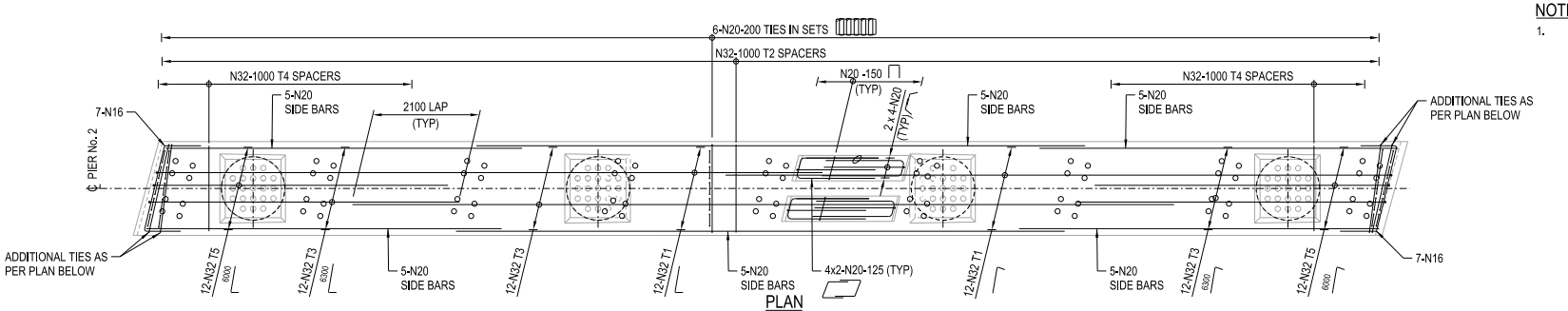
DRAWING NUMBER: GEHBI-GCA-DRG-S420-BR-00267

REV: 0A

NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

NOTES:

1. FOR GENERAL NOTES REFER DRAWING 00102 AND 00103

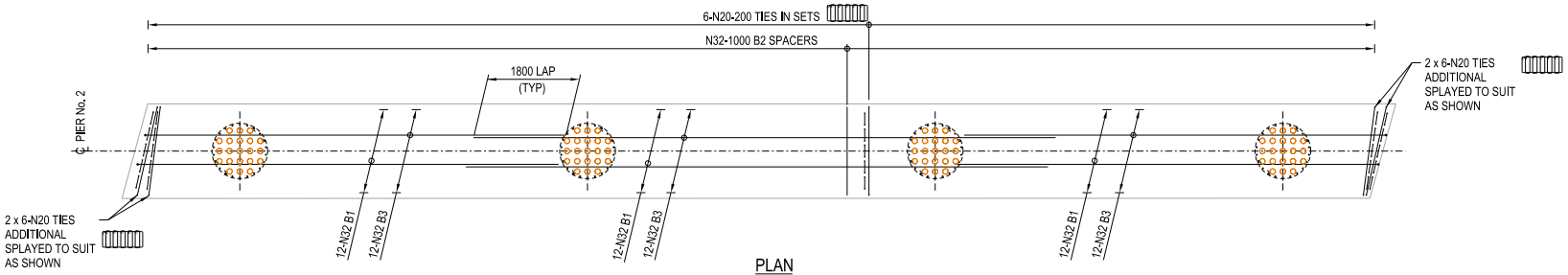


PLAN

HEADSTOCK - TOP REINFORCEMENT

1:50

NOTE:
N32 BAR SPACING TO BE AS PER SECTION (F) ON DRG 00269

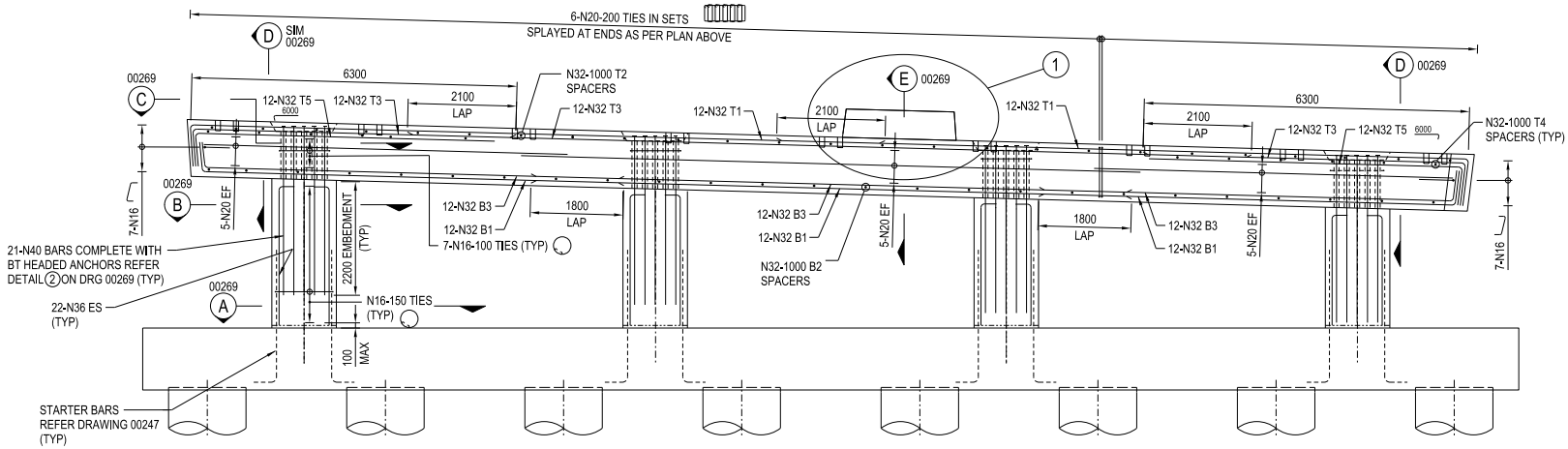


PLAN

HEADSTOCK - BOTTOM REINFORCEMENT

1:50

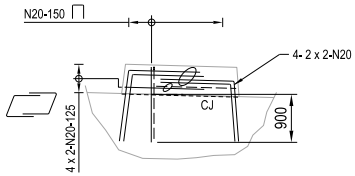
NOTE:
N32 BAR SPACING TO BE AS PER SECTION (F) ON DRG 00269



ELEVATION

HEADSTOCK AND COLUMNS REINFORCEMENT

1:50



DETAIL (1) RESTRAINT BLOCK (TYP)

1:50

SCALE 1:50

Last saved by: JW65789(2022-05-04) Last Plotted: 2005-09-07
Filename: C:\PW_WORKING_FOLDER\ARCADIS-AU-0A\DMS1223\1\GEHBI A1 TBLK.DGN

Rev.	DATE	DESCRIPTION	APPROVED
0A	18/11/2022	ISSUED FOR CONSTRUCTION APPROVAL	D.W

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P.TRAN		VERIFIER	J.MUCCILLO
DRAWN	W.ROSA		DESIGN MANAGER APPROVED	D.WATSON
CHECKED	G.MALATESTA		ALLIANCE PROJECT MANAGER APPROVED	E.GEE

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY OVER HELENA RIVER
BRIDGE No. 1899
PIER No. 2 - HEADSTOCK
REINFORCEMENT DETAILS - SHEET 1

SHEET: A1

MRWA DRAWING No.

LOCAL AUTHORITY: (106) SHIRE OF MUNDARING

MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

STATUS: IFCA

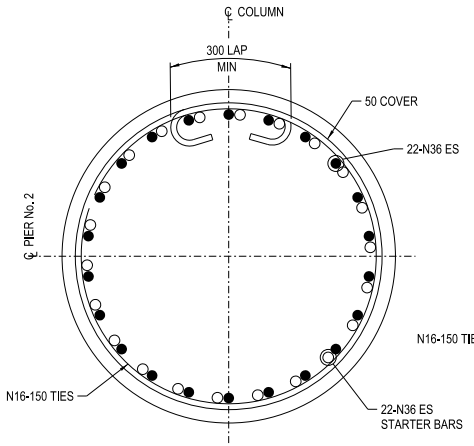
DRAWING NUMBER: GEHBI-GCA-DRG-S420-BR-00268

REV: 0A

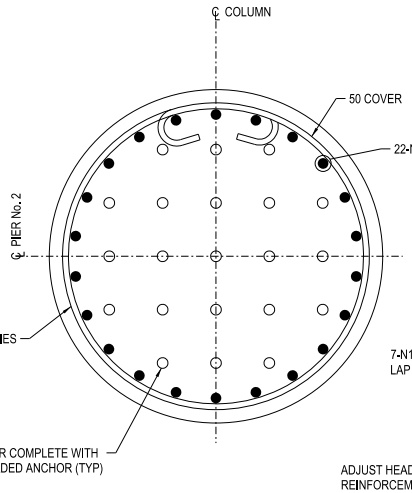
NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

NOTES:

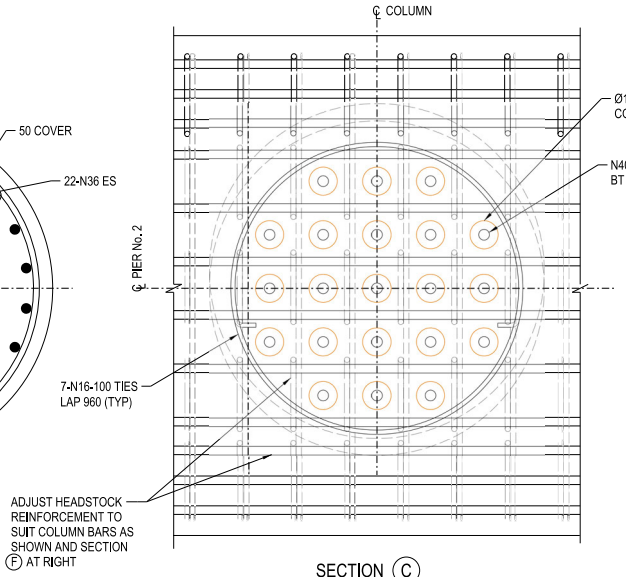
1. FOR GENERAL NOTES REFER DRAWING 00102 AND 00103



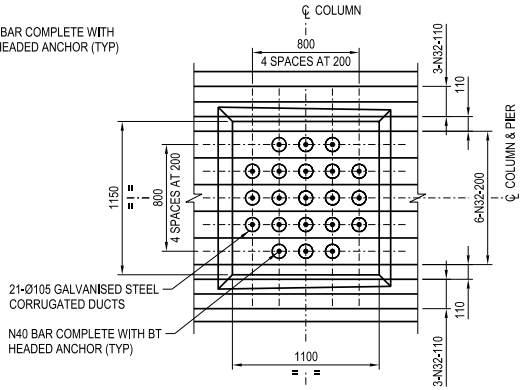
SECTION (A)
1:10 00267 & 00268



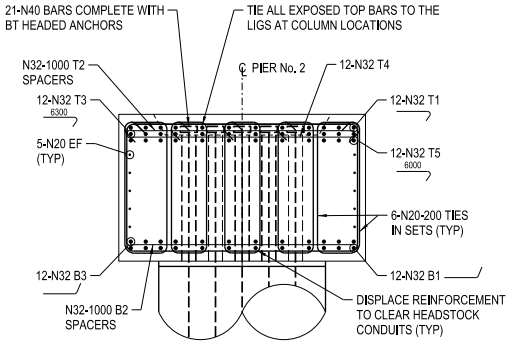
SECTION (B)
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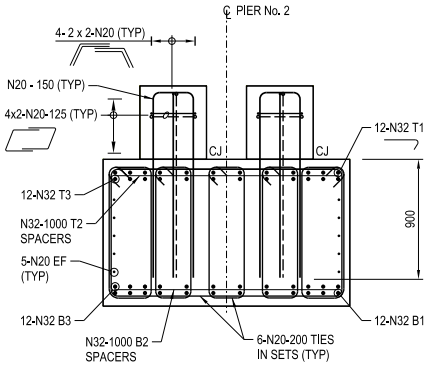
SECTION (C)
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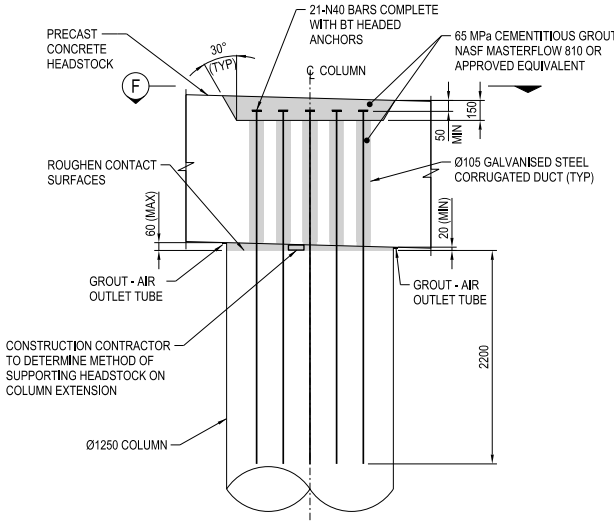
SECTION (F)
1:20



SECTION (D)
1:20 00269



SECTION (E)
1:20 00269



DETAIL (2)
1:20 00265

SCALE 1:10

Last saved by: JW65789(2022-05-04) Last Plotted: 2005-09-07
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Rev.	DATE	DESCRIPTION	APPROVED
0A	18/11/2022	ISSUED FOR CONSTRUCTION APPROVAL	D.W

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
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DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

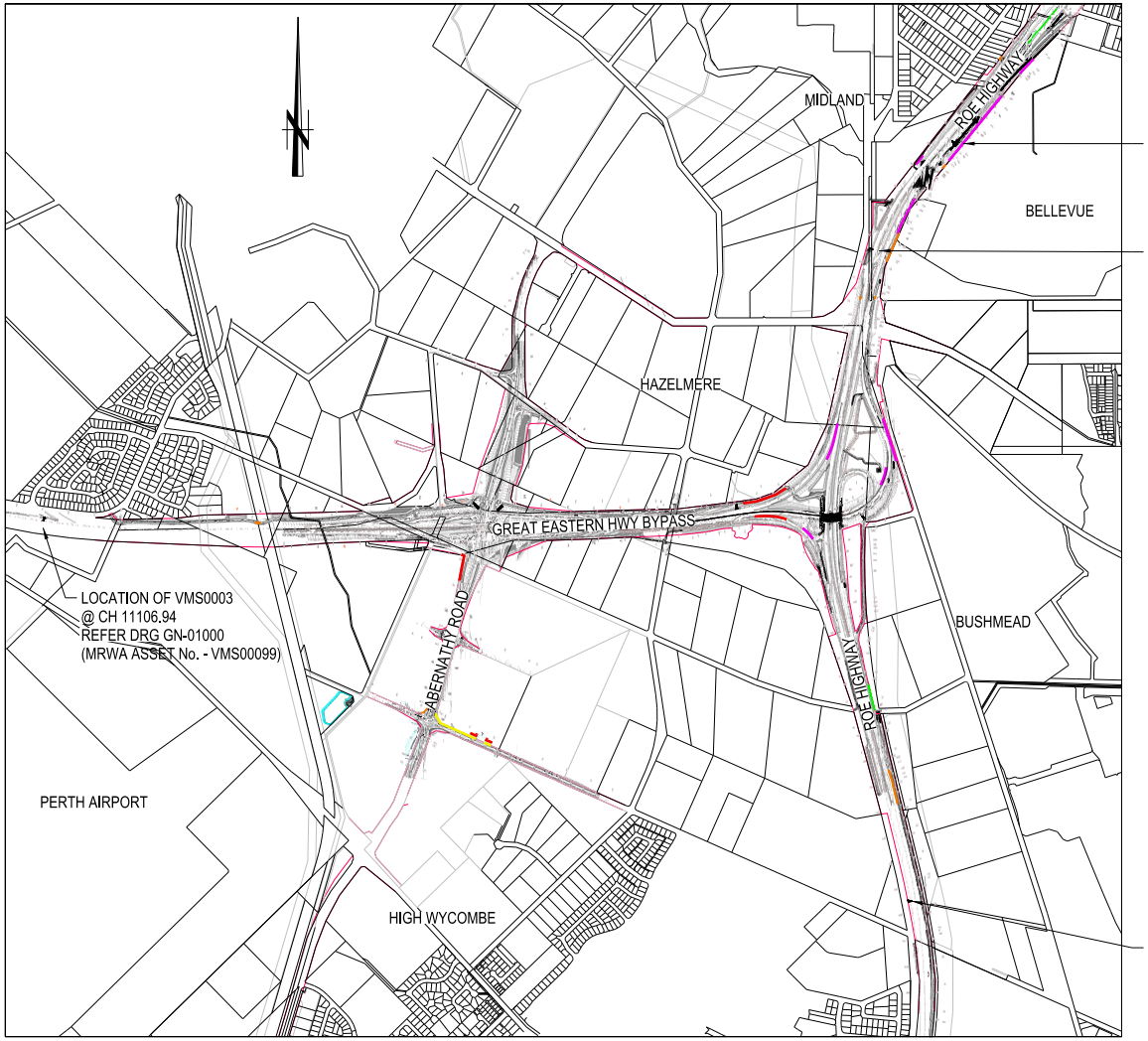
ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P.TRAN		VERIFIER	J.MUCCILLO
DRAWN	W.ROSA		DESIGN MANAGER APPROVED	D.WATSON
CHECKED	G.MALATESTA		ALLIANCE PROJECT MANAGER APPROVED	E.GEE

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES
DRAWING TITLE: ROE HIGHWAY OVER HELENA RIVER BRIDGE No. 1899 PIER No. 2 - HEADSTOCK REINFORCEMENT DETAILS - SHEET 2
SHEET: A1
MRWA DRAWING No.
LOCAL AUTHORITY: (106) SHIRE OF MUNDARING
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN
STATUS: IFCA
DRAWING NUMBER: GEHBI-GCA-DRG-S420-BR-00269
REV: 0A

NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED



LOCATION OF VMS0001
@ CH 38952
REFER DRG GN-04000
(MRWA ASSET No. - VMS00098)

LOCATION OF EXISTING VMS0034
(SLK38.42) TO BE RETAINED

LOCATION OF VMS0003
@ CH 11106.94
REFER DRG GN-01000
(MRWA ASSET No. - VMS00099)

LOCATION OF VMS0002
@ CH 35945
REFER DRG GN-04001
(MRWA ASSET No. - VMS00097)

LOCALITY PLAN
1:10000

DRAWING INDEX

DRAWING NUMBER	MRWA DRG No.	DRAWING DESCRIPTION
SITE WIDE		
GEHBI-GCA-DRG-S510-GN-00001	-	VMS GANTRIES - LOCALITY PLAN AND INDEX SHEET
GEHBI-GCA-DRG-S510-GN-00002	-	VMS GANTRIES - GENERAL NOTES - SHEET 1
GEHBI-GCA-DRG-S510-GN-00003	-	VMS GANTRIES - GENERAL NOTES - SHEET 2
GEHBI-GCA-DRG-S510-GN-00004	-	VMS GANTRIES - GENERAL NOTES - SHEET 3
GEHBI-GCA-DRG-S510-GN-00005	-	VMS GANTRIES - FOOTING DETAILS - SHEET 1
GEHBI-GCA-DRG-S510-GN-00010	-	VMS GANTRIES - LADDER AND ACCESS STAIR DETAILS
GEHBI-GCA-DRG-S510-GN-00014	-	VMS GANTRIES - GANTRY FRAME DETAILS - SHEET 1
GEHBI-GCA-DRG-S100-GN-00015	-	VMS GANTRIES - GANTRY FRAME DETAILS - SHEET 2
GEHBI-GCA-DRG-S510-GN-00016	-	VMS GANTRIES - GANTRY FRAME DETAILS - SHEET 3
GEHBI-GCA-DRG-S510-GN-00017	-	VMS GANTRIES - GANTRY FRAME DETAILS - SHEET 4
GEHBI-GCA-DRG-S510-GN-00019	-	VMS GANTRIES - LADDER DETAILS
GEHBI-GCA-DRG-S510-GN-00024	-	VMS GANTRIES - INFILL DETAILS
WORK PACKAGE 1		
GEHBI-GCA-DRG-S510-GN-01000	-	VMS GANTRIES - VMS0003 - GENERAL ARRANGEMENT PLAN AND ELEVATION
WORK PACKAGE 4		
GEHBI-GCA-DRG-S510-GN-04000	-	VMS GANTRIES - VMS0001 - GENERAL ARRANGEMENT PLAN AND ELEVATION
GEHBI-GCA-DRG-S510-GN-04001	-	VMS GANTRIES - VMS0002 - GENERAL ARRANGEMENT PLAN AND ELEVATION

Rev.	DATE	DESCRIPTION	APPROVED
C1	01/12/2022	ISSUED FOR 100% DESIGN REVIEW	D.W
C0	30/09/2022	ISSUED FOR 100% SQUAD CHECK	D.W
B1	05/08/2022	ISSUED FOR 85% DESIGN REVIEW	D.W
B0	25/05/2022	ISSUED FOR 85% SQUAD CHECK	D.W

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

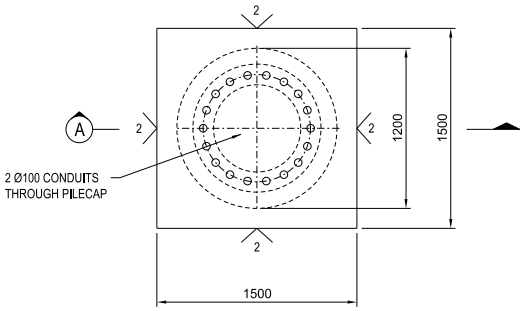
DESIGNED	T. PANIZZA	01/12/2022	VERIFIER	J.MUCCILLO	01/12/2022
DRAWN	R.CRUICKSHANK	01/12/2022	DESIGN MANAGER APPROVED	D. WATSON	01/12/2022
CHECKED	K. COCKER	01/12/2022	ALLIANCE PROJECT MANAGER APPROVED	E. GEE	01/12/2022

DRAWING PURPOSE: NOT FOR CONSTRUCTION

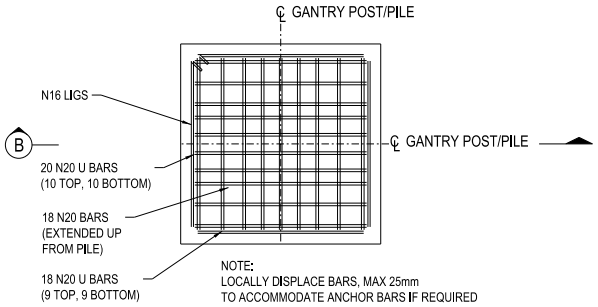
PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES
DRAWING TITLE: GEHBI - SITE WIDE
VMS GANTRIES
LOCALITY PLAN AND INDEX SHEET
SHEET: A1
MRWA DRAWING No.
LOCAL AUTHORITY: (10%) CITY OF SWAN / (10%) CITY OF KALAMUNDA / (80%) SHIRE OF MUNDARING
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN
STATUS: 100%
DRAWING NUMBER: GEHBI-GCA-DRG-S510-GN-00001
REV: C1
SCALE

Last saved by: JW65789(2022-05-04) Last Plotted: 2005-09-07
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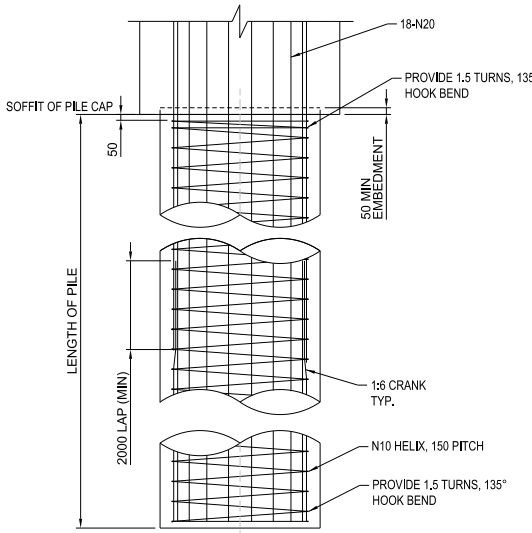
NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED



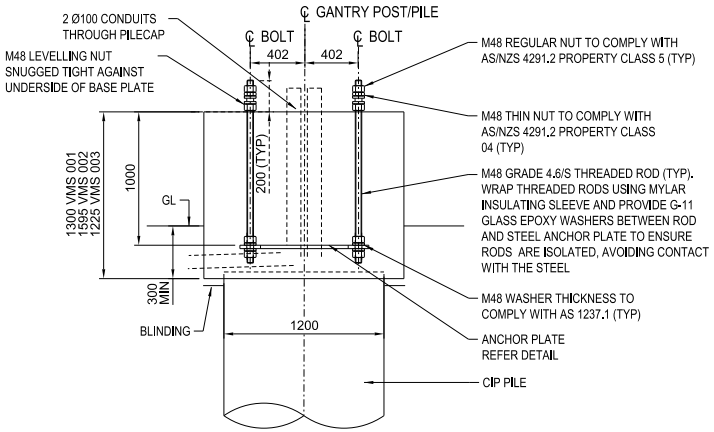
PILE CAP - PLAN
1:20



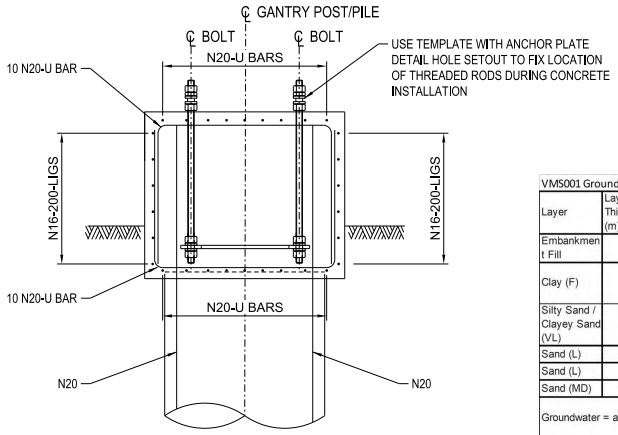
PILE CAP - REINFORCEMENT DETAILS
1:20



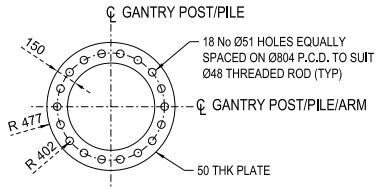
PILE - REINFORCEMENT DETAILS
1:20



SECTION (A)
1:20



SECTION (B)
1:20



ANCHOR PLATE DETAIL
1:20

	TOP OF PILE RL	MIN. PILE LENGTH (m)	PILE TOE LEVEL
VMS 001	14.788	15.5	0.712
VMS 002	35.899	6	29.899
VMS 003	14.983	6	8.983

VMS001 Ground Model

Layer	Layer Thickness (m)	Uni: weight (kN/m3)	phi	Su	E (Mpa)	fs (kPa)	fb (kPa)
Embankment Fill	7	18.5	36	N/A	60	25	-
Clay (F)	1	18	28	65	19.5	30	-
Silty Sand / Clayey Sand (VL)	2.3	16	32	N/A	4	10	-
Sand (L)	2.2	17	33	N/A	12	35	2000
Sand (L)	2	17	33	N/A	25	50	2500
Sand (MD)	2.5	18	35	N/A	45	70	4000
Groundwater = at existing ground level (at RL8.4m)							

VMS002 Ground Model

Layer	Layer Thickness (m)	Unit weight (kN/m3)	phi	Su (kPa)	E (Mpa)	fs (kPa)	fb (kPa)
Sand (VD)	1	18	35	N/A	60	80	4500
Sandy Clay (ST) / Clayey Sand (MD-D)	6	18	34	N/A	120	80	3000
Groundwater = at existing ground level (at RL31m)							

VMS003 Ground Model

Layer	Layer Thickness (m)	Unit weight (kN/m3)	phi	Su (kPa)	E (Mpa)	fs (kPa)	fb (kPa)
Sand (VD)	3.5	18	35	N/A	100	100	N/A
Stiff Clayey Sand / Silty Sand (D)	3.5	18	28	60	20	25	560
Groundwater = at existing ground level (at RL12m)							

NOTES:

1. FOR GENERAL NOTES REFER DRAWINGS GN- 00002 TO 00004.
2. AT VMS 001 AN ALLOWANCE SHOULD BE MADE FOR TEMPORARY LINERS TO APPROXIMATELY 14m LENGTH (IN COMBINATION WITH BORE SUPPORT FLUID) DUE TO RELATIVELY SOFT. LOOSE DEPOSITS PRESENT IN THIS LOCATION IF BORED PILES ARE TO BE USED AS PREFERRED CONSTRUCTION METHOD.

SCALE 1:20

Rev.	DATE	DESCRIPTION	APPROVED
C1	01/12/2022	ISSUED FOR 100% DESIGN REVIEW	D.W
C0	30/09/2022	ISSUED FOR 100% SQUAD CHECK	D.W
B1	05/08/2022	ISSUED FOR 85% DESIGN REVIEW	D.W
B0	25/05/2022	ISSUED FOR 85% SQUAD CHECK	D.W

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

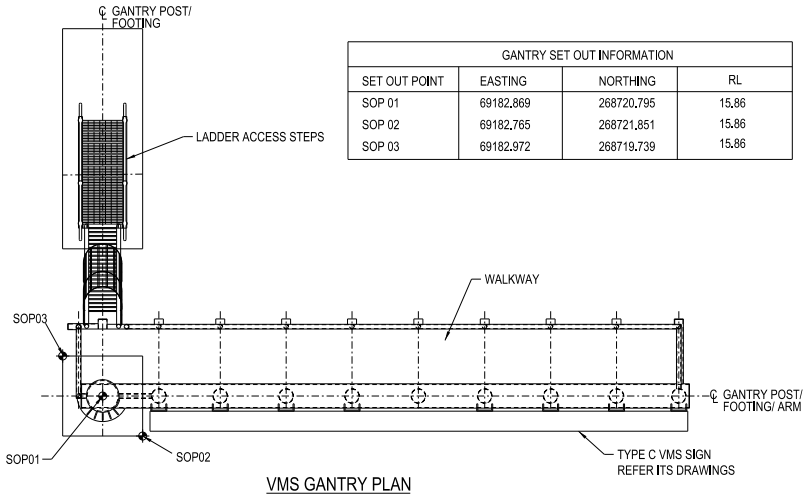
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DRAWN	R.CRUICKSHANK	01/12/2022	DESIGN MANAGER APPROVED	D.WATSON	01/12/2022
CHECKED	K.COCKER	01/12/2022	ALLIANCE PROJECT MANAGER APPROVED	E.GEE	01/12/2022

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES
DRAWING TITLE: GEHBI - SITE WIDE
VMS GANTRIES
FOOTING DETAILS
SHEET 1
SHEET: A1
MRWA DRAWING No.
LOCAL AUTHORITY: (90%) CITY OF SWAN / (10%) CITY OF KALAMUNDA / (0%) SHIRE OF MUNDARING
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN
STATUS: 100%
DRAWING NUMBER: GEHBI-GCA-DRG-S510-GN-00005
REV: C1

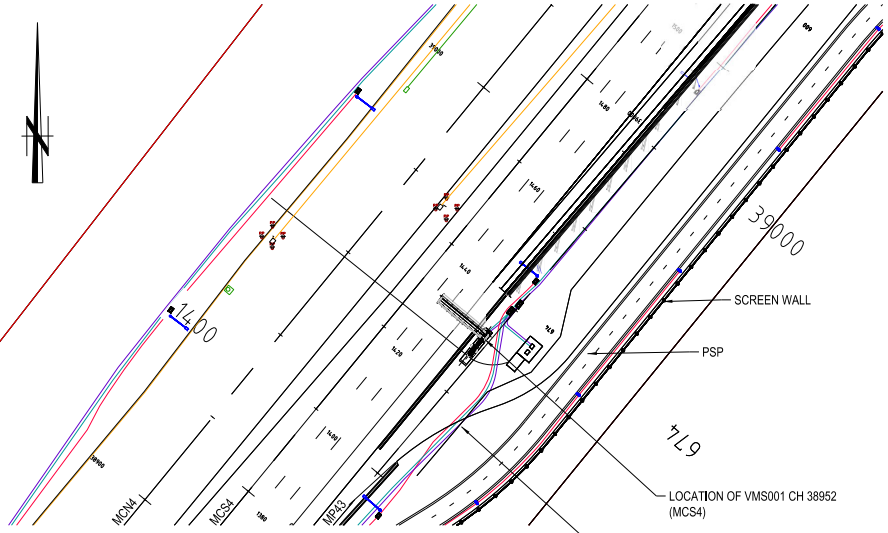
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Filename: C:\PW_WORKING_FOLDER\ARCADIS-AU-0A\DMS1223\1\GEHBI A1 TBLK.DGN

NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED



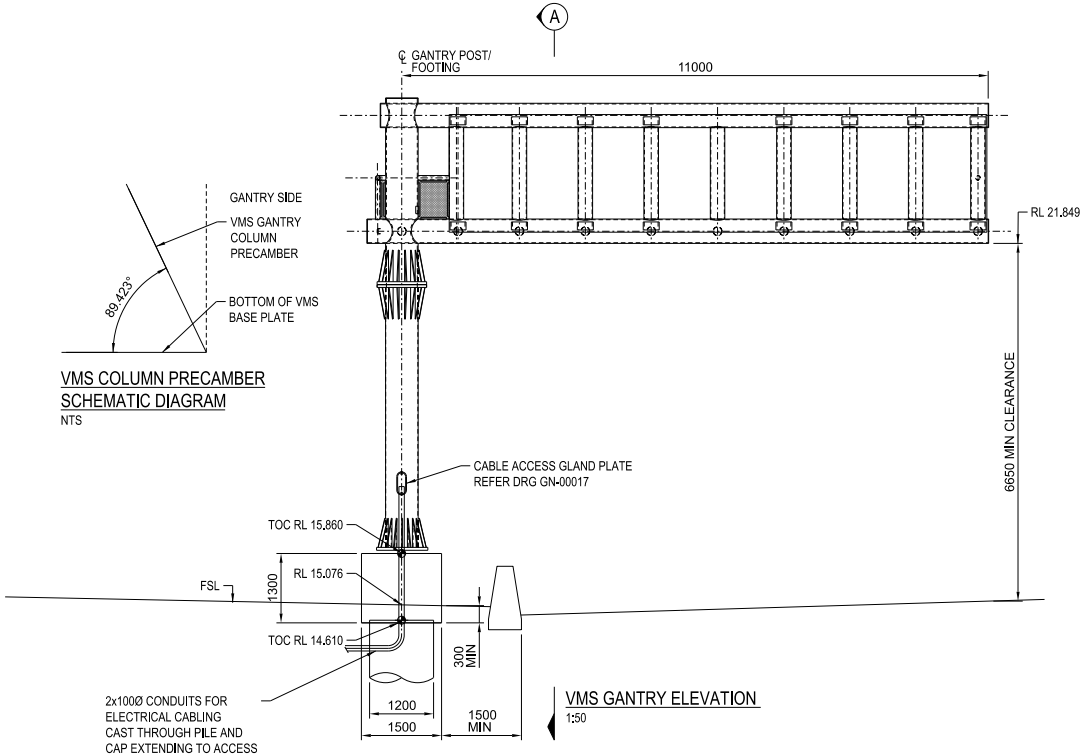
GANTRY SET OUT INFORMATION			
SET OUT POINT	EASTING	NORTHING	RL
SOP 01	69182.869	268720.795	15.86
SOP 02	69182.765	268721.851	15.86
SOP 03	69182.972	268719.739	15.86

VMS GANTRY PLAN
1:50

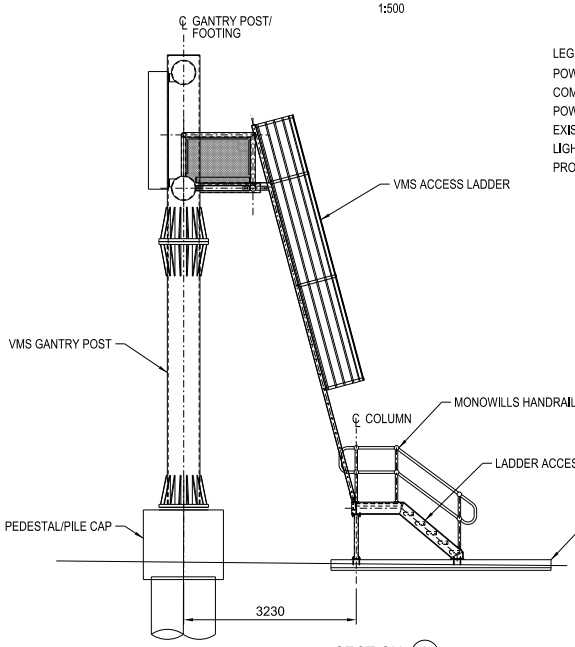


LOCALITY PLAN
1:500

VMS COLUMN PRECAMBER SCHEMATIC DIAGRAM
NTS



VMS GANTRY ELEVATION
1:50



SECTION (A)
1:50

LEGEND:
- POWER CONDUIT (LIGHTING)
- COMM SERVICE
- POWER CONDUIT (ITS)
- EXISTING DRAIN
- LIGHT POLE
- PROJECT BOUNDARY LINE

NOTES
1. FOR GENERAL NOTES REFER DRGS GN-00002 TO 00004

SCALE 1:50 1:500

Rev.	DATE	DESCRIPTION	APPROVED
C1	01/12/2022	ISSUED FOR 100% DESIGN REVIEW	D.W
C0	30/09/2022	ISSUED FOR 100% SQUAD CHECK	D.W
B1	05/08/2022	ISSUED FOR 85% DESIGN REVIEW	D.W
B0	25/05/2022	ISSUED FOR 85% SQUAD CHECK	D.W

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM:

ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA — INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	T. PANIZZA	01/12/2022	VERIFIER	J.MUCCILLO	01/12/2022
DRAWN	R.CRUICKSHANK	01/12/2022	DESIGN MANAGER APPROVED	D. WATSON	01/12/2022
CHECKED	K. COCKER	01/12/2022	ALLIANCE PROJECT MANAGER APPROVED	E. GEE	01/12/2022

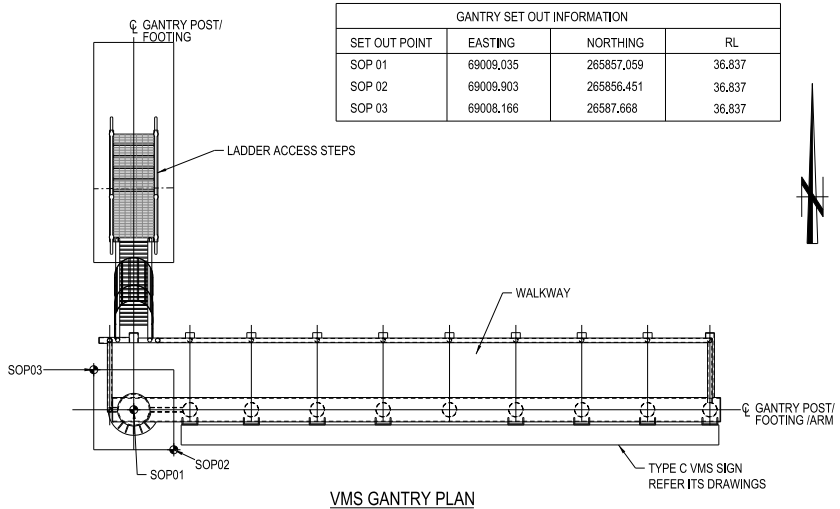
DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES
DRAWING TITLE: ROE HIGHWAY UPGRADE (WP4) VMS GANTRIES VMS001 - GENERAL ARRANGEMENT PLAN AND ELEVATION
SHEET: A1
MRWA DRAWING No.
LOCAL AUTHORITY: (109) CITY OF SWAN
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN
STATUS: 100%
DRAWING NUMBER: GEHBI-GCA-DRG-S510-GN-04000
REV: C1

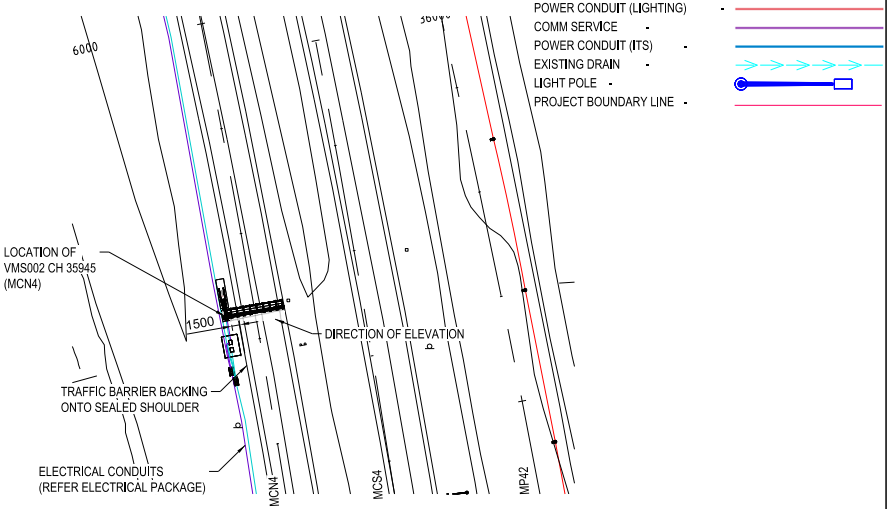
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NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

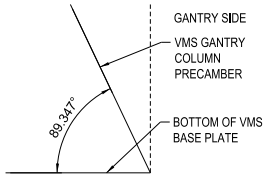
GANTRY SET OUT INFORMATION			
SET OUT POINT	EASTING	NORTHING	RL
SOP 01	69009.035	265857.059	36.837
SOP 02	69009.903	265856.451	36.837
SOP 03	69008.166	26587.668	36.837



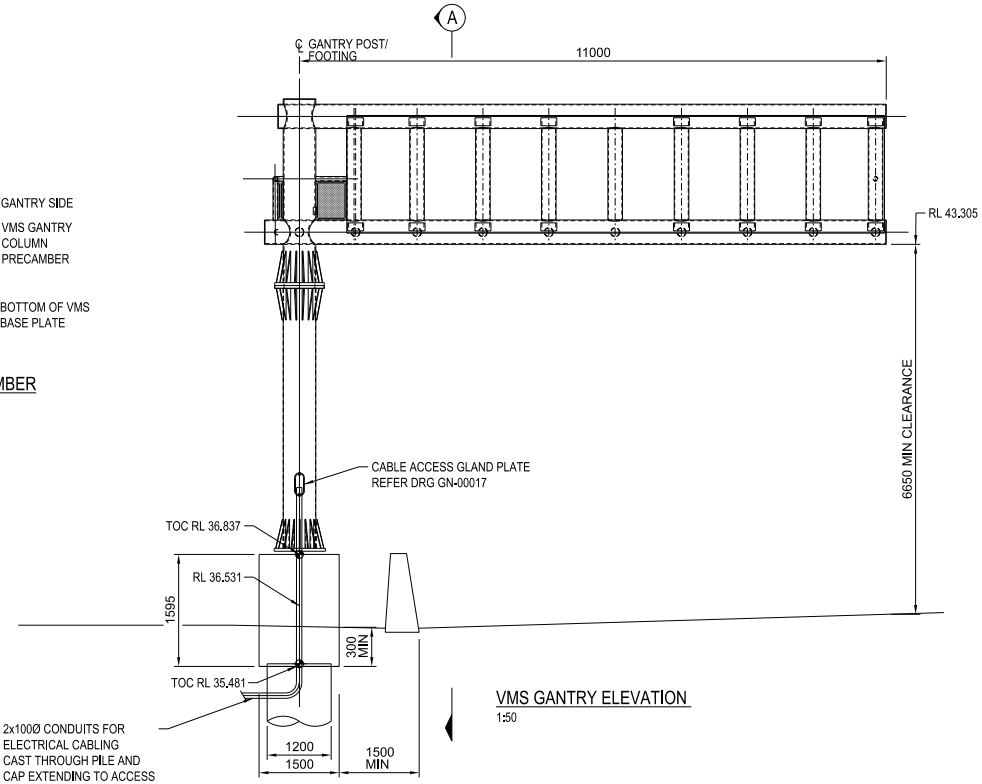
VMS GANTRY PLAN
1:50



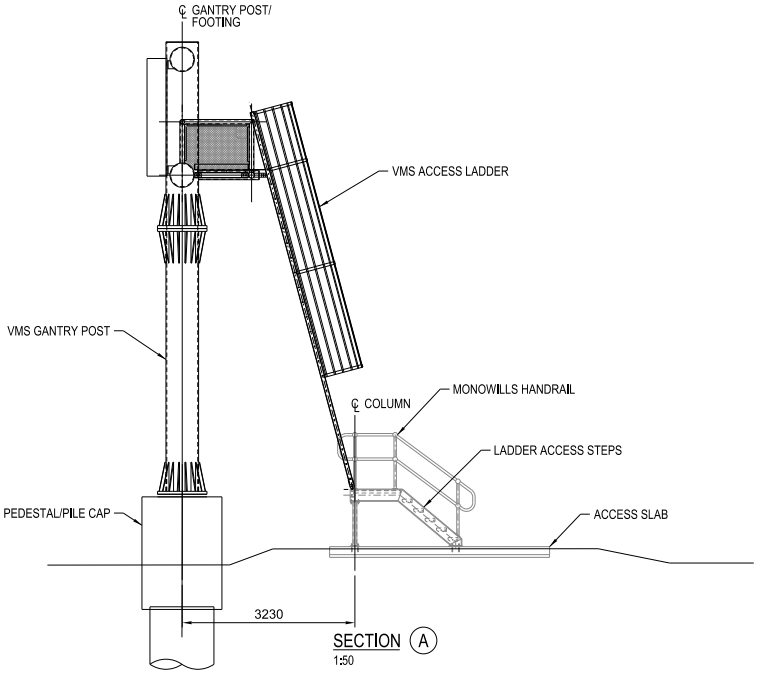
LOCALITY PLAN
1:500



VMS COLUMN PRECAMBER SCHEMATIC DIAGRAM
NTS



VMS GANTRY ELEVATION
1:50



SECTION A
1:50

NOTES
1. FOR GENERAL NOTES REFER DRGS GN-00002 TO 00004

Rev.	DATE	DESCRIPTION	APPROVED
C1	01/12/2022	ISSUED FOR 100% DESIGN REVIEW	D.W
C0	30/09/2022	ISSUED FOR 100% SQUAD CHECK	D.W
B1	05/08/2022	ISSUED FOR 85% DESIGN REVIEW	D.W
B0	18/03/2022	ISSUED FOR 85% SQUAD CHECK	D.W

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	T. PANIZZA	01/12/2022	VERIFIER	J.MUCCILLO	01/12/2022
DRAWN	R.CRUICKSHANK	01/12/2022	DESIGN MANAGER APPROVED	D. WATSON	01/12/2022
CHECKED	K. COCKER	01/12/2022	ALLIANCE PROJECT MANAGER APPROVED	E. GEE	01/12/2022

DRAWING PURPOSE: NOT FOR CONSTRUCTION

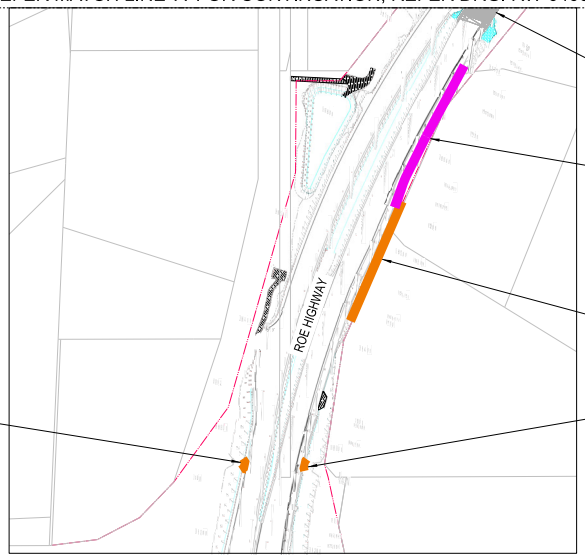
PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES
DRAWING TITLE: ROE HIGHWAY UPGRADE (WP4) VMS GANTRIES VMS002 - GENERAL ARRANGEMENT PLAN AND ELEVATION
SHEET: A1
MRWA DRAWING No.
LOCAL AUTHORITY: (106) SHIRE OF MUNDARING
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN
STATUS: 100%
DRAWING NUMBER: GEHBI-GCA-DRG-S510-GN-04001
REV: C1

SCALE 1:50 1:500

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NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

REFER MATCH LINE 'A' FOR CONTINUATION, REFER DRG. RW-04001



FOR BRIDGE 1899
REFER TO S420 PACKAGE

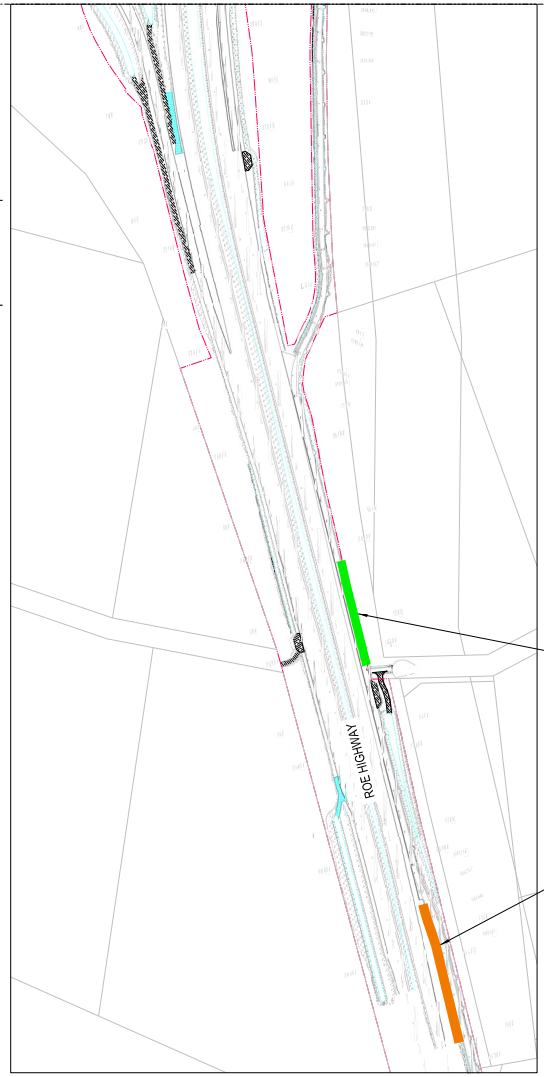
MSE RETAINING WALL
RW-U3, REFER TO
DRG. RW-04015 AND 04016

LIMESTONE RETAINING WALL
RW-U10, REFER TO
DRG. RW-04030 AND 04031

LIMESTONE RETAINING WALL
RW-U14, REFER TO
DRG. RW-04080

LIMESTONE RETAINING WALL
RW-U15, REFER TO
DRG. RW-04085

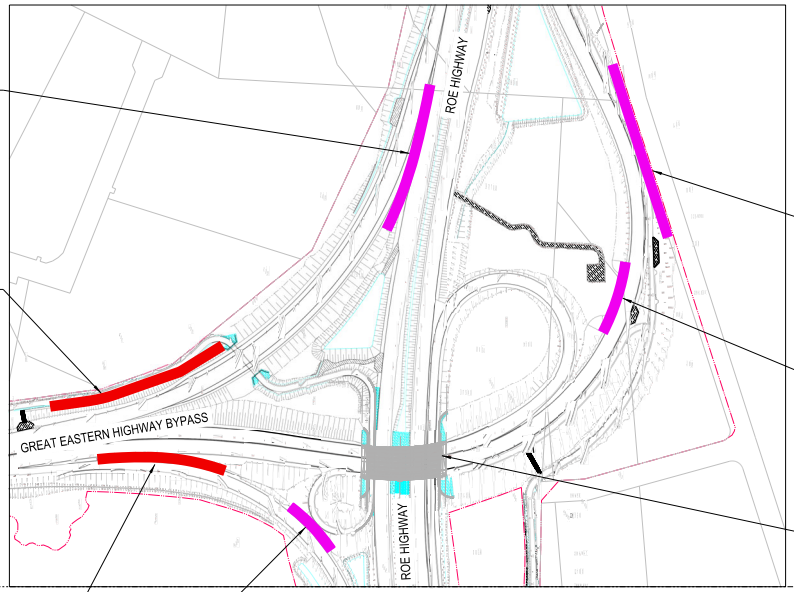
REFER MATCH LINE 'B' FOR CONTINUATION



BARRIER RETAINING WALL
RW-U12, REFER TO
DRG. RW-04070 AND 04071

LIMESTONE RETAINING WALL
RW-U19, REFER TO
DRG. RW-04105 AND 04106

MSE RETAINING WALL
RW-U13, REFER TO
DRG. RW-04075 TO 04077



MSE RETAINING WALL
RW-U7, REFER TO
DRG. RW-04020 TO 04022

PRECAST L-SHAPED
RETAINING WALL
RW-U1, REFER TO
DRG. RW-04011 TO 04013

MSE RETAINING WALL
RW-LP-U1, REFER TO
DRG. RW-04041

FOR BRIDGE 1898
RETAINING WALL,
REFER TO S410 PACKAGE

PRECAST L-SHAPED
RETAINING WALL
RW-U8, REFER TO
DRG. RW-04025 AND 04026

MSE RETAINING WALL
RW-U9, REFER TO
DRG. RW-04027

REFER MATCH LINE 'B' FOR CONTINUATION

- MSE WALL
- LIMESTONE RETAINING WALL
- PRECAST L-SHAPE REINFORCED CONCRETE WALL
- BARRIER RETAINING WALL

KEY PLAN 2
1:2500

SCALE 1:2500

Rev.	DATE	DESCRIPTION	APPROVED
C1	01/12/2022	ISSUED FOR 100% DESIGN REVIEW	D.W
C0	30/09/2022	ISSUED FOR 100% SQUAD CHECK	D.W

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P. THOMPSON	01/12/2022	VERIFIER	J. MUCILLO	01/12/2022
DRAWN	R. MASULA	01/12/2022	DESIGN MANAGER APPROVED	D. WATSON	01/12/2022
CHECKED	K. COCKER	01/12/2022	ALLIANCE PROJECT MANAGER APPROVED	E. GEE	01/12/2022

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES
DRAWING TITLE: ROE HIGHWAY UPGRADE (WP4) RETAINING WALLS WP4 - KEY PLAN 2 SHEET 2
SHEET: A1
MRWA DRAWING No.
LOCAL AUTHORITY: (109) CITY OF SWAN & (106) SHIRE OF MUNDARING
MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN
STATUS: 100%
DRAWING NUMBER: GEHBI-GCA-DRG-S510-RW-04003
REV: C1

Last saved by: JW65789(2022-05-04) Last Plotted: 2005-09-07
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NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

NOTES:

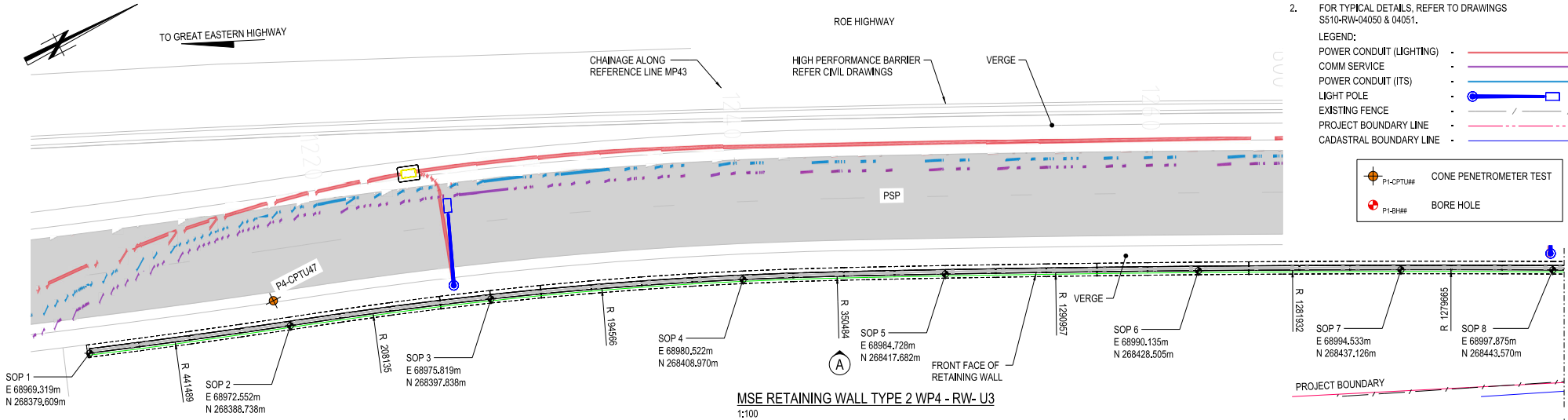
1. FOR GENERAL NOTES REFER TO DRAWINGS S500-RW-00002 & 00003.
2. FOR TYPICAL DETAILS, REFER TO DRAWINGS S510-RW-04050 & 04051.

LEGEND:

- POWER CONDUIT (LIGHTING)
- COMM SERVICE
- POWER CONDUIT (ITS)
- LIGHT POLE
- EXISTING FENCE
- PROJECT BOUNDARY LINE
- CADASTRAL BOUNDARY LINE

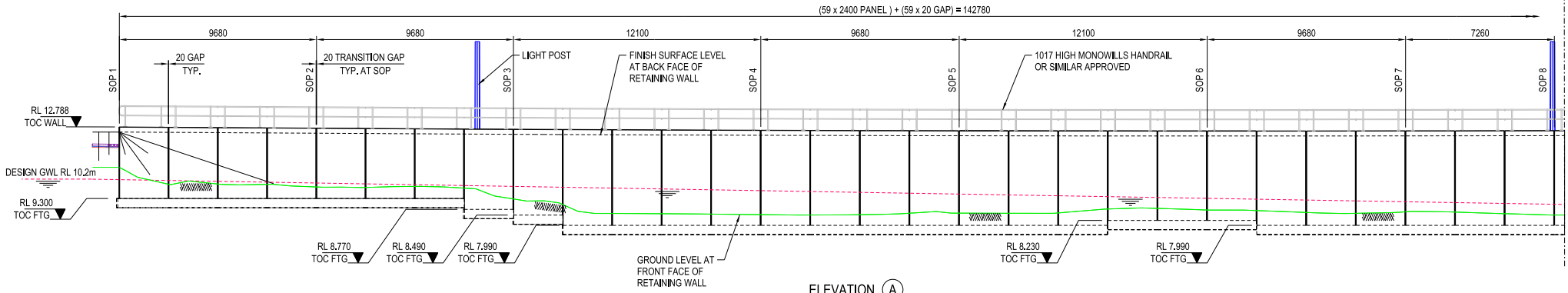
P1-CPTU## CONE PENETROMETER TEST

P1-BH## BORE HOLE



MSE RETAINING WALL TYPE 2 WP4 - RW- U3

1:100



ELEVATION (A)

1:100

DATUM RL 3.0m

WALL EXPOSED HEIGHT	1.979	2.783	2.756	2.756	2.870	2.877	2.815	2.885	3.405	3.672	4.087	4.086	4.103	4.125	4.126	4.106	4.027	4.021	4.023	4.000	3.808	3.781	3.859	3.886	3.980	4.019	3.947	3.967	4.049	4.117
TOP OF MSE WALL	12.788	12.774	12.760	12.746	12.732	12.718	12.704	12.691	12.679	12.667	12.657	12.647	12.638	12.630	12.623	12.616	12.611	12.606	12.603	12.600	12.597	12.596	12.595	12.595	12.596	12.598	12.600	12.603	12.607	12.612
GROUND LEVEL	10.809	9.991	10.004	9.990	9.862	9.841	9.889	9.806	9.274	8.995	8.570	8.561	8.535	8.505	8.497	8.510	8.584	8.585	8.580	8.600	8.789	8.815	8.736	8.709	8.616	8.579	8.653	8.636	8.558	8.495
TOP OF FOOTING	9.300	9.300	9.300	9.300	9.300	9.300	9.300	8.770	8.490	7.990	7.990	7.990	7.990	7.990	7.990	7.990	7.990	7.990	7.990	7.990	8.230	8.230	8.230	7.990	7.990	7.990	7.990	7.990	7.990	7.990
CHAINAGE AT RW-U3	0	2.42	4.84	7.26	9.68	12.1	14.52	16.94	19.36	21.78	24.2	26.62	29.04	31.46	33.88	36.3	38.72	41.14	43.56	45.98	48.4	50.82	53.24	55.66	58.08	60.5	62.92	65.34	67.76	70.18
	SOP 1				SOP 2				SOP 3					SOP 4				SOP 5					SOP 6					SOP 7				SOP 8

ELEVATION (A)

1:100

SCALE

Rev.	DATE	DESCRIPTION	APPROVED
C1	01/12/2022	ISSUED FOR 100% DESIGN REVIEW	D.W
C0	30/09/2022	ISSUED FOR 100% SQUAD CHECK	D.W
B1	05/08/2022	ISSUED FOR 85% DESIGN REVIEW	D.W
B0	25/05/2022	ISSUED FOR 85% SQUAD CHECK	D.W

METADATA

GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE

VERIFIER: WGA WALLBRIDGE GILBERT AZTEC

CLIENT: mainroads WESTERN AUSTRALIA — INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P. THOMPSON	01/12/2022	VERIFIER	J. MUCILLO	01/12/2022
DRAWN	R. MASULA	01/12/2022	DESIGN MANAGER APPROVED	D. WATSON	01/12/2022
CHECKED	K. COCKER	01/12/2022	ALLIANCE PROJECT MANAGER APPROVED	E. GEE	01/12/2022

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY UPGRADE (WP4)
RETAINING WALLS
WP4 - RW-U3 - PLAN AND ELEVATION
SHEET 1

SHEET: A1

MRWA DRAWING No.

LOCAL AUTHORITY: (106) SHIRE OF MUNDARING

MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

STATUS: 100%

DRAWING NUMBER: GEHBI-GCA-DRG-S510-RW-04015

REV: C1

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Last Plotted: 2005-09-07

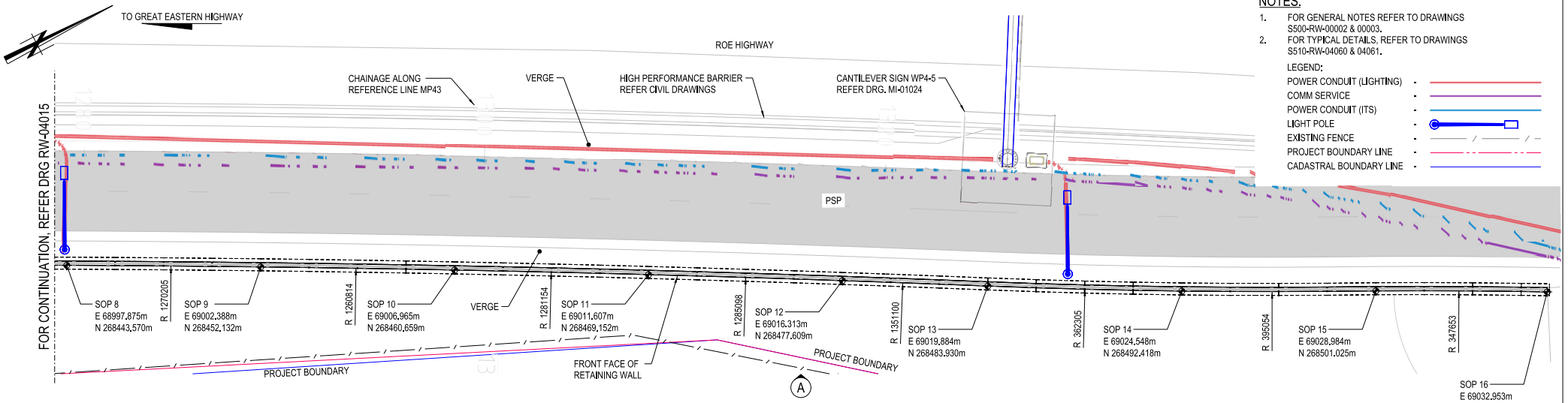
NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

NOTES:

1. FOR GENERAL NOTES REFER TO DRAWINGS S500-RW-00002 & 00003.
2. FOR TYPICAL DETAILS, REFER TO DRAWINGS S510-RW-04060 & 04061.

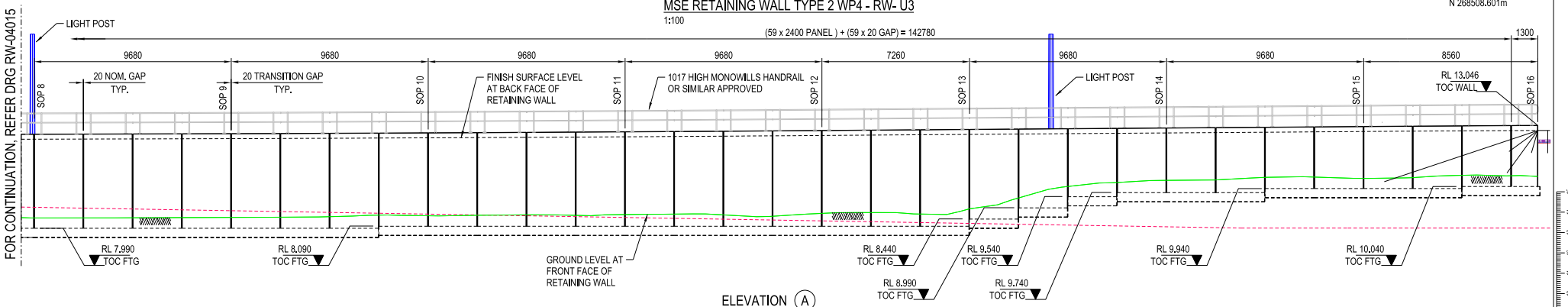
LEGEND:

- POWER CONDUIT (LIGHTING)
- COMM SERVICE
- POWER CONDUIT (ITS)
- LIGHT POLE
- EXISTING FENCE
- PROJECT BOUNDARY LINE
- CADASTRAL BOUNDARY LINE



MSE RETAINING WALL TYPE 2 WP4 - RW- U3

1:100



ELEVATION (A)

1:100

DATUM RL 2.0m

	SOP 8				SOP 9				SOP 10				SOP 11				SOP 12				SOP 13				SOP 14				SOP 15				SOP 16
WALL EXPOSED HEIGHT	4.117	4.122	4.12	4.118	4.116	4.115	4.104	4.031	4.076	4.061	4.057	4.093	4.067	4.059	4.118	4.194	4.072	4.052	4.143	3.899	3.374	2.836	2.862	2.576	2.573	2.462	2.47	2.551	2.529	2.434	2.465	2.512
TOP OF MSE WALL	12.612	12.617	12.624	12.631	12.639	12.647	12.657	12.667	12.678	12.69	12.703	12.716	12.73	12.745	12.761	12.777	12.795	12.812	12.83	12.848	12.865	12.883	12.901	12.918	12.936	12.953	12.971	12.989	13.007	13.023	13.034	13.046
GROUND LEVEL	8.495	8.495	8.504	8.513	8.523	8.532	8.553	8.636	8.602	8.629	8.646	8.623	8.663	8.686	8.643	8.583	8.723	8.76	8.687	8.949	9.491	10.047	10.239	10.342	10.363	10.491	10.501	10.438	10.478	10.589	10.569	10.534
TOP OF FOOTING	7.990	7.99	7.99	7.99	7.99	7.99	7.99	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.44	8.99	9.54	9.74	9.74	9.74	9.94	9.94	9.94	9.94	10.04	10.04	10.04
CHAINAGE AT RW-U3	70.18	72.6	75.02	77.44	79.86	82.28	84.7	87.12	89.54	91.96	94.38	96.8	99.22	101.64	104.06	106.48	108.9	111.32	113.74	116.16	118.58	121	123.42	125.84	128.26	130.68	133.1	135.52	137.94	140.36	142.78	144.08

ELEVATION (A)

Rev.	DATE	DESCRIPTION	APPROVED
C1	01/12/2022	ISSUED FOR 100% DESIGN REVIEW	D.W
C0	30/09/2022	ISSUED FOR 100% SQUAD CHECK	D.W
B1	05/08/2022	ISSUED FOR 85% DESIGN REVIEW	D.W
B0	25/05/2022	ISSUED FOR 85% SQUAD CHECK	D.W

METADATA

GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE

VERIFIER: WGA WALLBRIDGE GILBERT AZTEC

CLIENT: mainroads WESTERN AUSTRALIA — INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P. THOMPSON	01/12/2022	VERIFIER	J. MUCILLO	01/12/2022
DRAWN	R. MASULA	01/12/2022	DESIGN MANAGER APPROVED	D. WATSON	01/12/2022
CHECKED	K. COCKER	01/12/2022	ALLIANCE PROJECT MANAGER APPROVED	E. GEE	01/12/2022

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY UPGRADE (WP4)
RETAINING WALLS
WP4 - RW-U3 - PLAN AND ELEVATION
SHEET 2

SHEET: A1

MRWA DRAWING No.

LOCAL AUTHORITY: (106) SHIRE OF MUNDARING

MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

STATUS: 100%

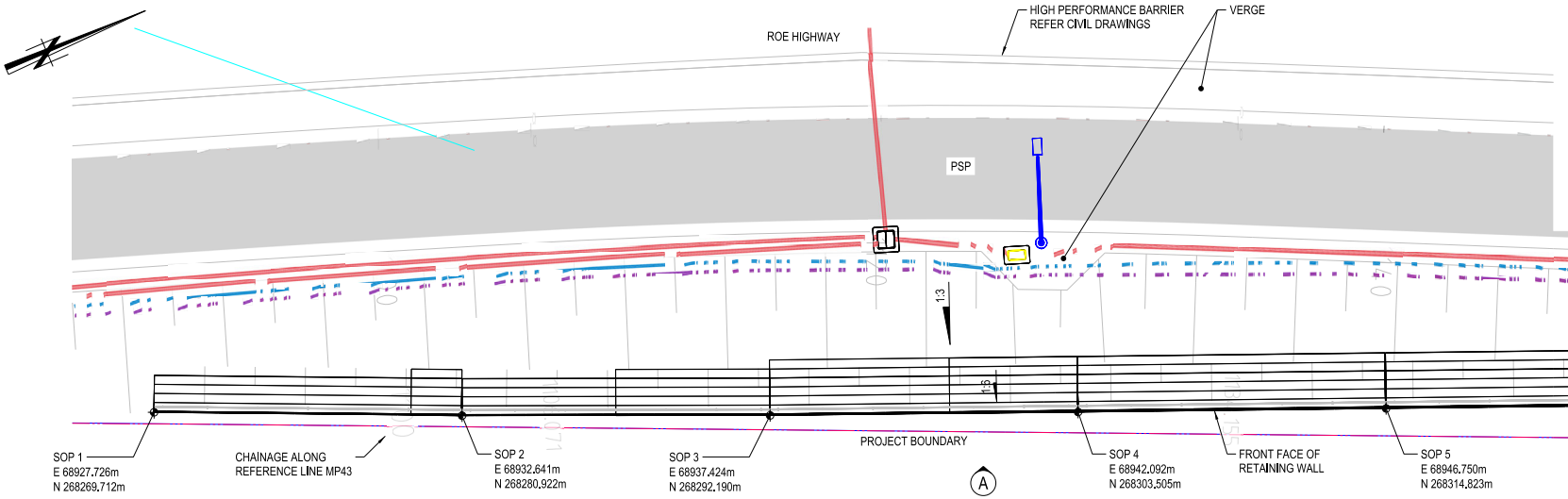
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REV: C1

SCALE: 1:100

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Last Plotted: 2005-09-07

NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED



NOTES:

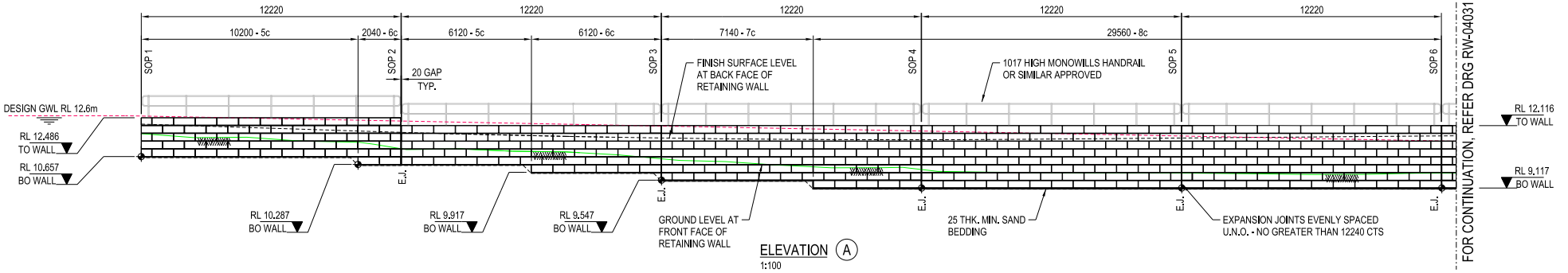
1. FOR GENERAL NOTES REFER TO DRAWINGS S500-RW-00002 & 00003.
2. FOR TYPICAL DETAILS, REFER TO DRAWINGS S500-RW-10003 TO 10009.

LEGEND:

- POWER CONDUIT (LIGHTING)
- COMM SERVICE
- POWER CONDUIT (ITS)
- LIGHT POLE
- EXISTING FENCE
- PROJECT BOUNDARY LINE
- CADASTRAL BOUNDARY LINE

LIMESTONE BLOCK RETAINING WALL TYPE 4 WP4 - RW- U10

1:100



ELEVATION (A)

1:100

DATUM RL 3.0m

WALL EXPOSED HEIGHT	0.750	0.920	1.154	0.719	1.101	1.241	1.242	1.612	1.860	1.979	2.129	2.197	2.216	2.292	2.245	2.301	2.243	2.305
TOP OF WALL	12.486	12.486	12.486	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116
GROUND LEVEL	11.736	11.566	11.332	11.397	11.015	10.875	10.874	10.504	10.256	10.137	9.987	9.919	9.900	9.824	9.871	9.815	9.873	9.811
BOTTOM OF WALL	10.657	10.657	10.657	10.287	10.287	9.917	9.917	9.547	9.547	9.117	9.917	9.117	9.117	9.117	9.117	9.117	9.117	9.117
CHAINAGE AT RW-U10	0	5	10	12.240	15	20	24.480	25	30	35	36.720	40	45	48.960	50	55	60	61.200
	SOP 1			SOP 2			SOP 3				SOP 4			SOP 5				SOP 6

ELEVATION (A)

SCALE 1:100

Rev.	DATE	DESCRIPTION	APPROVED
C1	01/12/2022	ISSUED FOR 100% DESIGN REVIEW	D.W
C0	30/09/2022	ISSUED FOR 100% SQUAD CHECK	D.W
B1	05/08/2022	ISSUED FOR 85% DESIGN REVIEW	D.W
B0	25/05/2022	ISSUED FOR 85% SQUAD CHECK	D.W

METADATA

GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE

VERIFIER: WGA WALLBRIDGE GILBERT AZTEC

CLIENT: mainroads WESTERN AUSTRALIA — INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P. THOMPSON	01/12/2022	VERIFIER	J. MUCILLO	01/12/2022
DRAWN	R. MASULA	01/12/2022	DESIGN MANAGER APPROVED	D. WATSON	01/12/2022
CHECKED	K. COCKER	01/12/2022	ALLIANCE PROJECT MANAGER APPROVED	E. GEE	01/12/2022

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY UPGRADE (WP4)
RETAINING WALLS
WP4 - RW-U10 - PLAN AND ELEVATION
SHEET 1

SHEET: A1

MRWA DRAWING No.

LOCAL AUTHORITY: (106) SHIRE OF MUNDARING

MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

STATUS: 100%

DRAWING NUMBER: GEHBI-GCA-DRG-S510-RW-04030

REV: C1

Last saved by: JW65798(2022-05-04)
Filename: C:\FW_WORKING_FOLDER\ARCADIS-AU-DA\DMS1223\1\GEHBI A1 TBLK.DGN
Last Plotted: 2005-09-07

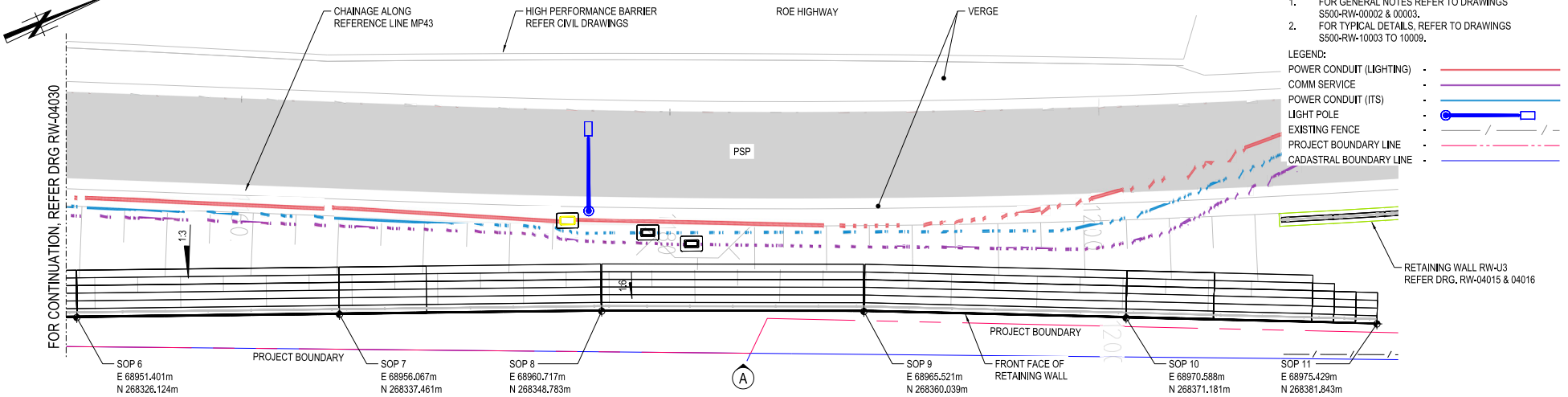
NOTE: ALL DRAWINGS ARE CONSIDERED UNCONTROLLED UNLESS STAMPED 'CONTROLLED COPY' IN RED

NOTES:

1. FOR GENERAL NOTES REFER TO DRAWINGS S500-RW-00002 & 00003.
2. FOR TYPICAL DETAILS, REFER TO DRAWINGS S500-RW-10003 TO 10009.

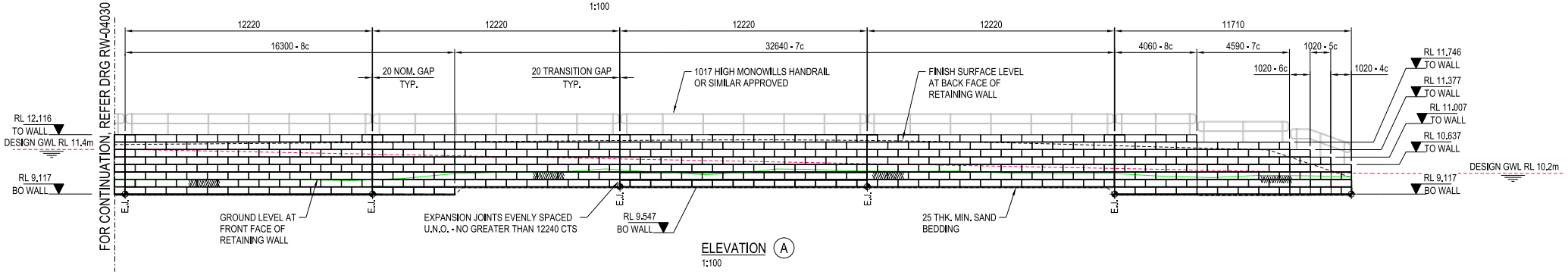
LEGEND:

- POWER CONDUIT (LIGHTING)
- COMM SERVICE
- POWER CONDUIT (ITS)
- LIGHT POLE
- EXISTING FENCE
- PROJECT BOUNDARY LINE
- CADASTRAL BOUNDARY LINE



LIMESTONE BLOCK RETAINING WALL TYPE 4 WP4 - RW- U10

1:100



ELEVATION (A)

1:100

DATUM RL 3.0m

WALL EXPOSED HEIGHT	2.243	2.305	2.223		2.233	2.290	2.163	1.854	1.697	1.738	1.976	1.715	1.801	1.822	1.911	1.911	1.980	1.749	0.932	0.601
TOP OF WALL	12.116	12.116	12.116		12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	12.116	11.746	11.007	10.637
GROUND LEVEL	9.873	9.811	9.893		9.883	9.826	9.953	10.262	10.419	10.378	10.140	10.401	10.315	10.294	10.205	10.205	10.136	9.997	10.075	10.036
BOTTOM OF WALL	9.117	9.117	9.117		9.117	9.117	9.117	9.547	9.547	9.547	9.547	9.547	9.547	9.547	9.547	9.547	9.117	9.117	9.117	9.117
CHAINAGE AT RW-U10	60	61.200	65		70	73.440	75	80	85	85.680	90	95	97.920	100	105	110	110.160	115	120	121.87

SOP 6 SOP 7 SOP 8 SOP 9 SOP 10 SOP 11

ELEVATION (A)

SCALE 1:100

Rev.	DATE	DESCRIPTION	APPROVED
C1	01/12/2022	ISSUED FOR 100% DESIGN REVIEW	D.W
C0	30/09/2022	ISSUED FOR 100% SQUAD CHECK	D.W
B1	05/08/2022	ISSUED FOR 85% DESIGN REVIEW	D.W
B0	25/05/2022	ISSUED FOR 85% SQUAD CHECK	D.W

Last saved by: JW65798(2022-05-04) Last Plotted: 2005-09-07
Filename: C:\FW_WORKING_FOLDER\ARCADIS-AU-DA\DMS1223\1\GEHBI A1 TBLK.DGN

METADATA
GROUND SURVEY STANDARD:
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE:
HEIGHT DATUM: AHD

ALLIANCE: Greater Connect ALLIANCE
VERIFIER: WGA WALLBRIDGE GILBERT AZTEC
CLIENT: mainroads WESTERN AUSTRALIA
INFRASTRUCTURE DELIVERY DIRECTORATE

DESIGNED	P. THOMPSON	01/12/2022	VERIFIER	J. MUCILLO	01/12/2022
DRAWN	R. MASULA	01/12/2022	DESIGN MANAGER APPROVED	D. WATSON	01/12/2022
CHECKED	K. COCKER	01/12/2022	ALLIANCE PROJECT MANAGER APPROVED	E. GEE	01/12/2022

DRAWING PURPOSE: NOT FOR CONSTRUCTION

PROJECT TITLE: GREAT EASTERN HIGHWAY BYPASS INTERCHANGES

DRAWING TITLE: ROE HIGHWAY UPGRADE (WP4)
RETAINING WALLS
WP4 - RW-U10 - PLAN AND ELEVATION
SHEET 2

SHEET: A1

MRWA DRAWING No.

LOCAL AUTHORITY: (106) SHIRE OF MUNDARING

MAIN ROADS RESPONSIBILITY AREA: METROPOLITAN

STATUS: 100%

DRAWING NUMBER: GEHBI-GCA-DRG-S510-RW-04031

REV: C1

APPENDIX I – ASS AND DEWATERING CALCULATIONS

Table I-1 Dewatering Calculations – Bridge, RW-U3 and RW-U10

Table I-2 Dewatering Calculations – North Pipes

Table I-3 Dewatering Calculations – South Pipes

Table I-4 Acid Sulfate Soil Calculations - Bridge, RW-U3 and RW-U10

Table I-5 Acid Sulfate Soil Calculations – North Pipes

Table I-6 Acid Sulfate Soil Calculations – South Pipes

Table I-1 Dewatering Calculations - Bridge, RW-U3 and RW-U10

Location	Pipe Invert (Start/Upstream) (mAHD)	Pipe Invert (Stop)	Bottom of structure	Ground Level	AAMGL	Excavation depth below AAMGL	Length plus 1.5m either side	Width plus 1.5 m either side	Excavation depth below AAMGL	Drawdown Depth	Drawdown depth	Saturated Thickness	Radius of influence	Time to establish drawdown	Initial flow	Continuous Flow	K Value	Duration	Total flow Initial (kL) in 24hrs	Total Flow Continuous	Total Volume
Units	RL mAHD	RL mAHD	RL mAHD	RL mAHD	RL mAHD	m	m	m	m	m	RL mAHD	m	m	hrs	L/sec	L/sec	m/day	days	24 hrs	kL	kL
Bridge 1899 Pier 1 pile caps	-	-	5.98	8.31	6.95	0.97	28.35	6.40	0.97	1.97	4.98	20	28.47	2.39	4.33	1.73	2	60	374.1	8978.7	9352.8
Bridge 1899 Pier 2 pile caps	-	-	6.69	8.63	6.96	0.27	28.35	6.40	0.27	1.27	5.69	20	18.35	1.00	4.34	1.74	2	60	375.0	8999.4	9374.4
Basin 18 subsoil SS-20	8.135	8.314	8.14	9.50	9.15	1.02	36.00	0.50	1.02	1.52	7.64	20	15.50	2.00	1.14	0.46	1	10	98.5	394.0	492.5
																				Total volume	***19219.7***

Table I-1 Dewatering Calculations - Bridge, RW-U3 and RW-U10

Drawing	Start of Chainage	Ground elevation	Top of footing	Footing depth Plus -0.3m	RW Length	RW Footing Excavation depth	RW width	RW width plus 500 mm each side	Design GWL- 0.95 RL mAHD	Dewatering depth Includes 1.0 m for compaction	Dewatering depth	Length	Max width	Max Dewatering drawdown depth	Saturated thickness	Radius of Influence	Time to establish drawdown	Time to establish drawdown	Initial flow	Continuous Flow	K Value	Duration	Month	Initial drawdown volume	Ongoing dewatering volume	Total extraction volume
Units		RL mAHD	RL mAHD	RL mAHD	m	RL mAHD	m	m	RL mAHD	RL mAHD	m	m	m	m	m	m	Hrs	Days	L/sec	L/sec	m/day	days		kL	kL	kL
RW-U3-04015	0	10.81	9.30	9.00	5.00	9.00	1.98	2.98	9.25	8.00	1.25	70.0	5.1	2.10	20	30	27	1	5.55	2.22	2	42	1.40	539.46	8,055.94	8,595.40
	5	10.00	9.30	9.00	5.00	9.00	2.76	3.76	9.16	8.00	1.16															
	10	9.86	9.30	9.00	5.00	9.00	2.87	3.87	9.07	8.00	1.07															
	15	9.89	9.30	9.00	5.00	9.00	2.82	3.82	8.97	8.00	0.97															
	20	9.27	8.49	8.19	5.00	8.19	3.41	4.41	8.88	7.19	1.69															
	25	8.57	7.99	7.69	5.00	7.69	4.08	5.08	8.79	6.69	2.10															
	30	8.54	7.99	7.69	5.00	7.69	4.10	5.10	8.70	6.69	2.01															
	35	8.51	7.99	7.69	5.00	7.69	4.13	5.13	8.60	6.69	1.91															
	40	8.59	7.99	7.69	5.00	7.69	4.03	5.03	8.51	6.69	1.82															
	45	8.60	7.99	7.69	5.00	7.69	4.00	5.00	8.42	6.69	1.73															
	50	8.82	8.23	7.93	5.00	7.93	3.78	4.78	8.33	6.93	1.40															
	55	8.71	7.99	7.69	5.00	7.69	3.89	4.89	8.23	6.69	1.54															
	60	8.58	7.99	7.69	5.00	7.69	4.02	5.02	8.14	6.69	1.45															
	65	8.64	7.99	7.69	5.00	7.69	3.99	4.99	8.05	6.69	1.36															
RW-U3-04016 (with pile caps)	70	8.50	7.99	6.29	5.00	6.29	4.12	5.12	7.96	5.29	2.67	40.0	5.1	2.67	20	39	46	1.9	4.6	1.86	2	42	1.40	768.38	6,735.05	7,503.44
	75	8.50	7.99	6.29	5.00	6.29	4.12	5.12	7.05	5.29	1.76															
	80	8.52	7.99	6.29	5.00	6.29	4.12	5.12	6.98	5.29	1.69															
	85	8.55	7.99	6.29	5.00	6.29	4.10	5.10	6.92	5.29	1.63															
	90	8.60	8.09	6.39	5.00	6.39	4.08	5.08	6.85	5.39	1.46															
	95	8.65	8.09	6.39	5.00	6.39	4.06	5.06	6.78	5.39	1.39															
	100	8.66	8.09	6.39	5.00	6.39	4.07	5.07	6.72	5.39	1.33															
	105	8.64	8.09	6.39	5.00	6.39	4.12	5.12	6.65	5.39	1.26															
	110	8.72	8.09	6.39	5.00	6.39	4.07	5.07	6.58	5.39	1.19	10.0	7.8	0.2	20.0	0.0	-	-	-	-	-	-	-	-	-	-
	115	8.95	8.09	6.39	5.00	6.39	4.14	5.14	6.52	5.39	1.13															
	120	10.05	8.99	7.29	5.00	7.29	3.37	4.37	6.45	6.29	0.16															
	125	10.34	9.74	8.04	5.00	8.04	2.58	3.58	6.38	7.04	-0.66															
	130	10.49	9.94	8.24	5.00	8.24	2.46	3.46	6.32	7.24	-0.92															
	135	10.44	9.94	8.24	5.00	8.24	2.55	3.55	6.25	7.24	-0.99															
	140	10.59	10.04	8.34	5.00	8.34	2.43	3.43	6.18	7.34	-1.16															
	144	10.53	10.04	8.34	4.08	8.34	2.51	3.51	6.18	7.34	-1.16															
																								Total volume		***16,098.83***

Table I - 1 Dewatering Calculations - Bridge, RW-U3 and RW-U10

Location (drawing)	Chainage	Ground elevation	Base of wall	Plus -0.5 m	Length	RW Footing Excavation depth	Excavation width	Excavation width plus 500 mm each side	Design GWL-0.95 RL mAHD	Dewatering depth Includes 1.0 m for compaction	Dewatering depth	Length	Max width	Max Dewatering drawdown depth	Saturated thickness	Radius of Influence	Time to establish drawdown	Time to establish drawdown	Initial flow	Continuous Flow	K Value	Duration	Initial drawdown volume	Ongoing dewatering volume	Total extraction volume
Units	RL mAHD	RL mAHD	RL mAHD	RL mAHD	m	RL mAHD	m	m	RL mAHD	RL mAHD	m	m	m	m	m	m	Hrs	Days	L/sec	L/sec	m/day	days	kL	kL	kL
	0	11.74	10.66	10.16	5	10.16	2.30	3.30	11.65	9.16	2.49														
	5	11.57	10.66	10.16	5	10.16	2.30	3.30	11.55	9.16	2.39														
	10	11.33	10.66	10.16	5	10.16	2.30	3.30	11.45	9.16	2.29														
	15	11.02	10.29	9.79	5	9.79	2.30	3.30	11.35	8.79	2.56														
	20	10.88	9.92	9.42	5	9.42	2.30	3.30	11.25	8.42	2.83														
	25	10.50	9.55	9.05	5	9.05	2.30	3.30	11.15	8.05	3.10														
RW-U10	30	10.26	9.55	9.05	5	9.05	2.30	3.30	11.05	8.05	3.00														
(04030)	35	10.14	9.12	8.62	5	8.62	2.30	3.30	10.95	7.62	3.33	70	3.30	3.33	20	48.12	74	3.1	5.59	2.2	2	28	1,489.18	5,409.33	6,898.51
	40	9.92	9.12	8.62	5	8.62	2.30	3.30	10.85	7.62	3.23														
	45	9.90	9.12	8.62	5	8.62	2.30	3.30	10.75	7.62	3.13														
	50	9.99	9.12	8.62	5	8.62	2.30	3.30	10.65	7.62	3.03														
	55	9.82	9.12	8.62	5	8.62	2.30	3.30	10.55	7.62	2.93														
	60	9.87	9.12	8.62	5	8.62	2.30	3.30	10.45	7.62	2.83														
	65	9.89	9.12	8.62	5	8.62	2.30	3.30	10.35	7.62	2.73														
	70	9.88	9.12	8.62	5	8.62	2.30	3.30	10.25	7.62	2.63														
	75	9.95	9.12	8.62	5	8.62	2.30	3.30	10.15	7.62	2.53														
	80	10.26	9.55	9.05	5	9.05	2.30	3.30	10.05	8.05	2.00														
	85	10.42	9.55	9.05	5	9.05	2.30	3.30	9.95	8.05	1.90														
	90	10.14	9.55	9.05	5	9.05	2.30	3.30	9.85	8.05	1.80														
/-U10 (040	95	10.40	9.55	9.05	5	9.05	2.30	3.30	9.75	8.05	1.70														
	100	10.29	9.55	9.05	5	9.05	2.30	3.30	9.65	8.05	1.60	51.87	3.30	2.63	20	38	44	1.8	4.76	1.904	2	28	753.98	4,606.16	5,360.14
	105	10.21	9.55	9.05	5	9.05	2.30	3.30	9.55	8.05	1.50														
	110	10.21	9.55	9.05	5	9.05	2.30	3.30	9.45	8.05	1.40														
	115	10.00	9.12	8.62	5	8.62	2.30	3.30	9.35	7.62	1.73														
	120	10.08	9.12	8.62	5	8.62	2.30	3.30	9.25	7.62	1.63														
	121.87	10.04	9.12	8.62	1.87	8.62	2.30	3.30	9.21	7.62	1.60														
																							Total volume		***12,258.65***

Table I-2 Dewatering Calculations for WP4 Drainage North

Start node (U/S)	Pit RL (Surface Level)	AAMGL	U/S IL + 0.25m Blue Metal	Stop node (D/S)	Pit RL (Surface level)	AAMGL	D/S IL + 0.25m Blue Metal	Pipe diameter	Pipe length	Excavation width (plus 0.6 m)	Excavation Depth U/S	Excavation Depth D/S	Dewatering depth U/S	Dewatering depth D/S	Dewatering time frame (20m/day)	K value	Saturation thickness	Radius of influence	Time to establish drawdown (DWER calc)	Initial flow rate	Continuous flow rate	Initial drawdown volume	Ongoing dewatering volume	Total extraction volume
	mAHD	mAHD	mAHD		mAHD	mAHD	m	mm	m	m	m	m	m	m	days	m/day	m	m	hrs	L/sec	L/sec	kL	kL	kL
4MCS4-D2	17.64	16.57	14.85	4MCS4-D3	17.64	16.50	14.83	450	8.24	1.05	2.78	2.81	1.71	1.67	1.0	2	20	25	2.0	1.77	0.7	305.5	108.0	413.6
4MCN4-D7	16.91	16.40	15.06	4MCS4-D2-C1	17.12	16.45	15.02	450	14.54	1.05	1.86	2.10	1.34	1.44	1.0	2	20	21	1.5	1.80	0.7	233.5	112.2	345.6
4MCS4-D2-C1	17.12	16.45	14.97	4MCS4-D2	17.64	16.57	14.90	450	22.21	1.05	2.15	2.73	1.49	1.66	1.0	2	20	24	2.0	2.13	0.9	368.7	157.4	526.1
4MCS4-D3	17.64	16.50	14.78	4MCS4-D4	17.48	16.34	14.73	450	17.81	1.05	2.86	2.75	1.72	1.61	1.0	2	20	25	2.0	2.07	0.8	357.3	147.8	505.1
4MCS4-D4	17.48	16.34	14.68	4MCS4-D5	17.06	15.98	14.58	525	46.55	1.13	2.80	2.48	1.66	1.40	3.0	2	20	24	2.0	2.62	1.0	453.0	237.5	690.5
4MCS4-D6	16.64	15.77	14.27	4MCS4-D7	16.39	15.63	14.21	525	28.29	1.13	2.38	2.18	1.50	1.42	2.0	2	20	22	1.5	2.19	0.9	284.4	166.4	450.7
4MCS4-D7	16.39	15.63	14.16	4MCS4-D8	16.11	15.50	14.10	525	28.17	1.13	2.23	2.01	1.47	1.40	2.0	2	20	21	1.5	2.18	0.9	281.9	163.5	445.4
4MCS4-D8	16.11	15.50	14.05	4MCS4-D9	15.77	15.53	14.01	525	13.86	1.13	2.06	1.75	1.45	1.52	1.0	2	20	22	1.5	1.86	0.7	241.1	119.6	360.7
4MCS4-D5	17.06	15.98	14.53	4MCS4-D6	16.64	15.77	14.43	525	46.42	1.13	2.53	2.21	1.45	1.34	2.0	2	20	21	1.5	2.49	1.0	322.5	214.0	536.5
4MCN4-E5	14.48	14.55	12.09	4MCN4-E6	14.25	14.36	11.94	600	36.31	1.20	2.39	2.31	2.46	2.42	2.0	2	20	36	4.0	2.98	1.2	990.3	307.9	1298.1
4MCN4-E4	14.71	14.70	12.59	4MCN4-E5	14.48	14.55	12.33	600	33.88	1.20	2.12	2.15	2.11	2.22	2.0	2	20	32	3.5	2.80	1.1	845.2	270.0	1115.2
4MCN4-E6	14.25	14.36	11.89	4MCN4-E7	14.24	14.34	11.87	675	2.45	1.28	2.36	2.37	2.47	2.47	1.0	2	20	36	4.0	1.89	0.8	653.2	123.4	776.6
4MCN4-E7	14.24	14.34	11.82	4MCN4-E8	14.29	14.22	11.73	675	22.09	1.28	2.42	2.56	2.52	2.49	1.0	2	20	36	4.5	2.75	1.1	1071.1	262.3	1333.5
4MCN4-E8	14.29	14.22	11.73	4MCN4-E9	13.46	14.24	11.64	675	21.06	1.28	2.56	1.82	2.49	2.60	1.0	2	20	38	4.5	2.77	1.1	1078.7	266.0	1344.8
4MC62-B1	16.61	12.08	14.98	4MC62-B1-NODE-BP	16.12	16.12	14.90	300	14.66	0.90	1.63	1.22	-2.90	1.22	1.0	2	20	18	1.0	1.60	0.6	138.4	88.7	227.0
4MC51-D1	18.04	16.03	16.26	4MC51-D2	16.74	15.76	15.21	300	50.58	0.90	1.79	1.54	-0.22	0.55	3.0	2	20	8	0.5	2.14	0.9	92.6	158.7	251.2
4MCS4-D1	17.98	16.79	16.50	4MCS4-D2	17.64	16.57	16.15	300	38.96	0.90	1.48	1.48	0.29	0.41	2.0	2	20	6	0.5	2.06	0.8	88.9	146.3	235.2
4MCS4-D12-C1	15.26	15.40	14.02	4MCS4-D12	15.39	15.37	13.94	300	7.37	0.90	1.23	1.46	1.38	1.44	1.0	2	20	21	1.5	1.52	0.6	196.7	79.6	276.4
4MCN4-E8-C1	13.90	14.21	12.72	4MCN4-E8	14.29	14.22	12.70	300	2.78	0.90	1.18	1.59	1.49	1.52	1.0	2	20	22	1.5	1.33	0.5	172.2	61.0	233.2
4MCN4-E5-C1	14.20	14.53	13.02	4MCN4-E5	14.48	14.55	13.00	300	4.44	0.90	1.18	1.48	1.51	1.55	1.0	2	20	22	1.5	1.46	0.6	188.6	73.2	261.8
4MCS4-E2	13.75	13.98	12.03	4MCS4-E3	13.65	13.75	11.97	300	12.30	0.90	1.72	1.69	1.95	1.78	1.0	2	20	28	2.5	2.00	0.8	431.5	137.9	569.4
4MCS4-E3	13.65	13.75	11.92	4MCS4-E4	13.56	13.52	11.85	300	12.31	0.90	1.74	1.71	1.83	1.67	1.0	2	20	27	2.5	1.93	0.8	416.3	128.4	544.6
4MC51-D2	16.74	15.76	15.04	4MCS4-D9	15.77	15.53	14.19	300	49.41	0.90	1.70	1.57	0.72	1.34	3.0	2	20	19	1.5	2.30	0.9	298.5	183.4	481.9
4MCS4-D10-C1	15.38	15.49	14.07	4MCS4-D10	15.59	15.47	13.98	300	7.65	0.90	1.31	1.61	1.42	1.49	1.0	2	20	21	1.5	1.56	0.6	202.2	84.1	286.4
4MCS4-D14-C1	15.48	15.14	13.74	4MCS4-D14	15.00	15.12	13.57	300	5.12	0.90	1.74	1.42	1.40	1.55	1.0	2	20	22	1.5	1.49	0.6	192.6	76.3	268.9
4MCS4-D20-C1	14.69	14.45	13.06	4MCS4-D20	14.28	14.44	12.86	300	6.42	0.90	1.63	1.42	1.39	1.58	1.0	2	20	23	2.0	1.57	0.6	271.2	85.1	356.3
4MCS4-D18-C1	14.94	14.64	13.28	4MCS4-D18	14.51	14.65	13.09	300	6.42	0.90	1.66	1.42	1.36	1.56	1.0	2	20	23	1.5	1.56	0.6	201.7	83.7	285.3
4MCS4-E1-C1	13.61	14.08	12.38	4MCS4-E1	13.84	14.07	12.29	300	8.16	0.90	1.23	1.55	1.69	1.78	1.0	2	20	26	2.0	1.76	0.7	303.8	106.9	410.7
4MCS4-E1	13.84	14.07	12.15	4MCS4-E2	13.75	13.98	12.08	300	12.39	0.90	1.70	1.67	1.93	1.90	1.0	2	20	28	2.5	1.98	0.8	428.6	136.1	564.7
4MCS4-D6-C1	16.07	15.78	14.35	4MCS4-D6	16.64	15.77	14.30	300	6.00	0.90	1.72	2.34	1.43	1.47	1.0	2	20	21	1.5	1.48	0.6	192.0	75.9	267.9
4MCN4-E1	15.38	15.24	13.69	4MCN4-E2	15.15	15.04	13.36	300	42.38	0.90	1.70	1.79	1.55	1.68	2.0	2	20	24	2.0	2.42	1.0	417.8	202.0	619.8
4MCS4-D15-C1	15.31	14.96	13.55	4MCS4-D15	14.81	14.96	13.39	300	5.13	0.90	1.76	1.42	1.42	1.57	1.0	2	20	23	1.5	1.50	0.6	194.6	77.9	272.5
4MCS4-E5-C1	13.71	13.29	12.47	4MCS4-E5	13.47	13.28	12.28	300	6.88	0.90	1.24	1.19	0.82	1.01	1.0	2	20	15	1.0	1.22	0.5	105.6	51.7	157.3
4MCS4-D21-C1	14.47	14.32	12.91	4MCS4-D21	14.13	14.32	12.71	300	6.47	0.90	1.56	1.42	1.41	1.61	1.0	2	20	23	2.0	1.58	0.6	273.9	86.8	360.7
EX-4MCN4-1	23.35	11.96	16.85	EX-MCN4-NODE	16.20	16.20	14.84	375	12.64	0.98	6.50	1.36	-4.89	1.36	1.0	2	20	20	1.5	1.67	0.7	216.3	96.3	312.6
4MCS4-E4	13.56	13.52	11.80	4MCS4-E5	13.47	13.28	11.73	375	12.23	0.98	1.76	1.73	1.72	1.55	1.0	2	20	25	2.0	1.88	0.8	325.4	122.5	447.9
4MCS4-E5	13.47	13.28	11.68	4MCS4-E6	13.32	12.92	11.58	375	19.92	0.98	1.78	1.74	1.60	1.34	1.0	2	20	23	2.0	2.01	0.8	347.1	139.5	486.6
4MCS4-E6	13.32	12.92	11.53	4MCS4-E7	13.21	12.64	11.40	375	26.45	0.98	1.79	1.81	1.39	1.24	2.0	2	20	20	1.5	2.01	0.8	260.2	139.4	399.6
4MCN4-D5	18.08	17.20	16.38	4MCN4-D6	17.38	16.77	15.74	450	62.29	1.05	1.69	1.64	0.82	1.03	3.0	2	20	15	1.0	2.47	1.0	213.8	211.7	425.5
4MCN4-D6	17.38	16.77	15.68	4MCN4-D7	16.91	16.40	15.27	450	58.77	1.05	1.70	1.64	1.09	1.13	3.0	2	20	16	1.0	2.45	1.0	212.0	208.1	420.2
4MCN4-D4	18.28	17.32	16.59	4MCN4-D5	18.08	17.20	16.43	450	16.39	1.05	1.69	1.64	0.73	0.77	1.0	2	20	11	0.5	1.41	0.6	60.9	68.6	129.5
B15-Out	20.07	18.07	18.10	4MCN4-D1	19.32	17.91	17.68	450	25.40	1.05	1.98	1.64	-0.03	0.23	2.0	2	20	3	Sump pump					
4MCN4-D2	19.08	17.82	17.39	4MCN4-D3	18.73	17.64	17.09	450	25.68	1.05	1.69	1.64	0.43	0.55	2.0	2	20	8	0.5	1.58	0.6	68.5	86.8	155.3
4MCN4-D3	18.73	17.64	17.04	4MCN4-D4	18.28	17.32	16.64	450	45.29	1.05	1.69	1.64	0.60	0.68	3.0	2	20	10	0.5	2.10	0.8	90.9	152.9	243.8
4MC52-C3	19.54	17.19	17.11	4MCN4-D5	18.08	17.20	16.49	450	24.08	1.05	2.43	1.59	0.08	0.71	2.0	2	20	10	0.5	1.58	0.6	68.4	86.6	155.0
B16-Out	18.60	16.46	16.78	4MCS4-D4	17.48	16.34	16.13	450	24.84	1.05	1.83	1.35	-0.31	0.22	2.0	2	20	3	Sump pump					
4MCN4-D7-C1	16.37	16.36	15.15	4MCN4-D7	16.91	16.40	15.11	450	15.08	1.05	1.22	1.81	1.21	1.29	1.0	2	20	19	1.0	1.72	0.7	148.6	102.3	250.9
4MCS4-D11-C1	15.68	15.38	14.20	4MCS4-D11	15.55	15.45	13.68	450	31.98	1.05	1.49	1.87	1.19	1.78	2.0	2	20	26	2.0	2.40	1.0	415.0	199.4	614.4
4MCS4-E7	13.21	12.64	11.35	4MCS4-E8	13.10	12.37	11.32	450	2.81	1.05	1.86	1.78	1.29	1.05	1.0	2	20	19	1.0	1.23	0.5	106.1	52.1	158.3
4MCS4-E8	13.10	12.37	11.27	4MCS4-E9	12.98	12.09	11.19	450	14.59	1.05	1.83	1.79	1.10	0.90	1.0	2	20	16	1.0	1.58	0.6	136.4	86.1	222.5
4MCS4-E9	12.98	12.09	11.14	4MCS4-E10	12.85	11.79	11.07	450	14.00	1.05	1.84	1.78	0.95	0.72	1.0	2	20	14	1.0	1.47	0.6	126.6	74.2	200.8
4MCS4-E10	12.85	11.79	11.02	4MCS4-E11	12.71	11.46	10.94	450	13.97	1.05	1.83	1.77	0.77	0.51	1.0	2	20	11	0.5	1.34	0.5	58.0	62.4	120.4
4MCN4-D1	19.32	17.91	17.68	4MCN4-D2	19.08	17.82	17.44	450	10.96	1.05	1.64	1.64	0.23	0.38	1.0	2	20	6	0.5	1.04	0.4	45.0	37.5	82.4
4MCN4-E2-C1	14.85	15.04	13.49	4MCN4-E2	15.15	15.04	13.46	450	4.43	1.05	1.36	1.69	1.55	1.58	0.2	2	20	23	2.0	1.51	0.6	261.0	78.8	339.8
4MC62-A9	15.77	12.28	13.98	4MC62-A9-NODE-BP	16.06	16.06	13.94	450	7.95	1.05	1.79	2.13	-1.70	2.13	1.0	2	20	31	3.0	2.00	0.8	518.2	138.1	656.4
4MCS4-E11	12.71	11.46	10.89	4MCS4-E12	12.58	11.13	10.82	525	13.96	1.13	1.82	1.76	0.56	0.31	1.0	2	20	8	0.5	1.25	0.5	54.1	54.3	108.4
4MCS4-E12	12.58	11.13	10.77	4MCS4-E13	12.48	10.85	10.70	525	12.14	1.13	1.81	1.78	0.36	0.15	1.0	2	20	5	0.5	1.14	0.5	49.2	44.8	93.9
4MCS4-E13	12.48	10.85	10.65	4MCS4-E14	12.39	10.57	10.59	525	12.08	1.13	1.83	1.80	0.20	-0.02	1.0	2	20	3	Sump pump					
4MCN4-E2	15.15	15.04	13.31	4MCN4-E3	14.90	14.85	12.95	525	46.76	1.13	1.84	1.95	1.73	1.90	3.0	2	20	27	2.5	2.77	1.1	598.4	265.3	863.7
4MCN4-E3	14.90	14.85	12.90	4MCN4-E4	14.71	14.70	12.64	525	33.95	1.13	2.00	2.07	1.95	2.06	2.0	2	20	30	3.0	2.66	1.1	688.9	244.1	933.0
4MCS4-D9	15.77	15.53	13.88	4MCS4-D10	15.59	15.47	13.70	600	13.10	1.20	1.88	1.89	1.65	1.77	1.0	2	20	26	2.0	2.02	0.8	349.4	141.3	490.6
4MCN4-H13	13.51	8.00	9.09	4MCN4-H-OUT	9.67	8.82	8.75	600	13.75	1.20	4.41	0.92	-1.09	0.07	1.0	2	20	1	Sump pump					
4MCS4-D11	15.55	15.45	13.58	4MCS4-D12	15.39	15.37	13.48	600	18.85	1.20	1.97	1.91	1.87	1.89	1.0	2	20	27	2.5	2.26	0.9	489.0	177.1	666.1
4MCS4-D12	15.39	15.37	13.43	4MCS4-D13	15.19	15.25	13.28	600	28.97	1.20	1.96	1.91	1.94	1.97	2.0	2	20	28	2.5	2.54	1.0	548.9	223.2	772.0
4MCS4-E14	12.39	10.57	10.54	4MCS4-E15	12.30	10.30	10.48	600	12.00	1.20	1.85	1.82	0.04	-0.18	1.0	2	20	1	Sump pump					
4MCS4-D10	15.59	15.47	13.65	4MCS4-D11	15.55	15.45	13.63	600	2.38	1.20	1.94	1.92	1.82	1.82	0.1	2	20	26	2.5	1.53	0.6	329.8	80.6	410.4
HTC 1	12.76	8.42	9.17	4MCN4-E-OUT2	10.98	9.29	9.15	600	8.84	1.20	3.59	1.83	-0.74	0.14	1.0	2	20	2	Sump pump					
4MCS4-D14	15.00	15.12	12.99	4MCS4-D15	14.81	14.96	12.83	675	31.33	1.28	2.01	1.98	2.13	2.13	2.0	2	20	31	3.0	2.73	1.1	707.0	257.1	964.2
4MCS4-D15	14.81	14.96	12.78	4MCS4-D16	14.71	14.86	12.68	675	16.93	1.28	2.03	2.03	2.18	2.18	1.0	2	20	32	3.0	2.42	1.0	626.5	201.9	828.3
4MCS4-D16	14.71	14.86	12.63	4MCS4-D17	14.61	14.76	12.54	675	17.09	1.28	2.08	2.07	2.23	2.21	1.0	2	20	32	3.5	2.45	1.0	740.4	207.2	947.6
4MCS4-D17	14.61	14.76	12.49	4MCS4-D18	14.51	14.65	12.40	675	16.92	1.28	2.12	2.11	2.26	2.25	1.0	2	20	33	3.5	2.47	1.0	745.9	210.3	956.2
4MCS4-D13	15.19	15.25	13.19	4MCS4-D14	15.00	15.12	13.04	675	28.80	1.28	1.99	1.96	2.05	2.08	2.0	2	20	30	3.0	2.64	1.1	685.1	241.5	926.6
4MCN4-E10	12.86	14.01	10.98	4MCN4-E11	12.62	13.25	10.77	750	40.74	1.35	1.89	1.85	3.03	2.48	2.0	2	20	44	6.5	3.48	1.4	1953.5	418.2	2371.7
B18-Out2	10.43	8.28	8.28	B18-Out3	9.93	9.02	8.15	750	28.52	1.35	2.15	1.78	0.00	0.87	2.0	2	20	13	0.5	1.94	0.8	83.8	130.2	214.0
4MCS4-D18	14.51	14.65	12.35	4MCS4-D19	14.40	14.55	12.26	750	15.66	1.35	2.16	2.14	2.30	2.29	1.0	2	20	33	3.5	2.48	1.0	749.7	212.4	962.1
4MCS4-D19	14.40	14.55	12.21	4MCS4-D20	14.28	14.44	12.13	750	15.64	1.35	2.19	2.16	2.34	2.32	1.0	2	20	34	3.5	2.50	1.0	755.5	215.7	971.3
4MCS4-D20	14.28	14.44	11.57	4MCS4-D21	14.13	14.32	11.51	750	19.14	1.35	2.71	2.63	2.87	2.81	1.0	2	20	42	5.5	2.91	1.2	1382.3	292.4	1674.8
4MCS4-D21	14.13	14.32	11.46	4MCS4-D22	14.02	14.22	11.41	750	14.32	1.35	2.68	2.61	2.86	2.81	1.0	2	20	41	5.5	2.75	1.1	1307.6	261.7	1569.2
4MCS4-D22	14.02	14.22	11.36	4MCN4-E9	13.46	14.24	11.29	750	22.79	1.35	2.66	2.17	2.86	2.95	1.0	2	20	43	6.0	3.05	1.2	1582.1	321.9	1904.0
4MCN4-E9	13.46	14.24	11.24	4MCN4-E10	12.86	14.01	11.03	750	40.35	1.35	2.22	1.84	3.00	2.98	2.0	2	20	43	6.0	3.45	1.4	1791.0	412.5	2203.5
4MCN4-E11	12.62	13.25	10.72	4MCN4-E12	12.06	11.35	10.23	750	94.63	1.35	1.90	1.83	2.53	1.12	5.0	2	20	37	4.5	3.96	1.6	1538.4	541.1	2079.4
4MCN4-E12	12.06	11.35	10.16	4MCN4-E13	11.80	10.34	9.90	900	43.63	1.50	1.90	1.90	1.19	0.44	2.0	2	20	17	1.0	2.54	1.0	219.3	222.7	442.1
4MCN4-E13	11.80	10.34	9.85	4MCN4-E14	11.55	9.47	9.64	900	42.88	1.50	1.95	1.90	0.49	-0.18	2.0	2	20	7	0.5	3.14	1.3	135.5	339.8	475.2
MC61-MH	17.74	11.02	14.05	EX-1200MH	19.52	19.52	13.87	1050	141.56	1.65	3.69	5.65	-3.03	5.65	7.0	2	20	82	25.0	6.29	2.5	13594.6	1369.0	14963.5
4MCN4-E17	12.74	8.29	9.45	4MCN4-E-OUT1	12.14	9.84	9.15	1200	13.94	1.80	3.29	2.99	-1.16	0.69	1.0	2	20	10	0.5	1.57	0.6	67.8	85.0	152.8
LP-	9.50	9.50	8.49	B18-Out2	10.43	8.28	8.30	225	78.74	0.83	1.01	2.13	1.01	-0.02	4.0	2	20	15	1.0	2.46	1.0	212.6	209.3	421.9
								Total	**2,058**													**Total**	**62,262.1**

Table I-3 Dewatering Calculations for WP4 Drainage South

Greater Connect ALLIANCE

Start node U/S	Pit RL (Surface Level)	AAMGL	U/S IL + 0.25m Blue Metal	Stop node D/S	Pit RL (Surface level)	AAMGL	D/S IL + 0.25m Blue Metal	Pipe Diameter	Pipe length	Excavation width (plus 0.6m)	Excavation Depth U/S	Excavation Depth D/S	Dewatering depth U/S	Dewatering Depth D/S	Dewatering time frame (20m/day)	K value	Saturation thickness	Radius of influence	Time to establish drawdown (DWER calc)	Initial flow rate	Continuous flow rate	Initial drawdown volume	Ongoing dewatering volume	Total extraction volume
	mAHD	mAHD	mAHD		mAHD	mAHD	mAHD	mm	m	m	m	m	m	m	day	m/day	m	m	hrs	L/sec	L/sec	kL	kL	kL
4MC52-A14	20.38	17.988	17.877	4MC52-A15	19.975	17.54	17.63	600	48.83	1.2	2.50	2.35	0.11	-0.09	2.44	2	20	1.60	Sump Pump					
4MC52-A16	19.615	17.09	17.377	4MC52-A17-OUTFALL-B4	18.02	17.976	16.95	600	11.11	1.2	2.24	1.07	-0.29	1.03	0.56	2	20	14.83	1.00	1.48	0.59	127.6	75.4	202.93
4MC52-A13	19.997	17.919	17.903	4MC52-A14	20.38	17.988	17.88	600	11.30	1.2	2.09	2.50	0.02	0.11	0.57	2	20	1.60	Sump Pump					
4MC52-A9	20.202	18.645	18.546	4MC52-A10	20.029	18.498	18.45	450	22.60	1.05	1.66	1.58	0.10	0.05	1.13	2	20	1.43	Sump Pump					
4MCS4-B27	21	18.572	18.568	4MCS4-B28	19.741	18.236	17.89	750	63.44	1.35	2.43	1.85	0.00	0.35	3.17	2	20	5.00	Sump Pump					
4MCS4-B28	19.741	18.236	17.89	4MCS4-B29	19.779	18.203	17.88	750	6.14	1.35	1.85	1.90	0.35	0.32	0.31	2	20	5.00	0.50	0.89	0.36	38.4	27.4	65.79
4MCS4-B29	19.779	18.203	17.88	4MCS4-B30	21.023	18.052	17.78	750	27.89	1.35	1.90	3.24	0.32	0.27	1.39	2	20	4.67	0.50	3.13	1.25	135.1	337.9	473.02
4MCS4-B30	21.023	18.052	17.78	4MCS4-B31-OUTFALL-B16	18.84	18.125	17.72	750	33.44	1.35	3.24	1.12	0.27	0.40	1.67	2	20	5.81	0.50	2.72	1.09	117.4	255.3	372.72
4MCS4-B32	18.575	17.626	17.619	4MCS4-B33-OUTFALL-B18	18.69	17.573	17.60	750	8.07	1.35	0.96	1.09	0.01	-0.03	0.40	2	20	0.10	Sump Pump					
4MPTQ-F1A	21.292	18.67	19.2	4MPTQ-F2-OUT	19.2	18.513	18.45	375	57.20	0.975	2.09	0.75	-0.53	0.06	2.86	2	20	0.91	Sump Pump					
4MCS4-C5	18.815	17.244	17.545	4MCS4-C6-OUTFALL-B16	18.903	18.124	17.35	375	45.54	0.975	1.27	1.55	-0.30	0.77	2.28	2	20	11.14	0.50	2.03	0.81	87.7	142.3	229.96
4MCS4-E1	36.68	32.916	32.395	DUMMY2	36.77	32.953	32.37	450	5.36	1.05	4.29	4.40	0.52	0.59	0.27	2	20	8.47	0.50	0.91	0.37	39.4	28.8	68.21
4MC52-B3	24.928	18.017	22.95	4MC52-B4-OUT	19.48	18.653	18.45	300	44.34	0.9	1.98	1.03	-4.93	0.20	2.22	2	20	2.93	Sump Pump					
4MC52-A10-C1	20.256	19.113	19.05	4MC52-A10	20.029	18.498	18.45	300	10.65	0.9	1.21	1.58	0.06	0.05	0.53	2	20	0.91	Sump Pump					
4MC52-A12	19.408	17.806	18.008	4MC52-A13	19.997	17.919	17.90	525	19.90	1.125	1.40	2.09	-0.20	0.02	0.99	2	20	0.23	Sump Pump					
4MC52-A10	20.029	18.498	18.445	4MC52-A11	19.845	18.314	18.32	525	24.12	1.125	1.58	1.53	0.05	0.00	1.21	2	20	0.77	Sump Pump					
								Total	**440**														**Total**	**1,413**

Table I-4 Acid Sulfate Soil Calculations - Bridge, RW-U3 and RW-U10

Location	Length	Excavation width	Excavation depth	Ground elevation	ASS Excavation depth	Related BH	ASS Depth	ASS end depth	ASS thickness	ASS Volume insitu	Coffee rock volume insitu	ASS volume per pile insitu	# of Piles	ASS volume all piles m3	Mean net acidity + 1 StDev	Liming Rate includes bulking factor of 1.5 (DWER online calculator)	Total Lime required
Units	m	m	RL mAHD	RL mAHD	m		RL mAHD	m	m	m^3	m^3			m^3	%S	kg/m^3	kg/m^3
Basin 14	116	2.5	28.8	30.08	1.28	BH112	30.08	27.33	1.28		371.2		-	-	0.09	8.20	3,043.8
Basin 18 including subsoil	1800		8.8	9.5	0.7	BH100	10.84	5.84	0.7	1,260.00	-		-	-	0.05	4.68	5,896.8
Abutment 1 - piles	18	0.75	-9.495	8.505	18	BH99	-					31.81	8	254.47	unknown	unknown	unknown
Abutment 2 - piles	21	0.75	-11.91	9.09	21	BH98	7.79	3.54	15.45		-	37.11	8	296.88	0.08	7.47	2217.7
Pier 1 piles	15	0.75	-8.968	6.032	15	BH09	7.31	3.81	12.778		-	26.51	8	212.06	0.04	3.74	793.1
Pier 2 piles	18.5	0.75	-11.758	6.742	18.5	BH10	6.6	6.1	17.858		-	32.69	8	261.54	0.04	3.74	978.2
Wingwall 1 piles	16	0.45	-7.575	8.425	16	BH99	-				-	10.18	6	61.07	unknown	unknown	unknown
Wingwall 2 piles	22	0.45	-12.965	9.035	22	BH98	7.79	3.54	16.505		-	14.00	6	83.97	0.08	7.47	627.3
Pier 1 Pile Cap	26.65	2.25	5.482	7.31	1.828	BH09	7.31	3.81	1.828	109.61	-		-		0.04	3.74	409.9
Pier 2 Pile Cap	26.65	2.25	6.192	6.6	0.408	BH10	6.6	6.1	0.408	24.46	-		-		0.04	3.74	91.5
VMS001 Gantry Sign - Piles	15.50	0.60	0.712	15.86	-	BH97	7.79	MDI	8.83		-	17.53	1	17.53	0.04	3.74	65.6
VMS002 Gantry Sign - Piles	6.00	0.60	29.89	36.84	-	N/A	N/A	N/A	N/A		-	6.79	1	6.79	unknown	unknown	unknown
Total										***1,394.08***	***371.20***			***1194.3***			***14,123.88***

Table I-4 Acid Sulfate Soil Calculations - Bridge, RW-U3 and RW-U10

ID (Drawing)	Start of Chainage	Ground elevation	Top of footing	Base of footing plus 0.3m	Length	RW Footing Excavation depth	RW width	RW width plus 500 mm each side	Related BH	ASS Depth	Ass end depth	RW ASS Excavation depth	RW ASS Volume insitu	Mean net acidity + 1 StDev	Liming Rate includes bulking factor (DWER online calculator)	Lime required
Units		RL mAHD	RL mAHD	RL mAHD	m	RL mAHD	m			RL mAHD	RL mAHD	m	m^3	%S		(kg/m3)
RW- U3 (04015)	0	10.81	9.30	9.00	5.00	9.00	1.98	2.98	BH100	10.84	5.48	1.81	26.95	0.05	4.68	126.10
	5	10.00	9.30	9.00	5.00	9.00	2.76	3.76	BH100	10.84	5.48	1.00	18.86	0.05	4.68	88.24
	10	9.86	9.30	9.00	5.00	9.00	2.87	3.87	BH100	10.84	5.48	0.86	16.68	0.05	4.68	78.06
	15	9.89	9.30	9.00	5.00	9.00	2.82	3.82	BH100	10.84	5.48	0.89	16.96	0.05	4.68	79.36
	20	9.27	8.49	8.19	5.00	8.19	3.41	4.41	BH100	10.84	5.48	1.08	23.88	0.05	4.68	111.74
	25	8.57	7.99	7.69	5.00	7.69	4.08	5.08	BH100	10.84	5.48	0.88	22.34	0.05	4.68	104.57
	30	8.54	7.99	7.69	5.00	7.69	4.10	5.10	BH100	10.84	5.48	0.85	21.56	0.05	4.68	100.90
	35	8.51	7.99	7.69	5.00	7.69	4.13	5.13	BH100	10.84	5.48	0.82	21.02	0.05	4.68	98.36
	40	8.59	7.99	7.69	5.00	7.69	4.03	5.03	BH100	10.84	5.48	0.90	22.50	0.05	4.68	105.28
	45	8.60	7.99	7.69	5.00	7.69	4.00	5.00	BH100	10.84	5.48	0.91	22.75	0.05	4.68	106.47
	50	8.82	8.23	7.93	5.00	7.93	3.78	4.78	BH100	10.84	5.48	0.88	21.16	0.05	4.68	99.01
	55	8.71	7.99	7.69	5.00	7.69	3.89	4.89	BH100	10.84	5.48	1.02	24.89	0.05	4.68	116.50
	60	8.58	7.99	7.69	5.00	7.69	4.02	5.02	BH100	10.84	5.48	0.89	22.31	0.05	4.68	104.41
	65	8.64	7.99	7.69	5.00	7.69	3.99	4.99	BH100	10.84	5.48	0.95	23.59	0.05	4.68	110.39
RW- U3 (04016)	70	8.50	7.990	6.29	5.00	6.29	4.12	5.12	BH100	10.84	5.48	2.21	56.41	0.05	4.68	264.02
	75	8.50	7.990	6.29	5.00	6.29	4.12	5.12	BH100	10.84	5.48	2.21	56.68	0.05	4.68	265.25
	80	8.52	7.990	6.29	5.00	6.29	4.12	5.12	BH100	10.84	5.48	2.23	57.12	0.05	4.68	267.32
	85	8.55	7.990	6.29	5.00	6.29	4.10	5.10	BH100	10.84	5.48	2.26	57.75	0.05	4.68	270.28
	90	8.60	8.090	6.39	5.00	6.39	4.08	5.08	BH100	10.84	5.48	2.21	56.14	0.05	4.68	262.74
	95	8.65	8.090	6.39	5.00	6.39	4.06	5.06	BH100	10.84	5.48	2.26	57.04	0.05	4.68	266.96
	100	8.66	8.090	6.39	5.00	6.39	4.07	5.07	BH100	10.84	5.48	2.27	57.59	0.05	4.68	269.50
	105	8.64	8.090	6.39	5.00	6.39	4.12	5.12	BH100	10.84	5.48	2.25	57.65	0.05	4.68	269.82
	110	8.72	8.090	6.39	5.00	6.39	4.07	5.07	BH100	10.84	5.48	2.33	59.16	0.05	4.68	276.89
	115	8.95	8.090	6.39	5.00	6.39	4.14	5.14	BH100	10.84	5.48	2.56	65.80	0.05	4.68	307.97
	120	10.05	8.990	7.29	5.00	7.29	3.37	4.37	BH100	10.84	5.48	2.76	60.30	0.05	4.68	282.18
	125	10.34	9.740	8.04	5.00	8.04	2.58	3.58	BH100	10.84	5.48	2.30	41.16	0.05	4.68	192.63
	130	10.49	9.940	8.24	5.00	8.24	2.46	3.46	BH100	10.84	5.48	2.25	38.96	0.05	4.68	182.36
	135	10.44	9.940	8.24	5.00	8.24	2.55	3.55	BH100	10.84	5.48	2.20	39.03	0.05	4.68	182.64
	140	10.59	10.040	8.34	5.00	8.34	2.43	3.43	BH100	10.84	5.48	2.25	38.62	0.05	4.68	180.72
	144	10.53	10.040	8.34	4.08	8.34	2.51	3.51	BH101	10.84	5.48	2.19	31.44	0.05	4.68	147.13
Total											***Total ASS volume***		***1104.85***	***Total lime required***		***5170.68***

Table I-4 Acid Sulfate Soil Calculations - Bridge, RW-U3 and RW-U10

ID (Drawing)	Start of Chainage	Ground elevation	Base of wall	Base of wall Plus - 0.5	Length	RW Footing Excavation depth	Excavation width	Excavation width plus 500 mm each side	Related BH	Band 1		Band 2		ASS Excavation depth	ASS Volume insitu	Mean net acidity + 1 StDev	Liming Rate includes bulking factor (DWER online calculator)	Lime required
										ASS Depth	Ass end depth	ASS Depth	Ass end depth					
	RL mAHD	RL mAHD	RL mAHD	RL mAHD	m	RL mAHD	m	m		RL mAHD	RL mAHD	RL mAHD	RL mAHD	m	m3	%S	kg/m3	kg/m3
RW-U10 (04031, 04030)	0	11.74	10.66	10.16	5	10.16	2.30	3.30	BH06	10.63	9.38	7.13	6.38	0.47	7.80	0.04	3.74	29.19
	5	11.57	10.66	10.16	5	10.16	2.30	3.30	BH06	10.63	9.38	7.13	6.38	0.47	7.80	0.04	3.74	29.19
	10	11.33	10.66	10.16	5	10.16	2.30	3.30	BH06	10.63	9.38	7.13	6.38	0.47	7.80	0.04	3.74	29.19
	15	11.02	10.29	9.79	5	9.79	2.30	3.30	BH06	10.63	9.38	7.13	6.38	0.84	13.91	0.04	3.74	52.02
	20	10.88	9.92	9.42	5	9.42	2.30	3.30	BH06	10.63	9.38	7.13	6.38	1.21	20.01	0.04	3.74	74.85
	25	10.50	9.55	9.05	5	9.05	2.30	3.30	BH06	10.63	9.38	7.13	6.38	1.46	24.04	0.04	3.74	89.91
	30	10.26	9.55	9.05	5	9.05	2.30	3.30	BH06	10.63	Assumed ASS to full depth - only clay material = ASS	7.13	6.38	1.21	19.95	0.04	3.74	74.61
	35	10.14	9.12	8.62	5	8.62	2.30	3.30	BH06	10.63		7.13	6.38	1.52	25.08	0.04	3.74	93.80
	40	9.92	9.12	8.62	5	8.62	2.30	3.30	BH06	10.63		7.13	6.38	1.30	21.48	0.04	3.74	80.35
	45	9.90	9.12	8.62	5	8.62	2.30	3.30	BH06	10.63		7.13	6.38	1.28	21.17	0.04	3.74	79.17
	50	9.99	9.12	8.62	5	8.62	2.30	3.30	BH06	10.63		7.13	6.38	1.37	22.61	0.04	3.74	84.55
	55	9.82	9.12	8.62	5	8.62	2.30	3.30	BH06	10.63		7.13	6.38	1.20	19.77	0.04	3.74	73.93
	60	9.87	9.12	8.62	5	8.62	2.30	3.30	BH06	10.63		7.13	6.38	1.26	20.72	0.04	3.74	77.51
	65	9.89	9.12	8.62	5	8.62	2.30	3.30	BH100	10.84	5.48	-	-	1.28	21.05	0.05	4.68	98.53
	70	9.88	9.12	8.62	5	8.62	2.30	3.30	BH100	10.84	5.48	-	-	1.27	20.89	0.05	4.68	97.76
	75	9.95	9.12	8.62	5	8.62	2.30	3.30	BH100	10.84	5.48	-	-	1.34	22.04	0.05	4.68	103.17
	80	10.26	9.55	9.05	5	9.05	2.30	3.30	BH100	10.84	5.48	-	-	1.22	20.05	0.05	4.68	93.82
	85	10.42	9.55	9.05	5	9.05	2.30	3.30	BH100	10.84	5.48	-	-	1.37	22.64	0.05	4.68	105.95
	90	10.14	9.55	9.05	5	9.05	2.30	3.30	BH100	10.84	5.48	-	-	1.09	18.03	0.05	4.68	84.40
	95	10.40	9.55	9.05	5	9.05	2.30	3.30	BH100	10.84	5.48	-	-	1.35	22.34	0.05	4.68	104.56
	100	10.29	9.55	9.05	5	9.05	2.30	3.30	BH100	10.84	5.48	-	-	1.25	20.58	0.05	4.68	96.29
	105	10.21	9.55	9.05	5	9.05	2.30	3.30	BH100	10.84	5.48	-	-	1.16	19.11	0.05	4.68	89.42
	110	10.21	9.55	9.05	5	9.05	2.30	3.30	BH100	10.84	5.48	-	-	1.16	19.11	0.05	4.68	89.42
	115	10.00	9.12	8.62	5	8.62	2.30	3.30	BH100	10.84	5.48	-	-	1.38	22.77	0.05	4.68	106.56
	120	10.08	9.12	8.62	5	8.62	2.30	3.30	BH100	10.84	5.48	-	-	1.46	24.06	0.05	4.68	112.59
	121.87	10.04	9.12	8.62	1.87	8.62	2.30	3.30	BH100	10.84	5.48			1.42	8.76	0.05	4.68	40.98
Total													***Total ASS volume***		***493.58***	***Total lime required***		***2091.72***

Table I-5 Acid Sulfate Soil Calculations WP4 Drainage North

Start Node	Start node	Existing terrain at start node pit location (U/S)	Invert (Start)	U/S max excavation (Start)	Stop node	Existing terrain at start node pit location (D/S)	Invert stop	D/S max excavation (Stop)	Diameter	Length	Max excavation depth U/S	Max excavation depth D/S	Related BH	ASS depth start	ASS depth end	ASS band thickness	Intercepts ASS band? U/S	Intercepts ASS band? D/S	Thickness of ASS (U/S)	Thickness of ASS (D/S)	Minumum thickness	Maximum thickness	ASS volume insitu	Net acidity - ANC	Liming rate includes bulking factor (DWER online calculator)	Lime required
	Units	RL mAHD	RL mAHD	RL mAHD		RL mAHD	RL mAHD		mm	m	m	m		RL mAHD	RL mAHD	m			m	m	m	m	m^3	%S	kgCaCO3	kg/m3
P-4MCS4-D2	4MCS4-D2	17.635	15.104	14.854	4MCS4-D3	17.638	15.08	14.83	450	8.237	2.781	2.808	BH22	16.75	16.25	0.5	Yes	Yes	0.5	0.5	0.5	0.5	4.1	0.05	4.67	19
P-4MCN4-D7	4MCN4-D7	16.913	15.306	15.056	4MCS4-D2-C1	17.119	15.265	15.015	450	14.537	1.857	2.104	BH22	16.75	16.25	0.5	Yes	Yes	0.5	0.5	0.5	0.5	7.3	0.05	4.67	34
P-4MCS4-D2-C1	4MCS4-D2-C1	17.119	15.215	14.965	4MCS4-D2	17.635	15.154	14.904	450	22.214	2.154	2.731	BH22	16.75	16.25	0.5	Yes	Yes	0.5	0.5	0.5	0.5	11.1	0.05	4.67	52
P-4MCS4-D3	4MCS4-D3	17.638	15.03	14.78	4MCS4-D4	17.478	14.981	14.731	450	17.805	2.858	2.747	BH22	16.75	16.25	0.5	Yes	Yes	0.5	0.5	0.5	0.5	8.9	0.05	4.67	42
P-4MCS4-D1	4MCS4-D1	17.981	16.75	16.5	4MCS4-D2	17.635	16.404	16.154	300	38.959	1.481	1.481	BH22	16.75	16.25	0.5	Yes	Yes	0.25	0.5	0.25	0.5	19.5	0.05	4.67	91
P-B20-Out	B20-Out	16	14.903	14.653	4MCN4-H3	15.817	14.72	14.47	450	10.283	1.347	1.347	BH139	15.27	12.77	2.5	Yes	Yes	0.617	0.8	0.617	0.8	8.2	0.04	3.73	31
P-B21-Out	B21-Out	16.585	15.16	14.91	B20-In	16.233	15	14.75	450	60.965	1.675	1.483	BH139	15.27	12.77	2.5	Yes	Yes	0.36	0.52	0.36	0.52	31.7	0.04	3.73	118
P-4MCN4-D7-C1	4MCN4-D7-C1	16.372	15.399	15.149	4MCN4-D7	16.913	15.356	15.106	450	15.077	1.223	1.807	BH22	16.75	16.25	0.5	Yes	Yes	0.5	0.5	0.5	0.5	7.5	0.05	4.67	35
P-B18-Out1	B18-Out1	10	8.85	8.6	B18-Out2	10.425	8.6	8.35	450	8.964	1.4	2.075	BH100	10.84	5.84	5	Yes	Yes	2.24	2.49	2.24	2.49	22.3	0.05	4.67	104
P-4MCS4-E13	4MCS4-E13	12.482	10.901	10.651	4MCS4-E14	12.388	10.836	10.586	525	12.08	1.831	1.802	BH100	10.84	5.84	5	Yes	Yes	0.189	0.254	0.189	0.254	3.1	0.05	4.67	14
P-4MCS4-E14	4MCS4-E14	12.388	10.786	10.536	4MCS4-E15	12.295	10.727	10.477	600	11.996	1.852	1.818	BH100	10.84	5.84	5	Yes	Yes	0.304	0.363	0.304	0.363	4.4	0.05	4.67	20
P-4MCS4-E15	4MCS4-E15	12.295	10.677	10.427	4MCS4-E15-MH	12.36	10.639	10.389	600	7.347	1.868	1.971	BH100	10.84	5.84	5	Yes	Yes	0.413	0.451	0.413	0.451	3.3	0.05	4.67	15
P-4MCS4-E16	4MCS4-E16	12.33	10.528	10.278	4MCS4-E17	12.249	10.453	10.203	600	15.221	2.052	2.046	BH100	10.84	5.84	5	Yes	Yes	0.562	0.637	0.562	0.637	9.7	0.05	4.67	45
P-4MCN4-E18	4MCN4-E17	12.735	9.432	9.182	GPT 1	12.744	9.423	9.173	600	2.478	3.553	3.571	BH100	10.84	5.84	5	Yes	Yes	1.658	1.667	1.658	1.667	4.1	0.05	4.67	19
P-HTC 1	HTC 1	12.756	9.415	9.165	4MCN4-E-OUT2	10.977	9.395	9.145	600	8.844	3.591	1.832	BH100	10.84	5.84	5	Yes	Yes	1.675	1.695	1.675	1.695	15.0	0.05	4.67	70
P-4MCS4-E15-MH	4MCS4-E15-MH	12.36	10.589	10.339	4MCS4-E16	12.33	10.578	10.328	600	1.232	2.021	2.002	BH100	10.84	5.84	5	Yes	Yes	0.501	0.512	0.501	0.512	0.6	0.05	4.67	3
P-GPT 1	GPT 1	12.744	9.423	9.173	HTC 1	12.756	9.415	9.165	600	2.871	3.571	3.591	BH100	10.84	5.84	5	Yes	Yes	1.667	1.675	1.667	1.675	4.8	0.05	4.67	22
P-4MCS4-E17	4MCS4-E17	12.249	10.403	10.153	4MCS4-E18	12.2	10.329	10.079	675	15.118	2.096	2.121	BH100	10.84	5.84	5	Yes	Yes	0.687	0.761	0.687	0.761	11.5	0.05	4.67	54
P-4MCS4-E18	4MCS4-E18	12.2	10.279	10.029	4MCS4-E19	12.184	10.204	9.954	675	15.102	2.171	2.23	BH100	10.84	5.84	5	Yes	Yes	0.811	0.886	0.811	0.886	13.4	0.05	4.67	62
P-4MCS4-E19	4MCS4-E19	12.184	10.154	9.904	4MCS4-E20	12.194	10.098	9.848	675	11.048	2.28	2.346	BH100	10.84	5.84	5	Yes	Yes	0.936	0.992	0.936	0.992	11.0	0.05	4.67	51
P-4MCS4-E20	4MCS4-E20	12.194	10.048	9.798	4MCS4-E21	12.222	9.993	9.743	675	10.692	2.396	2.479	BH100	10.84	5.84	5	Yes	Yes	1.042	1.097	1.042	1.097	11.7	0.05	4.67	55
P-4MCN4-E11	4MCN4-E11	12.618	10.965	10.715	4MCN4-E12	12.062	10.484	10.234	750	94.628	1.903	1.828	BH06	10.63	9.38	1.25	No	Yes	-0.085	0.396	-0.085	0.396	37.5	0.03	4.67	175
P-4MCS4-E21	4MCS4-E21	12.222	9.943	9.693	4MCN4-E16	11.42	9.8	9.55	750	24.242	2.529	1.87	BH100	10.84	5.84	5	Yes	Yes	1.147	1.29	1.147	1.29	31.3	0.05	4.67	146
P-4MCN4-E15	4MCN4-E15	11.419	9.612	9.362	4MCN4-E16	11.42	9.588	9.338	900	4.124	2.057	2.082	BH100	10.84	5.84	5	Yes	Yes	1.478	1.502	1.478	1.502	6.2	0.05	4.67	29
P-4MCN4-E12	4MCN4-E12	12.062	10.411	10.161	4MCN4-E13	11.799	10.148	9.898	900	43.632	1.901	1.901	BH100	10.84	5.84	5	Yes	Yes	0.679	0.942	0.679	0.942	41.1	0.05	4.67	192
P-4MCN4-E13	4MCN4-E13	11.799	10.098	9.848	4MCN4-E14	11.545	9.894	9.644	900	42.881	1.951	1.901	BH100	10.84	5.84	5	Yes	Yes	0.992	1.196	0.992	1.196	51.3	0.05	4.67	240
P-4MCN4-E14	4MCN4-E14	11.545	9.844	9.594	4MCN4-E15	11.419	9.662	9.412	900	43.623	1.951	2.007	BH100	10.84	5.84	5	Yes	Yes	1.246	1.428	1.246	1.428	62.3	0.05	4.67	291
P-4MCN4-E16	4MCN4-E16	11.42	9.499	9.249	4MCN4-E17	12.735	9.432	9.182	1200	29.26	2.171	3.553	BH100	10.84	5.84	5	Yes	Yes	1.591	1.658	1.591	1.658	48.5	0.05	4.67	227
P-4MCN4-E18-2	4MCN4-E17	12.735	9.7	9.45	4MCN4-E-OUT1	12.144	9.4	9.15	1200	13.936	3.285	2.994	BH100	10.84	5.84	5	Yes	Yes	1.39	1.69	1.39	1.69	23.6	0.05	4.67	110
P-LP-	LP-	9.5	8.742	8.492	B18-Out2	10.425	8.545	8.295	225	78.741	1.008	2.13	BH100	10.84	5.84	5	Yes	Yes	2.348	2.545	2.348	2.545	200.4	0.05	4.67	936
																						Total	**715.3**	**Total Lime Required**		**3,303**

Table I-6 Acid Sulfate Soil Calculations WP4 Drainage South

Start node	Existing terrain RL at start node pit location (U/S)	Invert (Start)	U/S max excavation (Start)	Stop node	Existing terrain RL at stop node pit location	Invert (Stop)	D/S max excavation (Stop)	Diameter	Length	Max excavation depth U/S	Max excavation depth D/S	Related BH	Ass depth start	ASS depth end	ASS band thickness	Intercepts ASS band? U/S	Intercepts ASS band? D/S	Thickness of ASS (U/S)	Thickness of ASS (D/S)	Minimum thickness	Maximum thickness	ASS volume insitu	Net acidity - ANC	Liming rate includes bulking factor (DWER online calculator)	Lime required
Units	RL mAHD	RL mAHD	RL mAHD		RL mAHD	RL mAHD	RL mAHD	mm	m	m	m		RL mAHD	RL mAHD	m	Yes/No	Yes/No	m	m	m	m	m3	%S	kgCaCO3	kg/m^3
4MC51-B17	19.403	17.728	17.478	4MC51-B18-OUTFALL-B16	17.341	16.847	16.597	450	21.909	1.93	0.74	BH22	16.75	16.25	0.5	No	Yes	-0.73	0.15	-0.73	0.15	3.4	0.05	4.67	16
4MCS4-A4	31.523	29.87	29.62	4MCS4-A5-OUTFALL-B9	30.32	29.5	29.25	525	9.469	1.90	1.07	BH112	30.08	27.33	2.75	Yes	Yes	0.46	0.83	0.46	0.83	7.9	0.06	5.60	44
4MCS4-A3	31.971	30.37	30.12	4MCS4-A4	31.523	29.87	29.62	525	64.733	1.85	1.90	BH112	30.08	27.33	2.75	No	Yes	-0.04	0.46	-0.04	0.46	29.8	0.06	5.60	167
4MCS4-B1	31.09	29.511	29.261	4MCS4-B2-OUT	30.284	29.408	29.158	300	9.294	1.83	1.13	BH112	30.08	27.33	2.75	Yes	Yes	0.82	0.92	0.82	0.92	8.6	0.06	5.60	48
																					Total	**49.6**		**Total**	**274**

APPENDIX J – %RPD CALCULATIONS

J -1 QA/QC Results

Table J-1: QA/QC Results
Soil - Relative Percentage Differences

	Field ID	BH94_A_1.5	SQC008_A		BH29_A_1.0	SQC009_A		BH31_A_0.5	SQC011_A		BH147_A_1.5	SQC012_A		BH32_A_1.0	SQC013_A	
	Date	16/08/2021	16/08/2021		16/08/2021	16/08/2021		16/08/2021	16/08/2021		17/08/2021	17/08/2021		17/08/2021	17/08/2021	
	Lab Report Number	EP2109376	EP2109376		EP2109376	EP2109376		EP2109377	EP2109377		EP2109375	EP2109375		EP2109375	EP2109375	
	Matrix Type	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD
Analyte	**Unit**	**EQL**														
Acid Neutralising Capacity																
Acid Neutralising Capacity	%CaCO3	0.01	0.29	0.22	27	-	-	-	0.54	0.68	23	-	0.29	-	0.37	0.17	74
ANCBT	mole H+/t	10	59	44	29	-	-	-	107	136	24	-	58	-	73	34	73
sulfidic-Acid Neutral	%S	0.01	0.09	0.07	25	-	-	-	0.17	0.22	26	-	0.09	-	0.12	0.05	82
Actual Acidity																
pH (KCl)	pH Unit	0.1	7.6	6.6	14	6.4	6.1	5	9.1	8.3	9	6.5	8.4	26	9.1	6.8	29
sulfidic - Titratable Actual Acidity	%S	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Titratable Actual Acidity	mole H+/t	2	<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0
Potential Acidity																
Chromium Reducible Sulfur	%S	0.005	<0.005	<0.005	0	<0.005	<0.005	0	0.005	<0.005	0	<0.005	0.005	0	<0.005	<0.005	0
Chromium Reducible Sulphur	mole H+/t	10	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0
Acid Base Accounting																
a-Net Acidity without ANCE	moles H+/t	10	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0
Net Acidity excluding ANC (sulfur units)	%S	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
ANC Fineness Factor	-	0.5	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0
Liming Rate	kg CaCO3/t	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Liming rate without ANCE	kg CaCO3/t	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Net Acidity (acidity units)	mole H+ / t	10	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0
Net Acidity (sulfur units)	%S	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Historical																
Reaction Rate	Units	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0
NA																
pH (F)	pH Unit	0.1	7.9	6.7	16	7.8	7.0	11	8.0	7.5	6	7.8	7.8	0	8.4	8.1	4

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 81 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table J-1: QA/QC Results
Soil - Relative Percentage Differences

		BH16_A_4.5	SQC018_A		BH17_A_0.5	SQC019_A		BH18_A_0.5	SQC020_A		BH18_A_1.0	SQC021_A		BH19_A_0.5	SQC022_A		BH19_A_1.0	SQC023_A	
		2/09/2021	2/09/2021		2/09/2021	2/09/2021		2/09/2021	2/09/2021		2/09/2021	2/09/2021		2/09/2021	2/09/2021		2/09/2021	2/09/2021	
		EP2110216	EP2110216		EP2110218	EP2110218		EP2110219	EP2110219		EP2110219	EP2110219		EP2110220	EP2110220		EP2110220	EP2110220	
		Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD
Analyte	**Unit**																		
Acid Neutralising Capacity																			
Acid Neutralising Capacity	%CaCO3	-	-	-	5.18	0.80	146	0.07	-	-	-	-	-	7.29	7.28	0	1.84	2.43	28
ANCBT	mole H+/t	-	-	-	1,040	159	147	15	-	-	-	-	-	1,460	1,450	1	368	486	28
sulfidic-Acid Neutral	%S	-	-	-	1.66	0.26	146	0.02	-	-	-	-	-	2.33	2.33	0	0.59	0.78	28
Actual Acidity																			
pH (KCl)	pH Unit	5.1	5.0	2	9.0	8.9	1	6.6	6.4	3	6.3	6.1	3	9.3	9.3	0	9.5	9.6	1
sulfidic - Titratable Actual Acidity	%S	0.02	0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Titratable Actual Acidity	mole H+/t	14	14	0	<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0
Potential Acidity																			
Chromium Reducible Sulfur	%S	0.005	0.005	0	<0.005	0.005	0	<0.005	<0.005	0	<0.005	<0.005	0	<0.005	0.005	0	<0.005	<0.005	0
Chromium Reducible Sulphur	mole H+/t	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0
Acid Base Accounting																			
a-Net Acidity without ANCE	moles H+/t	17	17	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0
Net Acidity excluding ANC (sulfur units)	%S	0.03	0.03	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
ANC Fineness Factor	-	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0
Liming Rate	kg CaCO3/t	1	1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Liming rate without ANCE	kg CaCO3/t	1	1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Net Acidity (acidity units)	mole H+ / t	17	17	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0
Net Acidity (sulfur units)	%S	0.03	0.03	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Historical																			
Reaction Rate	Units	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0
NA																			
pH (F)	pH Unit	6.9	6.1	12	8.1	7.6	6	7.6	7.5	1	7.4	6.6	11	8.6	8.1	6	9.0	8.4	7

**RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 81 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table J-1: QA/QC Results
Soil - Relative Percentage Differences

		BH27_A_0.5	SQC030_A		BH95_A_0.5	SQC031_A		BH112_A_0.5	SQC032_A		BH08_A_0.5	SQC033_A		BH99_A_0.5	SQC034_A		BH100_A_0.5	SQC035_A	
		3/09/2021	15/09/2021		13/09/2021	13/09/2021		13/09/2021	13/09/2021		13/09/2021	13/09/2021		13/09/2021	13/09/2021		14/09/2021	14/09/2021	
		EP2110345	EP2110870-AB		EP2110726	EP2110726		EP2110726	EP2110726		EP2110727	EP2110727		EP2110727	EP2110727		EP2110806	EP2110806	
		Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD
Analyte	**Unit**																		
Acid Neutralising Capacity																			
Acid Neutralising Capacity	%CaCO3	-	1.59	-	0.15	0.15	0	-	-	-	-	-	-	-	-	-	-	-	-
ANCBT	mole H+/t	-	318	-	29	29	0	-	-	-	-	-	-	-	-	-	-	-	-
sulfidic-Acid Neutral	%S	-	0.51	-	0.05	0.05	0	-	-	-	-	-	-	-	-	-	-	-	-
Actual Acidity																			
pH (KCl)	pH Unit	5.7	9.0	45	6.6	6.8	3	6.2	6.4	3	6.4	6.3	2	6.0	5.8	3	5.2	5.3	2
sulfidic - Titratable Actual Acidity	%S	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	0.03	0.02	40
Titratable Actual Acidity	mole H+/t	<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0	4	5	22	21	14	40
Potential Acidity																			
Chromium Reducible Sulfur	%S	<0.005	0.008	46	<0.005	<0.005	0	<0.005	<0.005	0	0.005	<0.005	0	0.005	<0.005	0	<0.005	<0.005	0
Chromium Reducible Sulphur	mole H+/t	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0
Acid Base Accounting																			
a-Net Acidity without ANCE	moles H+/t	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	22	16	32
Net Acidity excluding ANC (sulfur units)	%S	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	0.04	0.03	29
ANC Fineness Factor	-	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0
Liming Rate	kg CaCO3/t	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	1	<1	0	2	1	67
Liming rate without ANCE	kg CaCO3/t	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	1	<1	0	2	1	67
Net Acidity (acidity units)	mole H+ / t	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	22	16	32
Net Acidity (sulfur units)	%S	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	0.04	0.03	29
Historical																			
Reaction Rate	Units	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0
NA																			
pH (F)	pH Unit	5.6	8.2	38	6.0	6.2	3	7.2	6.1	17	7.2	6.9	4	7.2	6.9	4	6.5	6.7	3

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 81 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table J-1: QA/QC Results
Soil - Relative Percentage Differences

		BH09_A_0.5	SQC036_A		BH105_A_0.5	SQC037_A		BH15_A_0.5	SQC042_A		BH14_A_0.5	SQC043_A		BH12_A_0.0	SQC044_A		BH96_A_0.0	SQC045_A	
		14/09/2021	14/09/2021		14/09/2021	14/09/2021		15/09/2021	15/09/2021		15/09/2021	15/09/2021		18/10/2021	18/10/2021		18/10/2021	18/10/2021	
		EP2110806	EP2110806		EP2110809	EP2110809		EP2110869	EP2110869		EP2110870-AA	EP2110870-AA		EP2112538	EP2112538		EP2112543	EP2112538	
Analyte	Unit	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD
Acid Neutralising Capacity																			
Acid Neutralising Capacity	%CaCO3	0.25	0.35	33	9.27	8.47	9	22.7	28.9	24	0.50	0.25	67	-	-	-	-	-	-
ANCBT	mole H+/t	49	69	34	1,850	1,690	9	4,540	5,770	24	100	50	67	-	-	-	-	-	-
sulfidic-Acid Neutral	%S	0.08	0.11	32	2.97	2.71	9	7.27	9.25	24	0.16	0.08	67	-	-	-	-	-	-
Actual Acidity																			
pH (KCl)	pH Unit	7.5	8.3	10	9.1	9.0	1	9.5	9.3	2	7.4	7.6	3	5.0	5.2	4	5.1	4.9	4
sulfidic - Titratable Actual Acidity	%S	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	0.07	0.04	55	0.16	0.13	21
Titratable Actual Acidity	mole H+/t	<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0	43	22	65	101	83	20
Potential Acidity																			
Chromium Reducible Sulfur	%S	<0.005	<0.005	0	<0.005	<0.005	0	0.006	<0.005	18	0.006	<0.005	18	<0.005	<0.005	0	0.007	0.005	33
Chromium Reducible Sulphur	mole H+/t	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0
Acid Base Accounting																			
a-Net Acidity without ANCE	moles H+/t	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	45	25	57	105	86	20
Net Acidity excluding ANC (sulfur units)	%S	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	0.07	0.04	55	0.17	0.14	19
ANC Fineness Factor	-	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0
Liming Rate	kg CaCO3/t	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	3	2	40	8	6	29
Liming rate without ANCE	kg CaCO3/t	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	3	2	40	8	6	29
Net Acidity (acidity units)	mole H+ / t	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	45	25	57	105	86	20
Net Acidity (sulfur units)	%S	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	0.07	0.04	55	0.17	0.14	19
Historical																			
Reaction Rate	Units	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0
NA																			
pH (F)	pH Unit	7.5	7.6	1	8.5	8.5	0	8.9	7.8	13	7.1	7.1	0	5.4	5.3	2	5.7	5.8	2

**RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 81 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table J-1: QA/QC Results
Soil - Relative Percentage Differences

		BH98_A_0.0	SQC046_A		BH139_A_0.0	SQC047_A		BH11_A_0.0	SQC051_A		BH104_A_0.0	SQC052_A	
		18/10/2021	18/10/2021		19/10/2021	19/10/2021		19/10/2021	19/10/2021		19/10/2021	19/10/2021	
		EP2112543	EP2112543		EP2112530	EP2112530		EP2112529	EP2112530		EP2112529	EP2112529	
		Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD
Analyte	**Unit**												
Acid Neutralising Capacity													
Acid Neutralising Capacity	%CaCO3	-	-	-	6.30	-	-	0.70	-	-	0.15	0.07	73
ANCBT	mole H+/t	-	-	-	1,260	-	-	140	-	-	30	15	67
sulfidic-Acid Neutral	%S	-	-	-	2.02	-	-	0.23	-	-	0.05	0.02	86
Actual Acidity													
pH (KCl)	pH Unit	5.3	5.2	2	9.2	6.4	36	8.0	6.2	25	6.7	6.7	0
sulfidic - Titratable Actual Acidity	%S	0.12	0.10	18	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Titratable Actual Acidity	mole H+/t	76	64	17	<2	2	0	<2	6	100	<2	<2	0
Potential Acidity													
Chromium Reducible Sulfur	%S	0.009	0.006	40	0.009	0.005	57	<0.005	0.006	18	<0.005	<0.005	0
Chromium Reducible Sulphur	mole H+/t	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0
Acid Base Accounting													
a-Net Acidity without ANCE	moles H+/t	81	68	17	<10	<10	0	<10	10	0	<10	<10	0
Net Acidity excluding ANC (sulfur units)	%S	0.13	0.11	17	<0.02	<0.02	0	<0.02	0.02	0	<0.02	<0.02	0
ANC Fineness Factor	-	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0
Liming Rate	kg CaCO3/t	6	5	18	<1	<1	0	<1	1	0	<1	<1	0
Liming rate without ANCE	kg CaCO3/t	6	5	18	<1	<1	0	<1	1	0	<1	<1	0
Net Acidity (acidity units)	mole H+ / t	81	68	17	<10	<10	0	<10	10	0	<10	<10	0
Net Acidity (sulfur units)	%S	0.13	0.11	17	<0.02	<0.02	0	<0.02	0.02	0	<0.02	<0.02	0
Historical													
Reaction Rate	Units	1	1	0	1	1	0	1	1	0	1	1	0
NA													
pH (F)	pH Unit	6.0	6.3	5	7.9	5.8	31	7.4	6.3	16	6.9	7.0	1

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 81 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory


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