

Causeway Bridge Acid Sulfate Soils Management Plan Causeway Link Alliance

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Control Page

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REV.	DATE	SECTION	DESCRIPTION
0	05/09/2022	All	Issued for Approval

	NAME	TITLE	SIGNATURE	DATE
PREPARED BY	Danielle Pukeroa	Alliance HSE Manager		21-07-22
REVIEWED BY	Michelle Rhodes	Alliance Environmental & Sustainability Manager		21-07-22
APPROVED BY	Peter Ricciardello	Alliance Project Director		21-07-22

Executive Summary

360 Environmental Pty Ltd (360 Environmental), part of SLR Consulting (SLR) was commissioned by the Causeway Link Alliance (CLA) to undertake an Acid Sulfate Soil (ASS) investigation for the proposed Causeway Pedestrian and Cyclist Bridge (CPCB) Project, herein referred to as 'the site' see Figure 1.

WSP Australia Pty Ltd (WSP) was commissioned by CLA to undertake a geotechnical investigation for the CPCB project and there was an opportunity to collect environmental samples as part of the geotechnical investigation to assess contamination and the acid sulfate soil (ASS) profile within the proposed CPCB construction footprint. This report presents the findings of the ASS investigation.

Soils

Overall, the data indicates that PASS with high %S is present across all locations, soil types and depths below the watertable. Given the relatively small volumes from the piling works, the contractors may consider it more economical and practical to transport soils off-site to an appropriately licensed treatment facility. These soils should be dispatched to the facility immediately where feasible. The nominated treatment facility should be consulted and provided with the required information, including analytical testing results, where available.

Where immediate transport of the soil is not possible, it will be necessary to stockpile the material on-site and treat it at the maximum liming rate of 253 kg Aglime/m³.

For other excavations within the site of soils from below the watertable, the application of Aglime should be at the maximum rate of 253 kg Aglime/m³.

For other excavations within the site of soils from above the watertable, the application of Aglime should be at the maximum rate of 38 kg Aglime/m³. This liming rate may need to be adjusted if stockpile validation monitoring results fail the criteria ($\text{pH}_{\text{FOX}} < 5$).

Stockpile management including the use of a limestone pad and monitoring requirements are provided in this ASSMP.

Groundwater

Groundwater laboratory analysis indicated generally low groundwater acidity and a high buffering capacity.

Dewatering may be required for the construction of infrastructure within the Bridge Work Area. Without appropriate management, dewatering activities may lead to the oxidation of PASS and/or unacceptable drawdown that may impact nearby receptors. The management strategies for groundwater dewatering detailed in the ASSMP should be adhered to. The Dewatering Management Level 2 monitoring requirements to be adopted during dewatering works is summarised in this ASSMP and provided Appendix D.

Closure Reporting

If dewatering is required, groundwater monitoring will be required at intervals of 1, 3 and 6 months, following dewatering. This monitoring should include at least one groundwater monitoring event taken at the time of seasonal groundwater highs.

Following the first months post dewatering monitoring, the groundwater and dewatering effluent water quality and water level monitoring results will be reported to DWER in an ASS Initial Closure Report for the project along with a discussion of any environmental impacts observed.

Following the six-month monitoring event, the results of the post-dewatering groundwater quality monitoring program will be reported to DER in a Final Post-Dewatering Monitoring Closure report.



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1. INTRODUCTION

360 Environmental Pty Ltd (360 Environmental), part of SLR Consulting (SLR) was commissioned by the Causeway Link Alliance (CLA) to undertake an acid sulfate Soil (ASS) investigation for the proposed Causeway Pedestrian and Cyclist Bridge (CPCB) Project, herein referred to as 'the site' see Figure 1.

WSP Australia Pty Ltd (WSP) was commissioned by CLA to undertake a geotechnical investigation for the CPCB project and there was an opportunity to collect environmental samples as part of the geotechnical investigation to assess contamination and the ASS profile within the proposed CPCB construction footprint. This report presents the findings of the ASS investigation.

1.1 Proposed Development

The CPCB project aims to provide a safer pedestrian option for crossing the causeway while promoting the areas natural and cultural significance. According to Senversa (2021), Main Roads Western Australia (MRWA) provided a consultant brief outlining the following design concept:

- Two cable stayed bridges with two piers in the McCallum Park bridge and one pier in the Point Fraser bridge
- 6.0 m wide separated path (3.5 m for cyclists; 2.5 m for pedestrians)
- The bridge design is to acknowledge the Aboriginal history and culture of Heirisson Island and the Swan River
- Increased navigational clearances for both structures in particular the Point Fraser structure i.e. the primary river navigational channel
- The proposed bridge alignment is located approximately 80 – 90 m downstream of the existing Causeway Traffic Bridge with the design minimising the impacts to trees on Point Fraser and Heirisson Island
- The proposed Bridge is to incorporate weathering steel.

To construct the concept described above, ground disturbance at the following locations would be required:

- Northern approach of CPCB at Point Fraser
- Southern approach of CPCB at McCallum Park
- Piers on Heirisson Island
- Piers in Swan River.

1.2 Objective

The overall objective of the investigation is to:

- Determine the ASS profile and groundwater quality at the proposed Geotechnical test locations to inform requirements for the management of excavated soils during the construction phase of the CPCB Project.

1.3 Scope of Work

The following scope of work was completed to meet the stated project objective:

- Advancement of eight boreholes using mud rotary drilling to a maximum depth of 39.5 metres below ground level (mbgl) (BH01 to BH08).
- As the geotechnical investigation required undisturbed samples to be collected for logging and interpretation purposes, environmental samples could only be collected

where Standard Penetration Tests (SPTs) were undertaken at discreet intervals down the soil profile within each borehole.

- Advancement of two boreholes at proposed test pit locations T01 and T02 that were not completed as part of the geotechnical investigation, using a hand auger to a maximum depth of 1.0 m mbgl to optimise spatial coverage of the site.
- Submission of 32 primary soil samples to a National Association of Testing Authorities (NATA) accredited laboratory for analysis of the chromium reduceable sulfur (CRS) suite.
- Sampling of four existing groundwater monitoring wells (BH02, BH05, BH07 and BH14) that were installed as part of the phase 1 geotechnical investigation (WSP 2022).
- Submission of four primary groundwater samples to a National Association of Testing Authorities (NATA) accredited laboratory for key ASS parameters (pH, total Acidity, total alkalinity, sulfate, chloride, dissolved aluminium).
- Preparation of this ASSMP report detailing the results of the investigation and providing liming rates for excavated and management methods for soil and groundwater during excavations.

2. SITE INFORMATION

2.1 Site Identification

Key Site Information is summarised in Table 1. The site location is presented in Figure 1 and other site features including surrounding land uses are presented in Figure 2.

Table 1 Site Identification

Site Identification			
Current owner	Lot 305 on Deposited Plan 47251 – City of Perth Lot 5268 on Deposited Plan 213977 – City of Perth Lot 502 on Deposited Plan 412328 – Town of Victoria Park		
Primary address	Causeway, East Perth		
Property details	Lot 305 on Deposited Plan 47251 Lot 5268 on Deposited Plan 213977 Lot 502 on Deposited Plan 412328		
Centre coordinates of gateway area [Geographic Datum Australia (GDA 1994 MGA Zone 51)]		Easting	Northing
	Western Boundary (1)	394140	6463070
	Southern Boundary (2)	394201	6462979
	Southern Boundary (3)	394273	6462874
	Southern Boundary (4)	394436	6462828
	Southern Boundary (5)	394491	6462698
	Southern Boundary (6)	394635	6462651
	Eastern Boundary (7)	394841	6462468
	Northern Boundary (8)	394749	6462610
	Northern Boundary (9)	394553	6462759
	Northern Boundary (10)	394479	6462842
	Northern Boundary (11)	394247	6463043
Total site area	2.75 hectares		

Site Identification	
Current and future land use	Public Open Space
Contaminated sites status	<p>Heirisson Island was classified as ‘Possibly Contaminated - Investigation Required’ (PCIR) on 28 April 2010 due to historical landfilling on Heirisson Island however no specific information was available regarding the period across which landfilling occurred nor the type of waste disposed at the island</p> <p>Lot 502 on Deposited Plan 73841 (Waterbank Site) was classified on 30 July 2014 as Remediated for Restricted use due to the presence of uncontrolled fill containing elevated concentrations of metals, hydrocarbons and fragments of asbestos containing material.</p>

2.2 Surrounding Land Uses

The following surrounding land uses were identified in the Preliminary Detailed Site Investigation (PSI) (Senversa 2021):

- North – immediately north of the proposed bridge footprint is the Waterbank Development. Further north is the Western Australian Police Complex and the Western Australian Cricket Association (WACA). Trinity College is located to the northeast of the proposed site.
- Northeast – the existing causeway bridge is located immediately northeast of the proposed site and beyond the causeway is Heirisson island.
- East and West – the Swan River borders the proposed bridge footprint to the northwest and southeast.
- South – Canning Highway is located immediately south of the proposed site. Urban residential and commercial dwellings are located further to the south. McCallum Park is located to the southwest.

The PSI (Senversa, 2021) suggests that of the above-mentioned land uses, no potentially contaminating activities were identified however, it is reasonable to suspect some form of land reclamation is associated with the banks of the Swan River.

2.3 Environmental Setting

Information from a range of sources, including the PSI (Senversa, 2021), publicly available information and data bases were reviewed to develop the environmental setting. Establishing the environmental setting helps in understanding the potential contaminant migration pathways and the sensitivity of the receptors.

Topography

The Landgate map Viewer Plus (accessed on 24 August 2022) indicates that the topography of the site is relatively flat, and elevations range from 0 m to 5 m Australian height Datum (mAHD). The highest point is located southeast of McCallum Park towards Great Eastern Highway.

Geology

The site is located on the Swan Coastal Plain which is made up of sedimentary materials that originated as a result of river, wind and marine activity (Senversa 2021). The 1:50,000 geology maps for Perth identify the foreshore area of the site as comprising Swan River Alluvial (SRA) deposits consisting of clays, silty sand, and sands, with underlying Cenozoic aged eolian and alluvial.

According to the City of Perth (2008), Heirisson Island was originally a group of small swampy islands on a shallow portion of the Swan River and due to infilling have become Heirisson Island in

its current state. The proposed construction footprint comprises reclaimed land created using uncontrolled fill in the 1950s (Senversa 2021).

Hydrology

The Swan River runs through the metropolitan area and is one of Perth's major surface water supplies, forming part of the Swan-Canning catchment. For the past 100 years since the establishment of European settlement the banks of the Swan River have been modified from dredging. (Appleyard & Manford, 1979). The water quality of the Swan River varies from fresh-brackish during winter and spring months with saltier conditions observed during the summer and autumn months (Senversa 2021). According to Senversa 2021 some lakes on Heirisson Island are understood to be directly connected to the Swan River. Where this is not the case it is likely that the lakes water levels represent the iso potential levels of the groundwater system connected to the lake (Senversa 2021).

Hydrogeology

Regional Hydrogeology

The DWER water register (DWER 2022a) indicates that groundwater is present in the unconfined Perth Superficial Aquifer which is bounded to the east by Gin Gin and the Darling Scarp and to the west by the Indian ocean shoreline. According to DWER, 2010 a regional water table is present within the aquifer and two major water bodies including the Gnangara Groundwater mound to the north and the Jandakot mound to the south. The depth of the superficial aquifer ranges from surface up to 50 m deep across the Swan coastal plain. On the basis of topography, geology and the discharge boundaries formed by the rivers and ocean the superficial aquifer of the Perth region has been divided into discrete hydrogeological areas (DWER 2010). The Perth Groundwater Atlas (DWER, 2022) indicates that groundwater underlying the southern portion of the site flows in a northwest direction towards the river while the northwest portion of the site flows in a southeast direction with groundwater discharging into the Swan River.

Local hydrogeology

The Perth Groundwater Atlas (DWER, 2022a) indicates that groundwater levels range from 0 mAHD at Heirisson Island and gradually rises to 1.0 mbgl mAHD towards Point Fraser (in the northwest portion of the site) and 2.0 mAHD towards Great Eastern Highway in the southeast portion of the site. Groundwater across the site will most likely be affected by the tides associated with the Swan River.

Groundwater Quality

The majority of Perth's groundwater extraction occurs from the Gnangara Mound and the Jandakot superficial aquifer. The Perth Groundwater Atlas (DWER, 2022a) indicates that conditions are marginal with the northwest portion of the site at Point Fraser reporting salinity between 500 mg/L to 1,000 mg/L, and becoming brackish towards McCallum Park with salinity found to be 1,500 mg/L. The former Department of Water (2010) states that water extracted from Perth's superficial aquifer (Gnangara and Jandakot) is generally used for urban supply as well as individual supply, including for use in agriculture, public parks, and gardens.

Vegetation

The Department of Primary Industry and Regional Development (DPIRD) (DPIRD, 2022) vegetation mapping shows that Heirisson Island is scattered with remnant vegetation. According to the Department of Biodiversity, Conservation and Attractions (DBCA) (DBCA, 2021) the vegetation is a closed scrub fringing woodland and open forest.

Wetlands and Sensitive Ecosystems

The PSI (2021) found that no Ramsar listed wetlands are onsite or within 500 m radius. There are also no geomorphic wetlands within the site boundary however, the following are located within a 500 m radius of the site boundary:

- The Swan River
- Three artificial lakes on Heirisson Island.

Groundwater Dependent Ecosystems (GDEs) are present within 500m of the site boundary including:

- Swan River – high potential GDE
- 44 terrestrial GDEs ranging from low to high potential GDEs with majority of these located on Heirisson Island.

Acid Sulfate Soils

DWER's ASS Risk Map indicates that majority of the site and its surrounds has a high to moderate risk of ASS occurrence in the top 3 m of natural soil surface, except for the northern portion of the site with areas of East Perth identified as having no known risk of ASS (Senversa 2021).

2.4 Proposed Construction Activities

The following earthworks are proposed within the Bridge Work Area:

- Site establishment works
- Topsoil stripping, clearing, and grubbing
- Utility services protection / relocation
- Ground improvement: Controlled Modulus Columns (CMC), Perforated Vertical Drains (PVD)
- Embankment construction (fill)
- Excavation for structural works (concrete piles, pile caps)
- Landscaping including drainage

3. ASS ASSESSMENT CRITERIA

3.1 Guidance Documents

The CLA is responsible for identifying and obtaining the approvals, licenses and permits required delivering the Causeway Pedestrian and Cyclist Bridge Works. This ASSP has been prepared in consideration of the following guidelines and guidance documents.

- *Department of Environment Regulation (DER) (2015a) Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes*
- *DER (2015b). Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes.*
- *DWER (2019) Landfill Waste Classification and Waste Definitions (as amended December 2019)*
- *Contaminated Sites Act 2003*
- *Department of Water and Environmental Regulation (DWER) (2021) Assessment and management of contaminated sites*
- *National Environment Protection Council (NEPC) (2013) National Environment Protection (Assessment of Site Contamination) Amendment Measure (NEPM),*

Schedule B(1) – Guideline on Investigation Levels for Soil and Groundwater Contamination

3.2 Soils Assessment Criteria

ASS soil assessment criteria for excavated soils are detailed in Table 2. Field testing was not undertaken for this investigation, however future investigations may use field tests to screen samples for PASS.

Table 2: Acid Sulfate Soil Assessment Criteria

Criteria	Source	Description, Use and Application
Field Assessment Criteria	DER (2015a)	<p>The presence of AASS or PASS are generally indicated as follows:</p> <ul style="list-style-type: none"> • $pH_F < 4$ is indicative of AASS • pH_F of 4 to 5.5 is an acid soil and may be indicative of an AASS presence • $pH_{FOX} < 3$ combined with a significant reaction is indicative of PASS • A large pH_F to pH_{FOX} drop (i.e. > 3) is indicative of PASS. <p>Other indicators such as presence/absence of fill, jarosite, coffee rock, black ooze is used to aid in the interpretation of field results.</p>
Action Criteria		<p>For disturbances of <1000 tonnes, a net acidity action criterion of 0.06 %S is applicable for clays.</p> <p>For disturbances of >1000 tonnes, a net acidity action criterion of 0.03 %S is applicable for clays.</p> <p>For disturbances of all volumes, a net acidity action criterion of 0.03 %S is applicable for sands.</p>

3.3 Groundwater Assessment Criteria

Groundwater parameters that indicate ASS and their criteria are provided in DWER’s guidelines Treatment and management of soils and water in acid sulfate soil landscapes (DER 2015b). The criteria include:

- A pH of less than 5
- A soluble aluminium concentration greater than 1 mg/L
- An acidity:alkalinity ratio greater than 1
- A Cl:SO₄ ratio of less than 4.

Acidic water is defined as water with a pH of less than 6 where the total acidity exceeds the total alkalinity of the water. The buffering capacity of the groundwater, a function of its alkalinity, is described in Table 3.

Table 3: Alkalinity Classification (DER, 2015b)

Class	Designation	Alkalinity (mg/L)	pH	Description
1	Very high alkalinity	<180	> 6.5	Generally adequate to maintain acceptable pH level in the future.
2	High alkalinity	60-80	> 6.0	Generally adequate to maintain acceptable pH level in the future.
3	Moderate alkalinity	30-60	5.5 - 7.5	Inadequate to maintain stable, acceptable pH level in areas vulnerable to acidification.

Classes	Designation	Alkalinity (mg/L)	pH	Description
4	Low alkalinity	10-30	5.0 - 6.0	Inadequate to maintain stable, acceptable pH level.
5	Very low alkalinity	< 10	< 6.0	Unacceptable pH level under all circumstances.

4. ASS INVESTIGATION RESULTS

4.1 Site Specific Lithology

Soil lithological logs were undertaken by WSP however, where samples were taken 360 Environmental recorded the lithology. Table 4 presents the general lithology recorded at each borehole and test pit location.

Table 4 General Lithology of Boreholes/Test Pits

Borehole/Test Pit ID	General Lithology
BH01	SAND, fine to coarse grained, grey, brown. CLAY low to medium plasticity, dark grey.
BH02	Clayey SAND and CLAY, high plasticity, dark grey. SAND of fine to coarse grained, poorly graded and orange, brown in colour. Sandy CLAY at depths, low to medium plasticity and dark brown in colour.
BH03	No lithology description recorded.
BH04	Silty CLAY, dark grey or medium plasticity. SAND, fine to coarse grained and ranging in colours from yellow to brown and greys. Dark grey-black CLAY was observed at depth.
BH05	SAND, fine to coarse grained, dark grey in colour. CLAY, dark grey-black and mottled red of medium plasticity.
BH06	Clayey SAND orange-brown, medium to coarse grained. Silty CLAY of brown to grey colour. Silty SAND, fine to coarse grained and brown to grey in colour.
BH07	CLAY/ clayey SAND, low to high plasticity, yellow/brown, red mottled and grey. Sand of fine to coarse grain was observed at depths.
BH08	SAND of medium to coarse grain, ranging in colour from pale brown to brown, yellow and grey.

4.2 Sampling Locations

The sampling locations (Figure 2) chosen for ASS analysis are described in Table 5 along with their simplified lithology. At total of 30 samples from eight boreholes (BH01 to BH08) and test-pits (TP01, TP02) were laboratory tested using the CRS suite of analysis. Field notes are provided in Appendix B.

Table 5: Bore ID, Depth (mbgl) and Soil Type

Bore ID	Depth	Soil Type
BH01	2	SAND
	3.5	SAND
	5	SAND

Bore ID	Depth	Soil Type
BH02	3.5	Clayey SAND
	5	CLAY
	6.5	CLAY
	8	CLAY
BH03	3.5	SAND
	5	CLAY
	6.5	CLAY
BH04	2	SAND
	3.5	SAND
BH05	2	SAND
	6.5	Silty CLAY
BH06	2	Clayey SAND
	3.5	Sandy CLAY
	5	Sandy CLAY
BH07	6.5	CLAY
	14	CLAY
	20	CLAY
BH08	26	Clayey SAND
	30	SAND
	33.5	SAND
	39.5	SAND
TP01	0.5	SAND
	0.25	SAND
	1	SAND
TP02	0.5	SAND
	0.25	SAND
	1	SAND

4.3 Sample Analysis (CRS Suite)

A total of 30 samples underwent testing using the CRS suite of analysis. Laboratory documentation is provided in Appendix C.

Of these 30 samples, 18 samples from the 8 borehole locations (BH01 to BH08) had a Net Acidity excluding Acid Neutralising Capacity (Net Acidity excl. ANC) exceeding the DWER criteria of 0.03%S (DER, 2015). There were no exceedances from the test pit locations (TP01 and TP02). Table 6 presents the results.

Net acidity (excl ANC) was below the management criteria for all soils sampled above 2 mbgl (i.e. the water table) and will not require management during construction works.

Net acidity (excl ANC) values exceeding 2%S were recorded at varying depths below the water table and at locations on both sides of the Swan River and both sides of Heirrisson Island. As such, the high-risk ASS soils are not delineated by location, either laterally and vertically. Further net acidity

(excl ANC) exceeded the management criteria in all soil types encountered below the water table, with maximum concentrations reported as follows:

- SAND was present as PASS with a maximum concentration of 2.85 %S (3.5 mbgl)
- CLAY was present as PASS with a maximum concentration of 3.38 %S at 5 mbgl
- Silty/Sandy CLAY was present as PASS with a maximum concentration of 2.21 %S at 6.5 mbgl
- Clayey SAND was present as PASS with a maximum concentration of 2.85 %S at 26 mbgl.

All soils disturbed below 2 mbgl will require management during construction works

Table 6: Samples exceeding DWER criteria (Net Acidity exc. ANC > 0.03 %S)

Bore ID	Depth (mbgl)	Simplified Lithology	Net Acidity excluding ANC (%S)	Net Acidity excluding ANC (acidity units)	Liming Rate excluding ANC (kg CaCO ₃ / T)
BH01	2	SAND	0.14	86	6
	3.5	SAND	0.05	30	2
BH02	3.5	Clayey SAND	0.42	260	19
	5	CLAY	3.38	2110	158
	6.5	CLAY	1.93	1200	90
	8	CLAY	2.24	1400	105
BH03	3.5	SAND	2.85	1780	133
	5	CLAY	3.21	2000	150
	6.5	CLAY	2.24	1400	105
BH04	2	SAND	0.19	120	9
	3.5	SAND	0.07	42	3
BH05	6.5	Silty CLAY	2.21	1380	103
BH06	2	Clayey SAND	0.51	318	24
	5	Sandy CLAY	0.43	267	20
BH07	6.5	CLAY	0.89	556	42
	14	CLAY	0.06	35	3
	20	CLAY	2.4	1500	112
BH08	26	Clayey SAND	2.84	1770	133

Groundwater Results

Four (4) groundwater monitoring wells, BH02, BH05, BH07 and BH14 (Figure 3), were installed by WSP in July 2022. The groundwater monitoring wells were sampled on 1 August 2022.

Groundwater Field Parameters

Table 8 presents the field parameters for the groundwater monitoring event.

Table 8 Groundwater Monitoring Field Parameters

Parameter	Minimum	Maximum	Comment
Temperature °C	15.5 (BH02)	20.8 (BH07)	None
pH (pH units)	6.1 (BH05)	7.24 (BH14)	Indicating slightly acidic to neutral conditions
Dissolved oxygen (DO) (mg/L)	0.17 (BH14)	0.43 (BH02)	Indicating anaerobic conditions
Electrical Conductivity (EC) (µS/cm)	2,258 (BH02)	37,464 (BH05)	Indicating brackish to hypersaline conditions
Oxidation Reduction Potential (ORP) (mV)	-160.4 (BH07)	-68.1(BH05)	Indicating strongly reducing to reducing conditions

Groundwater Laboratory Analytical Results – ASS Parameters

Alkalinity and Acidity

- Acidity (total) as CaCO₃ were below the DWER ASS criteria of 40 mg/L for all bores except BH05 (225 mg/L)
- Alkalinity (total) as CaCO₃ concentrations ranged from 152 mg/L (BH14) to 487 mg/L (BH07) indicating a significant presence of alkalinity in the groundwater.
- The acidity:alkalinity ratio was equal to the DWER ASS criteria of 1 for BH05 and less than 1 for the other bores indicating low groundwater acidity and a high buffering capacity.

Chloride and Sulfate

- Chloride concentrations ranged from 453 mg/L (BH02) to 17,100 mg/L (BH14).
- Sulfate concentrations ranged from 106 mg/L (BH02) to 2,410 mg/L (BH05).
- The chloride:sulfate ratio was higher than the DWER ASS criteria of 4 for all bores, indicating low groundwater acidity.

Dissolved Aluminium

- Al concentrations ranged from <0.05 mg/L (BH05, BH07 and BH14) to 0.14 mg/L (BH02) and all below the DWER ASS Criteria of 1.0 mg/L

Nutrients

- Nitrogen (Total) concentrations ranged from 1.1 mg/L (BH14) to 13.6 mg/L (BH05).
- Total Phosphorus as P (Organic Phosphate as P) concentrations ranged from 0.08 mg/L (BH14) to 0.26 mg/L (BH07).

Analyte	unit	BH02	BH05	BH07	BH14
pH	pH Unit	8.04	6.68	7.85	7.58
Electrical Conductivity	µS/cm	2240	39600	36700	51400
Total Dissolved Solids	mg/L	1260	27100	24600	36900
Total Alkalinity as CaCO ₃	mg/L	383	219	487	152
Acidity as CaCO ₃	mg/L	9	229	30	19

Analyte	unit	BH02	BH05	BH07	BH14
Sulfate	mg/L	106	2410	1560	2330
Chloride	mg/L	453	13300	12100	17100
Dissolved Aluminium	mg/L	0.14	<0.05	<0.05	<0.05
Total Nitrogen as N	mg/L	1.6	13.6	5.4	1.1
Total Phosphorus as P	mg/L	0.19	0.15	0.26	0.08
Acidity/Alkalinity	---	0.0	1.0	0.1	0.1
Chloride:Sulfate	---	4.3	5.5	7.8	7.3

5. OVERVIEW OF MANAGEMENT REQUIREMENTS

5.1 Scope and Objectives

The objective of this ASSMP is to provide a framework for the management ASS and dewater during the drilling and dewatering works. Issues addressed by the ASSMP include the following:

- Training of contactors
- Evaluation of ASS management options
- Dewatering strategy
- Evaluation of dewatering effluent treatment and disposal options
- Monitoring and validation program
- Ongoing reporting and closure requirements
- Contingency measures and proposed corrective actions.

5.2 Roles and Responsibilities

For successful implementation of the ASSMP, the general roles and responsibilities of parties involved are described in Table 6 below.

Table 6: Roles and Responsibilities

Roles	Organisation	Responsibilities
Project Manager	Causeway Link Alliance (CLA)	<ul style="list-style-type: none"> • Facilitate overall compliance with this ASSMP. • Responsible for ensuring ongoing effective communication with contractors. • Appointing and managing suitably qualified Contractors. • Community/stakeholder consultation, where required.
Drilling & Piling Contractor	TBC, as contracted by CLA	<ul style="list-style-type: none"> • Set-up, implementation, and supervision of drilling and piling works to ensure overall compliance with this ASSMP. • Ensure contract documentation specifies the responsibilities of contractors consistent with the ASSMP. • Responsible for compliance with legislative requirements.
Earthworks Contractor	TBC as contracted by CLA	<ul style="list-style-type: none"> • Setup of laydown areas • Treatment and removal of treated soils • Compliance with this ASSMP • Responsible for compliance with legislative requirements.
Environmental Consultant	TBC as contracted by CLA	<ul style="list-style-type: none"> • Provide advice on the environment and related legislation to Project Manager and assist them in managing environmental issues.



Roles	Organisation	Responsibilities
		<ul style="list-style-type: none"> • Review performance monitoring reports. • Monitor and report on environmental performance. • Undertake scheduling of analysis for dewater validation and surface water during site works. • Promote a consultative approach by interacting with personnel at all levels within the project team.

5.3 Training and Orientation

Training and orientation/toolbox sessions should be conducted for all relevant contractor staff, particularly those involved in works related to the disturbance of ASS and management of soils and dewatering. These sessions will be conducted prior to the commencement of works.

6. MANAGEMENT MEASURES

6.1 Liming Rates for Soil Management

The excavation and drilling contractors require clear guidance when determining soil liming rates. Logistical factors have been considered when providing liming rate information for contractors undertaking piling works. This includes the difficulty in identifying and separating different soil types for different liming rates.

Piling Works

Overall, the data indicates that PASS with high %S is present across all locations, soil types and depths below the watertable. Given the relatively small volumes from the piling works, the contractors may consider it more economical and practical to transport soils off-site to an appropriately licensed treatment facility. These soils should be dispatched to the facility immediately where feasible. The nominated treatment facility should be consulted and provided with the required information, including analytical testing results, where available.

Where immediate transport of the soil is not possible, it will be necessary to stockpile the material on-site and treat it at a liming rate of 255 kg Aglime/m³ [assuming an effective neutralising value (ENV) of the Aglime of 80%].

Other Excavations

The following earthworks are proposed within the Bridge Work Area:

- Site establishment works
- Topsoil stripping, clearing, and grubbing
- Utility services protection / relocation
- Ground improvement: Controlled Modulus Columns (CMC), Perforated Vertical Drains (PVD)
- Embankment construction (fill)
- Excavation for structural works (concrete piles, pile caps)
- Landscaping including drainage

For other excavations within the site of soils from below the watertable, the application of Aglime should be at the maximum rate of 255 kg Aglime/m³.

For other excavations within the site of soils from above the watertable, the application of Aglime should be at the maximum rate of 38 kg Aglime/m³. This liming rate may need to be adjusted if stockpile validation monitoring results fail the criteria (pH_{FOX} < 5).

6.2 Treatment Method

The following measures should be adopted to ensure appropriate liming treatment of soils from drilling for the piling works and other excavations within the Bridge Work Area:

- All stockpiled soils requiring treatment shall be stored on a bunded lime treatment pad and lime-dosed within 18 hours of excavation.
- Aglime will be mixed into the soil profile during the excavation process via soil turnover and blending to achieve uniform blending of the neutralising material and the natural soils.
- Where practicable, soil excavation and backfilling will be undertaken progressively during the earthworks program to ensure the soils are not exposed for longer than necessary and thus minimising potential oxidization.
- The base of all excavations where the soil has been exposed shall be dressed with a thin layer of Aglime prior to backfilling.

Stockpile Management Methodology

The following general management practices are to be adopted during any stockpiling activities of excavated AASS or PASS material, if required. All excavated identified AASS or PASS material requires active management and subsequent lime application as outlined in above sections. Soils may however be temporarily stockpiled for a period of 70 hours prior to receiving treatment. The following best practices shall be adopted during ASS management:

- Excavated ASS is to be stockpiled for the shortest time possible to limit exposure to oxidising conditions.
- Soils will require stockpiling in the designated stockpiling areas rather than along the side of the trench, will be placed on an impervious liner overlain with crushed lime. Details of pad requirements include:
 - Pad thickness will be designed to neutralise the average existing plus potential acidity measured in the soil in accordance with recommended guidelines.
 - Design of limestone pads to intercept and convey excess free water towards an infiltrating guard layer of loosely compacted limestone at the low point of the storage apron.
 - Provision of a 150 mm high perimeter bund of compacted crushed limestone around each pad (with the exception of plant and vehicle access points).
 - The stockpile containment will be constructed so that all leachate and run-off can infiltrate through the neutralising guard layer. Where the infiltration to ground is impracticable, leachate and run-off will be diverted to one or more collection basins with an impermeable lining and a layer of crushed lime.
- Stockpiles will be inspected daily for signs of ASS oxidation, including sulfur odour, rust staining, formation of jarosite (yellow-white precipitate).
- Any leachate will be monitored for pH and Total Actual Acidity (TAA,) with the results recorded and sent to the Environmental Manager for advice on management, prior to disposal to the environment.
- The surface area of all stockpiles will be minimised to reduce the extent of material exposed to atmospheric oxygen. This may involve:

- Shaping the stockpile and/or capping or lining it with a material that will minimise its drying by wind and sun and prevent the ingress of rainfall. This management practice will apply to soils collected from above the water table.
- Spraying the surface of the stockpile to keep it moist using iron-free or neutralising solution. The spray will need to be carefully managed to prevent over-wetting of the stockpile material and should comprise of a fine mist to prevent desegregation of the soil from the stockpile surface.
- Decommissioning of the treatment pad will include disposal of all crushed limestone and the HDPE liner to an appropriate landfill facility in accordance with Landfill Waste Classification and Waste Definitions (DWER, 2019).

Unexpected ASS Material

Any coffee rock/sands, strongly organic/peaty soils or soils exhibiting a sulfurous odour that were not recorded during the investigation, but which arise during excavation, will be assessed by the Principal Environmental Consultant. Assessment may involve field testing and laboratory analysis to determine the character and extent of any ASS and any requirement for ongoing management.

Record keeping

It is recommended the Construction Contractor maintain records of:

- The volume of ASS materials treated
- The volumes and quality of Aglime imported to site
- The daily management of ASS undertaken
- The reuse location of treated ASS materials
- The landfill receipts for ASS material disposed of off-site.

It is possible that this information may need to be provided to the DWER at some future stage.

7. DEWATERING MANAGEMENT PLAN

7.1 Groundwater Levels and Effluent Volume

It is possible that groundwater will be intercepted during the excavations the site and dewatering will be required. The following management measures are for dewatering effluent volumes that can be managed on-site during works via infiltration trenches and lime dosing plants.

Management of effluent will be possible for small dewatering requirements where temporary lowering of the watertable is required by a small amount (e.g. 1m) and for a short period of time (e.g 1 week). There is limited space available for infiltration of larger dewatering volumes. However, without specific engineering details, the groundwater level, anticipated volume of dewatering and length of time dewatering is required is unknown.

7.2 Baseline Groundwater and Surface Water Monitoring

A baseline groundwater monitoring event (GME) that includes surface water monitoring of the Swan River should be undertaken at site prior to any dewatering. Ideally, the baseline GME should be undertaken following completion of the preliminary earthworks including clearing the site and the importation of clean fill required to raise the site's elevation above the watertable.

7.3 Dewatering Strategy

Dewatering may be required for the construction of infrastructure within the Bridge Work Area. Without appropriate management, dewatering activities may lead to the oxidation of PASS and/or

unacceptable drawdown that may impact nearby receptors. The dewatering management strategy to be adopted during dewatering works applied the following key management principles:

- Avoidance of ASS disturbance where feasible
- Minimizing the volume and extent of dewatering as practicable
- Reusing groundwater for dust suppression on site (where possible)
- Ensuring effective treatment and monitoring programs are in place to identify and minimise potential environmental impacts.

7.4 Dewatering Management

Dewatering Management Level 2

Dewatering Management Level 2 should be applied where:

- Dewatering will be undertaken in an area underlain by ASS for a total duration of greater than seven days or where the predicted radius of the cone of depression of the water table exceeds 50 metres.
- Sensitive receptors are nearby.

The dewatering effluent monitoring requirements for Management Level 2 are contingent on daily field measurements of water quality. The monitoring/action matrix for Management Level 2 is provided in Appendix D.

Dewatering Containment and Controls

The dewatering contractor is responsible for implementing engineering strategies to contain groundwater drawdown associated with dewatering to within the immediate area of construction in accordance with Dewatering Management Level 2.

Dewatering Effluent Treatment

Based on the background water quality, from this and other stages of the development, which indicates degradation of water quality typical of ASS environments is already present, groundwater will be pumped into an impermeable lined basin and dosed with lime to achieve a final pH > 6.0 and a total titratable acidity (TTA) of <40 mg CaCO₃/L. Treated effluent will be discharged into a lined settlement basin prior to prior to infiltration. Diagram 1 below is an example of a dewatering effluent treatment system (DER, 2011). The settlement and infiltration basins will be located on the adjacent land to immediately southwest of the site.

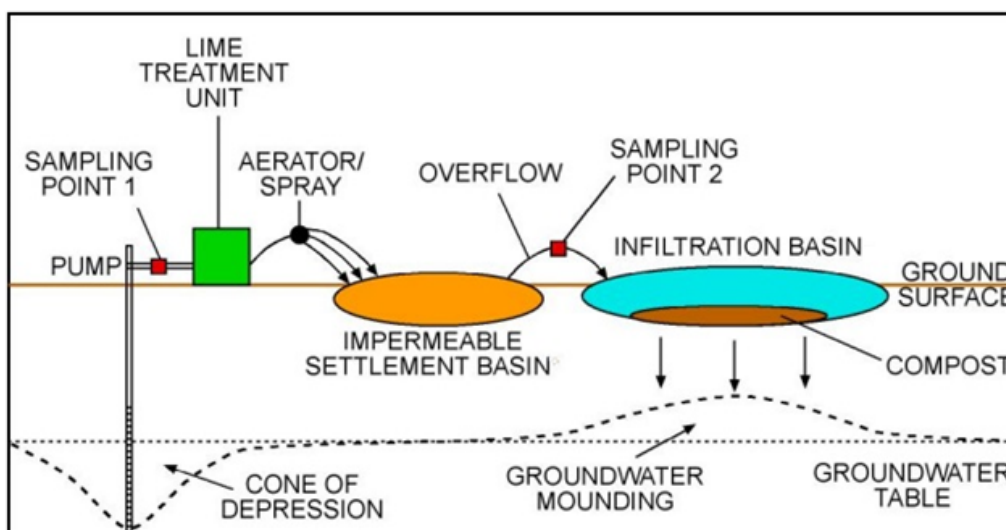


Diagram 1: Dewatering Effluent Treatment System



This setup will facilitate the removal of iron and nutrients. Monitoring of pre and post treated dewatering effluent will be undertaken during dewatering abstraction, and dewatering effluent will be treated based on the water quality monitoring results. Through the process of treatment (neutralisation treatment, aeration and settlement, filtration) it is expected that the water quality will be improved to a level that renders is suitable for reinfiltration.

Decommissioning of Treatments Ponds

At the completion of the works, the Environmental Consultant will collect samples of the accumulated sediments at the base of each infiltration trench to determine the appropriate decommissioning requirements in accordance with the DEC (2019) Landfill Waste Classification and Waste Definitions 1996 (as amended 2019).

Sample analysis will include, but not necessarily be limited to total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc). In the event these metal concentrations are elevated above background, an assessment of the risk to ecological values and/or human health will be undertaken to determine the appropriate management option. This may include the excavation of the sediment in the trench and off-site disposal to an appropriate landfill.

7.5 Dewatering Effluent Monitoring

Monitoring, Action Criteria and Corrective Actions

Treatment of dewatering effluent should be undertaken as per Table 9. A pre-treatment sample will be collected (if practical) for laboratory analysis from the spears and post-treatment sample will be collected for laboratory analysis.

Table 9: Dewatering Effluent Treatment Criteria

Water Quality Trigger	Treatment Method
pH <6	Dewatering effluent will be treated to neutralise the effluent within a mobile dewatering effluent treatment plant.
Total Titratable Acidity > 40 mg/L	Neutralisation treatment, aeration, and settlement to precipitate dissolved metals.

The Contractor responsible for management of the treatment system will generally be responsible for daily field monitoring of the dewater effluent.

The Principal Environmental Consultant will be responsible for dewater effluent sampling for laboratory analysis.

Historical data and experience with water quality at the site suggests that the treatment of effluent will be in accordance with the minimum requirements outlined in Management Level 2 -Section 1a.

If pH or TTA fall outside of the Management Level 2 - Section 1a water quality triggers, the Contractor will be notified to take corrective actions as outlined in Table 10. Depending on effluent results, sampling and analysis requirements described in either Section 2a, 3a, 4a or 5a from Management Level 2, (Appendix D) should be implemented.

Table 10: Dewatering Effluent Monitoring (Management Level 2, Section 1a) and Corrective Actions

Trigger	Monitoring	Field Monitoring (Contractor)	Sampling and Laboratory Analysis (Principal Environmental Consultant)
pH > 6 TTA < 40 mg/L	Continue daily field measurements of pH and TTA	Field pH, EC, TTA, TAlk,	Total Acidity, Total Alkalinity, pH, EC
<p>Corrective Actions</p> <ul style="list-style-type: none"> • The Principal Environmental Consultant will review laboratory data upon receipt and immediately inform the contractor of any results outside the criteria. • In the event of an exceedance, corrective actions will be undertaken. • If, TTA, pH or TALK of post-treatment effluent falls outside of criteria, Contractor to recycle treated effluent back through the treatment system and perform additional treatment of effluent (i.e. increase lime dosing rates, • If recycling not viable, increase retention time in settlement basin and treat as needed. 			

7.6 Groundwater and Surface Water Monitoring During Dewatering

Monitoring Network

Groundwater level and quality monitoring and surface water monitoring will be undertaken at groundwater monitoring bores and nearby surface water locations (Swan River) to monitor drawdown impacts and changes in water quality that may result from acidification of ASS during the dewatering program.

The groundwater and surface water monitoring program will be undertaken as per Management Level 2 (Appendix D) and summarised in Table 11.

Minimum Groundwater Monitoring Requirements for Groundwater

The DWER (2015b) provide the minimum groundwater/surface water monitoring requirements for groundwater:

- Baseline laboratory groundwater quality data to be collected before the commencement of dewatering operations (this should include more than one monitoring event to ensure the data are representative and to capture seasonal variations).
- pH, standing water levels, Eh, DO, EC, total titratable acidity (TTA) and total alkalinity (TAlk) to be monitored in the field every second day during the dewatering operation and continued until it can be shown that groundwater levels have returned to normal elevations.
- Monitoring of groundwater field parameters twice a week is generally undertaken by the Contractor, although the Principal Environmental Consultant could be commissioned to undertake these monitoring requirements if needed.
- Samples to be collected for laboratory analysis at fortnightly intervals during the dewatering operation.
- Laboratory groundwater quality analytical suite to include total acidity, total alkalinity, pH, sulfate, chloride, dissolved aluminium (filtered), dissolved arsenic (filtered), dissolved chromium (filtered), dissolved cadmium (filtered), dissolved iron (filtered), dissolved manganese (filtered), dissolved nickel (filtered), dissolved zinc (filtered), dissolved selenium (filtered), ammonia-nitrogen, total nitrogen, total phosphorus, filterable reactive phosphorus (FRP), EC and TDS.

- Laboratory groundwater quality data to be collected immediately after finalisation of dewatering operations. Post-dewatering monitoring should be undertaken at 1 month, 3 month and 6 month intervals.

Table 11: Groundwater and Surface Water Monitoring Schedule (All Locations)

Stage	Frequency	Field Measurements	Laboratory Analysis	Responsibility
Pre-dewatering	Once (baseline)	pH, SWL, ORP, DO, EC, Temp, turbidity, odour	TTA, TAlk, pH, sulfate, chloride, total metals (Fe, Al), dissolved metals (As, Cr, Cd, Fe, Mn, Ni, Zn, Se), TN-suite#, TP, FRP, EC, TDS	Principal Environmental Consultant
During Dewatering	Daily	pH, SWL, ORP, DO, EC, TTA, TAlk, Temp, turbidity, odour		Dewatering Contractor
	Weekly (if required)	pH, SWL, Eh, DO, EC, Temp, turbidity, odour	TTA, TAlk, pH, EC	Principal Environmental Consultant
	Fortnightly	pH, SWL, ORP, DO, EC, Temp, turbidity, odour	TTA, TAlk, pH, sulfate, chloride, total metals (Fe, Al), dissolved metals (As, Cr, Cd, Fe, Mn, Ni, Zn, Se), TN-suite#, TP, FRP, EC, TDS	Principal Environmental Consultant
Post-Dewatering	Immediately following dewatering. Plus 3 events at 1 month, 3 month and 6 month intervals.	pH, SWL, ORP, DO, EC, Temp, turbidity, odour	TTA, TAlk, pH, sulfate, chloride, total metals (Fe, Al), dissolved metals (As, Cr, Cd, Fe, Mn, Ni, Zn, Se), TN-suite#, TP, FRP, EC, TDS	Principal Environmental Consultant

Performance Criteria and Corrective Actions

Analytical results are to be compared to the following assessment criteria:

- Initial background concentrations and calculated trigger values from baseline results.
- DWER (2015b) Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes.

Corrective actions for Management Level 2 are detailed in Appendix D and include measures including reducing the pumping rate and increasing effluent liming rate.

Preliminary groundwater trigger levels

Groundwater level (GWL) triggers can be set using the following method:

$$Trigger (mbToC) = Baseline\ GWL (mbToC) + Est.\ Drawdown (m) + 0.5 (m, for\ seasonal\ variation)$$

Baseline water quality monitoring undertaken for the site will also set preliminary groundwater quality triggers for:

- Field measured parameters of ph, EC
- Laboratory analysis results for Total Acidity and Dissolved Aluminium.

The details of these criteria and trigger levels will be provided as an Addendum to this ASSMP following the results of the baseline GME.

8. REPORTING

8.1 Reporting by civil works contractor

For dewatering and excavation works, the following should be tracked:

- The total volume of dewatering effluent treated
- The quantity and type of neutralising agent used for soils and effluent
- The dates over which the treatment operation ran
- Daily lime dosing unit operational readings
- The approximate on-site location of disposal of treated effluent.

The Contractor shall prepare and maintain a log of the following activities:

- The approximate on-site location of treatment pads
- Volumes of any material disposed off-site
- Landfill receipt volumes, dockets and documentation confirming any off-site soil disposal that was undertaken.

The logs should be submitted to the appointed environmental consultant at the end of each week during the dewatering stages.

8.2 Closure Reporting

If dewatering is required, groundwater monitoring will be required at intervals of 1, 3 and 6 months, following dewatering. This monitoring should include at least one groundwater monitoring event taken at the time of seasonal groundwater highs.

Following the first months post dewatering monitoring, the groundwater and dewatering effluent water quality and water level monitoring results will be reported to DWER in an ASS Initial Closure Report for the project along with a discussion of any environmental impacts observed.

Following the six-month monitoring event, the results of the post-dewatering groundwater quality monitoring program will be reported to DER in a Final Post-Dewatering Monitoring Closure report.

9. CONCLUSION AND RECOMMENDATION

9.1 Soils

Overall, the data indicates that PASS with high %S is present across all locations, soil types and depths below the watertable. Given the relatively small volumes from the piling works, the contractors may consider it more economical and practical to transport soils off-site to an appropriately licensed treatment facility. These soils should be dispatched to the facility immediately where feasible. The nominated treatment facility should be consulted and provided with the required information, including analytical testing results, where available.

Where immediate transport of the soil is not possible, it will be necessary to stockpile the material on-site and treat it at the maximum liming rate of 253 kg Aglime/m³.

For other excavations within the site of soils from below the watertable, the application of Aglime should be at the maximum rate of 253 kg Aglime/m³.

For other excavations within the site of soils from above the watertable, the application of Aglime should be at the maximum rate of 38 kg Aglime/m³. This liming rate may need to be adjusted if stockpile validation monitoring results fail the criteria ($\text{pH}_{\text{FOX}} < 5$).

Stockpile management including the use of a limestone pad and monitoring requirements are provided in this ASSMP.

9.2 Groundwater

Groundwater laboratory analysis indicated generally low groundwater acidity and a high buffering capacity.

Dewatering may be required for the construction of infrastructure within the Bridge Work Area. Without appropriate management, dewatering activities may lead to the oxidation of PASS and/or unacceptable drawdown that may impact nearby receptors. The management strategies for groundwater dewatering detailed in the ASSMP should be adhered to. The Dewatering Management Level 2 monitoring requirements to be adopted during dewatering works is summarised in this ASSMP and provided Appendix D.

9.3 Closure Reporting

If dewatering is required, groundwater monitoring will be required at intervals of 1, 3 and 6 months, following dewatering. This monitoring should include at least one groundwater monitoring event taken at the time of seasonal groundwater highs.

Following the first months post dewatering monitoring, the groundwater and dewatering effluent water quality and water level monitoring results will be reported to DWER in an ASS Initial Closure Report for the project along with a discussion of any environmental impacts observed.

Following the six-month monitoring event, the results of the post-dewatering groundwater quality monitoring program will be reported to DER in a Final Post-Dewatering Monitoring Closure report.

10. LIMITATIONS

This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of soil and water other than the visual observation and analytical data in this report.

In the preparation of this report, 360 Environmental has relied upon documents, information, data, and analyses ('client's information') provided by the client and other individuals and entities. In most cases where client's information has been relied upon, such reliance has been indicated in this report. Unless expressly set out in this report, 360 Environmental has not verified that the client's information is accurate, exhaustive, or current and the validity and accuracy of any aspect of the report including, or based upon, any part of the client's information is contingent upon the accuracy, exhaustiveness, and currency of the client's information. 360 Environmental shall not be liable to the client or any other person in connection with any invalid or inaccurate aspect of this report where that invalidity or inaccuracy arose because the client's information was not accurate, exhaustive, and current or arose because of any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to 360 Environmental.

Aspects of this report, including the opinions, conclusions, and recommendations it contains, are based on the results of the investigation, sampling and testing set out in the contract and otherwise in

accordance with normal practices and standards. The investigation, sampling and testing are designed to produce results that represent a reasonable interpretation of the general conditions of the site that is the subject of this report. However, due to the characteristics of the site, including natural variations in site conditions, the results of the investigation, sampling and testing may not accurately represent the actual state of the whole site at all points.

It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions, and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

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Tables

Table A: Soil CRS Suite Analysis Results

Bore Hole ID	Sample Depth (mbgl)	Sample Date	Simplified Lithology	EA002: pH 1:5 (Soils)	EA033-A: Actual Acidity		EA033-B: Potential Acidity	EA033-D: Retained Acidity	EA033-E: Acid Base Accounting		
				pH Value	pH KCl (23A)	sulfidic - Titratable Actual Acidity (s-23F)	Chromium Reducible Sulfur (22B)	Net Acid Soluble Sulfur (20Je)	Net Acidity excluding ANC (sulfur units)	Net Acidity excluding ANC (acidity units)	Liming Rate excluding ANC
			Unit	pH Unit	pH Unit	% pyrite S	% S		% S	mole H+ / t	kg CaCO3/t
			Limit of reporting	0.1	0.1	0.02	0.005		0.02	10	1
			DWER (2015) ASS Guideline			0.03	0.03		0.03		
BH01	2	08/07/2022	SAND	7.1	8.8	<0.02	0.014		<0.02	<10	1
	3.5	08/07/2022	SAND	7.1	7.3	<0.02	0.137		0.14	86	6
	5	08/07/2022	SAND	7.7	7.2	<0.02	0.048		0.05	30	2
BH02	3.5	13/07/2022	Clayey SAND	7.9	6.4	<0.02	0.416	----	0.42	260	19
	5	13/07/2022	CLAY	8.4	4	0.27	2.45	0.89	3.38	2110	158
	6.5	13/07/2022	CLAY	8.7	7.2	<0.02	1.93	----	1.93	1200	90
	8	13/07/2022	CLAY	8.6	7.5	<0.02	2.24	----	2.24	1400	105
BH03	3.5	14/07/2022	SAND	8.4	3.9	0.2	2.25	0.54	2.85	1780	133
	5	14/07/2022	CLAY	8.6	4.3	0.19	2.37	0.86	3.21	2000	150
	6.5	14/07/2022	CLAY	8.9	7.9	<0.02	2.24	----	2.24	1400	105
BH04	2	05/07/2022	SAND	7.2	6.7	<0.02	0.192		0.19	120	9
	3.5	05/07/2022	SAND	8	9.3	<0.02	0.067		0.07	42	3
BH05	2	01/07/2022	SAND	8.4	9.4	<0.02	0.025		0.02	15	1
	6.5	01/07/2022	Silty CLAY	8.8	8.2	<0.02	2.21		2.21	1380	103
BH06	2	30/06/2022	Clayey SAND	6.6	9	<0.02	0.51		0.51	318	24
	3.5	30/06/2022	Sandy CLAY	8.6	8.2	<0.02	0.005		<0.02	<10	<1
	5	30/06/2022	Sandy CLAY	8	8.6	<0.02	0.428		0.43	267	20
BH07	6.5	28/06/2022	CLAY	8.2	8.6	<0.02	0.892		0.89	556	42
	14	28/06/2022	CLAY	6.4	5.1	0.05	<0.005		0.06	35	3
	20	28/06/2022	CLAY	8.1	8.1	<0.02	2.4		2.4	1500	112
BH08	26	27/06/2022	Clayey SAND	6.4	5.6	0.07	2.77		2.84	1770	133
	30	27/06/2022	SAND	8.1	6.9	<0.02	0.006		<0.02	<10	<1
	33.5	27/06/2022	SAND	7.5	6.9	<0.02	0.006		<0.02	<10	<1
	39.5	27/06/2022	SAND	7.6	6.8	<0.02	0.032		0.03	20	1
T01	0.5	11/07/2022	SAND	9	8.8	<0.02	0.011		<0.02	<10	1
	0.25	11/07/2022	SAND	9.1	8.9	<0.02	0.012		<0.02	<10	1
	1	11/07/2022	SAND	8.8	8.7	<0.02	<0.005		<0.02	<10	<1
T02	0.5	11/07/2022	SAND	8.8	8.5	<0.02	0.005		<0.02	<10	<1
	0.25	11/07/2022	SAND	9.1	8.9	<0.02	<0.005		<0.02	<10	<1
	1	11/07/2022	SAND	9.1	9.3	<0.02	<0.005		<0.02	<10	<1

Lab Report Number	EP2209829	EP2209829	EP2209829	EP2209829
Lab Name	ALSE-Perth	ALSE-Perth	ALSE-Perth	ALSE-Perth
Field ID	BH02	BH05	BH07	BH14
Date	01-08-2022	01-08-2022	01-08-2022	01-08-2022
Matrix Type	Water	Water	Water	Water

	Unit	LOR	ADWG 2014 NPUG	ANZG (2018) Freshwater 95% LOSP Toxicant DGVs	Alkalinity (Table 5 - Assessment of the Buffering Capacity of Groundwater DWER)									
					Very High Alkalinity	High Alkalinity	Moderate Alkalinity	Low Alkalinity	Very Low Alkalinity					
Water Quality Parameters														
Temperature	Degrees C	---	---	---	---	---	---	---	---	---	15.5	18.1	20.8	19.2
Dissolved Oxygen	mg/L	---	---	---	---	---	---	---	---	---	0.43	0.35	0.18	0.17
Specific Conductivity	uS/cm	---	---	---	---	---	---	---	---	---	2258	37464	35035	49633
pH	pH (unit)	---	---	---	>6.5	>6.0	5.5 - 5.7	5.0 - 6.0	<6.0	---	7.3	6.1	7.11	7.24
ORP	mV	---	---	---	---	---	---	---	---	---	-105.9	-68.1	-160.4	-133.3
Depth to Water	m b(TOC)	---	---	---	---	---	---	---	---	---	0.36	1.13	2.75	0.65
Inorganics														
Electrical Conductivity (Lab)	µS/cm	1	---	---	---	---	---	---	---	---	2,240	39,600	36,700	51,400
pH (Lab)	-	0.01	---	---	>6.5	>6.0	5.5 - 5.7	5.0 - 6.0	<6.0	---	8.04	6.68	7.85	7.58
Total Dissolved Solids (Lab)	mg/L	10	---	---	---	---	---	---	---	---	1,260	27,100	24,600	36,900
Anions Total	meq/L	0.01	---	---	---	---	---	---	---	---	22.6	430	384	534
Cations Total	meq/L	0.01	---	---	---	---	---	---	---	---	21.9	476	453	581
Ionic Balance	%	0.01	---	---	---	---	---	---	---	---	1.6	5.16	8.35	4.24
Nutrients														
Ammonia as N	mg/L	0.01	0.41	0.9	---	---	---	---	---	---	0.13	10.4	3.43	0.52
Kjeldahl Nitrogen Total	mg/L	0.1	---	---	---	---	---	---	---	---	1.6	13.6	5.4	1.1
Nitrate (as N)	mg/L	0.01	113	---	---	---	---	---	---	---	<0.01	<0.02	<0.01	<0.01
Nitrite (as N)	mg/L	0.01	9.13	---	---	---	---	---	---	---	<0.01	<0.02	<0.01	<0.01
Nitrite + Nitrate as N	mg/L	0.01	---	---	---	---	---	---	---	---	<0.01	<0.01	<0.01	<0.01
Nitrogen (Total)	mg/L	0.1	---	---	---	---	---	---	---	---	1.6	13.6	5.4	1.1
Total Phosphorus as P (Organic Phosphate as P)	mg/L	0.01	---	---	---	---	---	---	---	---	0.19	0.15	0.26	0.08
Alkalinity														
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	---	---	---	---	---	---	---	---	383	219	487	152
Alkalinity (Carbonate as CaCO3)	mg/L	1	---	---	---	---	---	---	---	---	<1	<1	<1	<1
Alkalinity (Hydroxide) as CaCO3	mg/L	1	---	---	---	---	---	---	---	---	<1	<1	<1	<1
Alkalinity (total) as CaCO3	mg/L	1	---	---	>180	60 - 80	30 - 60	10.0 - 30.0	<10	---	383	219	487	152
Major Ions														
Calcium (filtered)	mg/L	1	---	---	---	---	---	---	---	---	70	1,150	613	447
Chloride	mg/L	1	250	---	---	---	---	---	---	---	453	13,300	12,100	17,100
Magnesium (filtered)	mg/L	1	---	---	---	---	---	---	---	---	18	1,010	1,000	1,280
Sodium (filtered)	mg/L	1	180	---	---	---	---	---	---	---	375	7,580	7,670	10,200
Potassium (filtered)	mg/L	1	---	---	---	---	---	---	---	---	25	244	270	385
Sulfate as SO4 - Turbidimetric (filtered)	mg/L	1	---	---	---	---	---	---	---	---	106	2,410	1,560	2,330
Acidity														
Acidity (as CaCO3)	mg/L	1	---	---	---	---	---	---	---	---	9	229	30	19
Metals														
Aluminium (filtered)	mg/L	0.01	0.2	0.055	---	---	---	---	---	---	0.14	<0.05	<0.05	<0.05
Arsenic (filtered)	mg/L	0.001	0.1	---	---	---	---	---	---	---	0.003	<0.005	<0.005	<0.005
Cadmium (filtered)	mg/L	0.0001	0.02	0.0002	---	---	---	---	---	---	<0.0001	<0.0005	<0.0005	<0.0005
Chromium (III+VI) (filtered)	mg/L	0.001	0.5	---	---	---	---	---	---	---	0.001	<0.005	<0.005	<0.005
Copper (filtered)	mg/L	0.001	20	0.0014	---	---	---	---	---	---	0.003	<0.005	<0.005	<0.005
Iron (filtered)	mg/L	0.05	0.3	---	---	---	---	---	---	---	2.94	161	1.66	7.55
Lead (filtered)	mg/L	0.001	0.1	0.0034	---	---	---	---	---	---	0.004	<0.005	<0.005	<0.005
Manganese (filtered)	mg/L	0.001	0.1	1.9	---	---	---	---	---	---	0.196	5.86	0.638	0.836
Mercury (filtered)	mg/L	0.0001	0.01	0.0006	---	---	---	---	---	---	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (filtered)	mg/L	0.001	0.2	0.011	---	---	---	---	---	---	0.002	0.006	<0.005	<0.005
Zinc (filtered)	mg/L	0.005	3	0.008	---	---	---	---	---	---	<0.005	<0.025	<0.025	<0.025

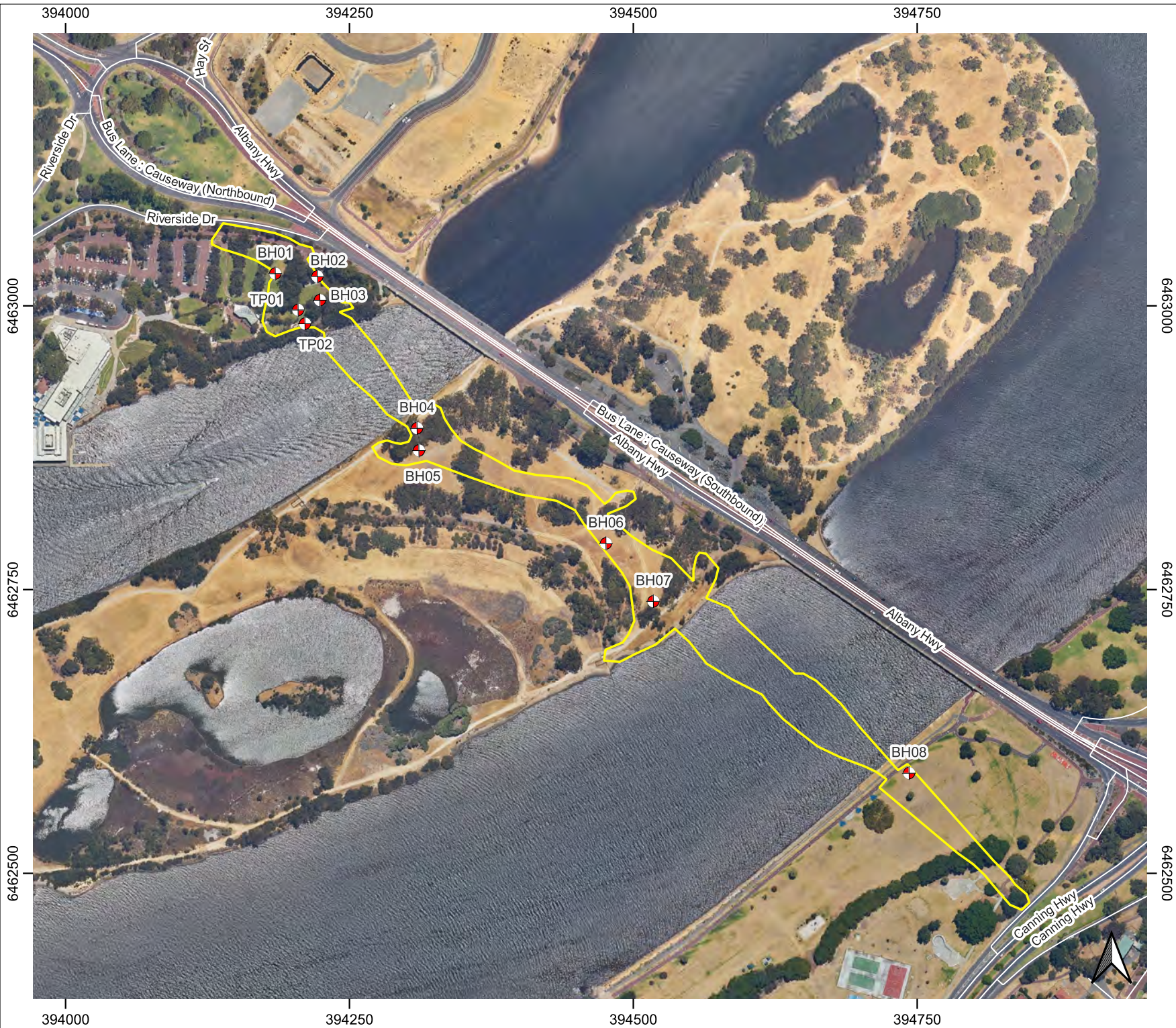
Lab Report Number	EP2209829	EP2209829	EP2209829	EP2209829
Lab Name	ALSE-Perth	ALSE-Perth	ALSE-Perth	ALSE-Perth
Field ID	BH02	BH05	BH07	BH14
Date	01-08-2022	01-08-2022	01-08-2022	01-08-2022
Matrix Type	Water	Water	Water	Water

	Unit	LOR	ADWG 2014 NPUG	ANZG (2018) Freshwater 95% LOSP Toxicant DGVs	Alkalinity (Table 5 - Assessment of the Buffering Capacity of Groundwater DWER)								
					Very High Alkalinity	High Alkalinity	Moderate Alkalinity	Low Alkalinity	Very Low Alkalinity				
BTEX													
Naphthalene (VOC)	mg/L	0.005	---	0.016	---	---	---	---	---	<0.005	<0.005	<0.005	<0.005
Benzene	µg/L	1	10	950	---	---	---	---	---	<1	<1	<1	<1
Toluene	µg/L	2	25	180	---	---	---	---	---	<2	<2	<2	<2
Ethylbenzene	µg/L	2	3	80	---	---	---	---	---	<2	<2	<2	<2
Xylene (m & p)	µg/L	2	20	---	---	---	---	---	---	<2	<2	<2	<2
Xylene (o)	µg/L	2	20	350	---	---	---	---	---	<2	<2	<2	<2
Xylene Total	µg/L	2	---	---	---	---	---	---	---	<2	<2	<2	<2
Total BTEX	µg/L	1	---	---	---	---	---	---	---	<1	<1	<1	<1
TRH													
C6-C10 Fraction (F1)	µg/L	20	---	---	---	---	---	---	---	<20	<20	<20	<20
C6-C10 (F1 minus BTEX)	µg/L	20	---	---	---	---	---	---	---	<20	<20	<20	<20
>C10-C16 Fraction (F2)	µg/L	100	---	---	---	---	---	---	---	<100	<100	<100	<100
>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	100	---	---	---	---	---	---	---	<100	<100	<100	<100
>C16-C34 Fraction (F3)	µg/L	100	---	---	---	---	---	---	---	<100	<100	<100	<100
>C34-C40 Fraction (F4)	µg/L	100	---	---	---	---	---	---	---	<100	<100	<100	<100
>C10-C40 Fraction (Sum)	µg/L	100	---	---	---	---	---	---	---	<100	<100	<100	<100
PAH													
Acenaphthene	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Anthracene	µg/L	1	---	0.4	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Benzo(a)anthracene	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Benzo(a) pyrene	µg/L	0.5	0.1	0.2	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	mg/L	0.001	---	---	---	---	---	---	---	<0.0010	<0.0010	<0.0010	<0.0010
Benzo(g,h,i)perylene	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Chrysene	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Fluoranthene	µg/L	1	---	1.4	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Fluorene	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Indeno(1,2,3-c,d)pyrene	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Naphthalene	µg/L	1	---	16	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Phenanthrene	µg/L	1	---	2	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Pyrene	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
PAHs (Sum of total)	µg/L	0.5	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Halogenated Benzenes													
Hexachlorobenzene	µg/L	0.5	---	0.1	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Phenols													
3&4-Methylphenol (m&p-cresol)	µg/L	2	---	---	---	---	---	---	---	<2.0	<2.0	<2.0	<2.0
2,4,5-Trichlorophenol	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol	µg/L	1	2	20	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
2,4-Dichlorophenol	µg/L	1	0.3	160	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
2,6-Dichlorophenol	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
2-Chlorophenol	µg/L	1	0.1	490	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
2-Nitrophenol	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
4-chloro-3-methylphenol	µg/L	1	---	---	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	µg/L	2	100	10	---	---	---	---	---	<2.0	<2.0	<2.0	<2.0
Phenol	µg/L	1	---	320	---	---	---	---	---	<1.0	<1.0	<1.0	<1.0

Lab Report Number	EP2209829	EP2209829	EP2209829	EP2209829
Lab Name	ALSE-Perth	ALSE-Perth	ALSE-Perth	ALSE-Perth
Field ID	BH02	BH05	BH07	BH14
Date	01-08-2022	01-08-2022	01-08-2022	01-08-2022
Matrix Type	Water	Water	Water	Water

	Unit	LOR	ADWG 2014 NPUG	ANZG (2018) Freshwater 95% LOSP Toxicant DGVs	Alkalinity (Table 5 - Assessment of the Buffering Capacity of Groundwater DWER)									
					Very High Alkalinity	High Alkalinity	Moderate Alkalinity	Low Alkalinity	Very Low Alkalinity					
Organochlorine Pesticides														
4,4-DDE	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
a-BHC	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Aldrin	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Aldrin + Dieldrin	µg/L	0.5	3	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
b-BHC	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Chlordane	µg/L	0.5	20	0.08	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Chlordane (cis)	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Chlordane (trans)	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
d-BHC	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
DDD	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
DDT	µg/L	2	90	0.01	---	---	---	---	---	---	<2.0	<2.0	<2.0	<2.0
DDT+DDE+DDD	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Dieldrin	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Endosulfan I	µg/L	0.5	200	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Endosulfan II	µg/L	0.5	200	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Endosulfan sulphate	µg/L	0.5	200,000	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Endrin	µg/L	0.5	---	0.02	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Endrin ketone	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
g-BHC (Lindane)	µg/L	0.5	---	0.2	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Heptachlor	µg/L	0.5	---	0.09	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	µg/L	0.5	3,000	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Methoxychlor	µg/L	2	---	---	---	---	---	---	---	---	<2.0	<2.0	<2.0	<2.0
Organophosphorous Pesticides														
Azinophos methyl	µg/L	0.5	300	0.02	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Carbophenothion	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	µg/L	0.5	20	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	µg/L	0.5	100	0.01	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	mg/L	0.0005	---	---	---	---	---	---	---	---	<0.0005	<0.0005	<0.0005	<0.0005
Diazinon	µg/L	0.5	40	0.01	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Dichlorvos	µg/L	0.5	50	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Dimethoate	µg/L	0.5	70	0.15	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Ethion	µg/L	0.5	40	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Fenthion	µg/L	0.5	70	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Malathion	µg/L	0.5	700	0.05	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Methyl parathion	µg/L	2	7	---	---	---	---	---	---	---	<2.0	<2.0	<2.0	<2.0
Monocrotophos	µg/L	2	---	---	---	---	---	---	---	---	<2.0	<2.0	<2.0	<2.0
Prothiofos	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Pesticides														
Demeton-S-methyl	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Fenamiphos	µg/L	0.5	5	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
Parathion	µg/L	2	200	0.004	---	---	---	---	---	---	<2.0	<2.0	<2.0	<2.0
Primphos-ethyl	µg/L	0.5	---	---	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5

Figures

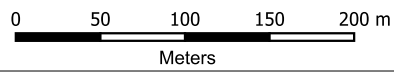


- Legend**
- Site Boundary
 - ⊕ Boreholes

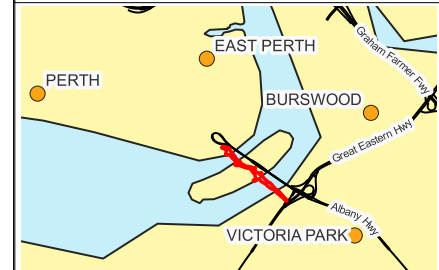
- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2022
 - AERIAL PHOTOGRAPHY SOURCED FROM LANDGATE 2022
 - NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

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 t (+618) 9388 8360
 w www.360environmental.com.au

HORIZONTAL DATUM AND PROJECTION
 GDA 2020 MGA Zone 50



LOCALITY MAP



PROJECT NO 5412	DATE 29/08/2022	REVISION 0
CREATED VM	CHECKED RD	APPROVED CD

Seymour Whyte
Causeway Pedestrian and Cyclist Bridge,
East Perth, WA

Contamination Investigation

Figure 2
Sampling Locations



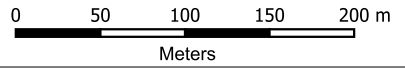
Legend

- Site Boundary
- + Groundwater Wells

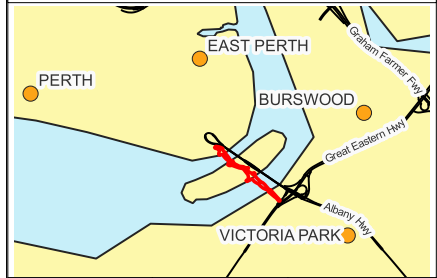
- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2022
 - AERIAL PHOTOGRAPHY SOURCED FROM LANDGATE 2022
 - NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

360 environmental | Part of **SLR** | a 10 Bermondsey Street
 West Leederville WA 6007
 t (+618) 9388 8360
 w www.360environmental.com.au

HORIZONTAL DATUM AND PROJECTION
 GDA 2020 MGA Zone 50



LOCALITY MAP



PROJECT NO 5412	DATE 29/08/2022	REVISION 0
CREATED VM	CHECKED RD	APPROVED CD

Seymour Whyte
Causeway Pedestrian and Cyclist Bridge,
East Perth, WA

Contamination Investigation

Figure 3
Groundwater Sampling Locations

Appendices

Appendix A

Method Statements

METHOD STATEMENT

Decontamination

1 SCOPE

This Method Statement has been developed for decontamination activities.

2 METHOD SUMMARY

Decontamination is a critical QA/QC element to site investigations and must be applied appropriately.

3 PROCEDURES

Step 1: Decon Set Up

1. Set up decontamination equipment in dedicated area on site, away from impacted area/s.
2. Place clean used large plastic bag/tarp on the ground
3. Place two clean unused buckets on top of the tarp. Fill one bucket with deionised water for rinsate. Fill the second bucket with Decon 90 and deionised water.
4. Pour deionised water in decontaminated clean spray bottle.

Step 2: Decontamination

The following procedures are to be undertaken in order to minimise the risk of cross contamination of samples:

1. All samples are to be handled using disposal nitrile gloves, which are to be replaced between each sampling event.
2. Decontamination of manual sampling equipment includes:
 - o Remove soil (if viable) adhering to the sampling equipment by brushing
 - o Wash equipment with phosphate free detergent and rinsate water (laboratory supplied).
 - o Rinse equipment in bucket with deionised water
 - o Complete second rinsing by pouring deionised water over equipment

Specific decontamination procedures are as follows:

- Always decontaminate the water level meter/interface probe before starting investigations and at the end of investigations (daily), and between each use
- All reusable equipment used for each soil monitoring well installation will be decontaminated between each well location
- Thoroughly clean the tape measure and any stainless steel sample collection equipment (if warranted) before initiation of the sampling event and between sample collection endeavours.
- All drill rods will be decontaminated with Decon 90 and rinsate water between each use.
- Decon the hand-auger barrel between each soil sample collection endeavour.
- The riser, well screen and annual seal installation equipment should be cleaned immediately prior to well installation or certified clean from the manufacturer and delivered to the site in a protective wrapping.

METHOD STATEMENT

Hand Augering and Sampling

1 SCOPE

This Method Statement addresses soil bore advancement using a manual hand auger and associated soil sample field screening and collection for laboratory analysis. Soil sample collection methods are also included, in addition to a subsurface utility service survey due to prevalent requirements by the drilling companies or client.

2 METHOD SUMMARY

Although not recommended by 360 Environmental due to soil sample collection integrity concerns, hand-push barrel augers are commonly used as the initial part of soil bore advancement, for site where a limited or targeted investigation is required, or for site with access restrictions/difficulties for drill rigs. The expected depth from surface for hand-augering in these situations is maximum 3 metres.

3 REFERENCES

This Method Statement references the following literature:

- *Field Sampling Procedures Manual*, New Jersey Department of Environmental Protection, August 2015
- *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1)*, National Environmental Protection Council, Government of Australia
- *Standard Guide for Soil Sampling from the Vadose Zone, ASTM D4700-15*
- *AS 4482.2-1999 Guide to the sampling and investigation of potentially contaminated soil - Volatile substances*
- *AS 4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil - Non-volatile and semi-volatile compounds*
- *AS 1726-1993 Geotechnical Site Investigations*

4 EQUIPMENT AND SUPPLIES

Equipment	Supplies
<ul style="list-style-type: none">• GPS• Photoionisation detector (PID)• Digital Camera• Hand-held barrel auger (the barrel corresponds to a depth of penetration of approximately 7.6 to 12.7 cm)	<ul style="list-style-type: none">• Survey stakes or flags• Tape Measure• Laboratory supplied sample containers• Eskies• Cooled Ice Bricks• Decon 90 Cleaning Agent (non-phosphate)• Deionised Water• Nitrile gloves• Three decontamination buckets• Disposal paper towels• Small rubbish plastic bags• Spray bottle• Large plastic bag/tarp

6 PROCEDURES

The following procedures will be undertaken in the following stepped approach.

Step 1: Utility Services Survey

A utility services survey will be contacted by a licenced surveyor using ground penetrating radar (GPR). The survey will be undertaken on nominated pre-specified soil bore locations at the prior to soil bore advancement activities. The survey will be monitored by 360 Environmental field personnel to allow for professional judgment in offsetting nominated locations in the event subsurface utilities are encountered.

METHOD STATEMENT

Hand Augering and Sampling

Step 2: Soil Bore Location Staking and Measurement

The soil bore locations will be staked with survey stakes/flags. The locations of the soil bore will be measurement using a hand-help GPS unit and via tape measurements. Tape measurements will be collected in an x, y coordinate system referencing permanent structures.

Step 3: Decon Set Up

Refer to Contaminated Sites TSOP E-2 Decontamination

Step 4: Storage, Handling and Transport Set Up

Refer to Project – Specific QAP

Step 5: Surface Sample Collection

Sub step	Description
1	Surface soil samples should be collected using decontaminated or dedicated sampling equipment. All inconsequential surface debris should be removed from the surface before commencing sampling.
2	Collect the sample from surface to 150 mm below ground surface and place the soils directly into a pre-labelled laboratory supplied container prepared/preserved for the chosen analytical parameters.
3	Fresh disposal gloves will be worn for the sample collection.
4	Log the geologic profile <ul style="list-style-type: none">• Document PID readings• Place the pre-labelled and appropriate laboratory supplied samples in a chilled Esky. The Esky needs to remain chilled between 4 and 6 degrees Celsius.• Follow the sample storage, handling, and transport procedures identified in the project-specific QAP.
5	Complete the above steps at each location

Step 6: Hand-held Barrel Auger

Sub step	Description
1	Following the surface soil sample collection, place a plastic sheet on the ground next to the nominated bore hole.
2	Begin augering, periodically removing and depositing accumulated soils onto the plastic sheet. The soils are not intended for collection and laboratory analysis.
3	Once the nominated soil sample collection depth has been reached (there may be more than one soil sample collection depth), retrieve the auger from the hole and transfer the sample directly from the auger head into a pre-labelled laboratory supplied container and secure tightly.
4	<ul style="list-style-type: none">• Log the geologic profile• Document PID readings• Place the pre-labelled and appropriate laboratory supplied samples in a chilled Esky. The Esky needs to remain chilled between 4 and 6 degrees Celsius.• Follow the sample storage, handling, and transport procedures identified in the project-specific QAP.
5	Complete the above steps at each new location

METHOD STATEMENT

Hand Augering and Sampling

Step 7: Bore Hole Reinstatement

If the soil bore is not to be completed as a monitoring well, backfill the hole with certified clean fill sand. If a clay unit was intercepted during drilling, backfill the hole with bentonite from the base of the hole to the top of the clay unit, then finalised backfilling with certified clean fill sand. If required, reinstate with concrete at the surface.

7 ACCOMPANING METHOD STATEMENTS

The following accompanying Method Statements must be adhered to as part of the procedures described in this Method Statement:

- Method Statement: Soil Logging
- Method Statement: Decontamination
- Method Statement: Waste Management

The following procedures must be followed in line with the SAQP-specific QAP:

- Field Documentation
- Field QC
- Storage, Handling and Transport

METHOD STATEMENT

Instrument Calibration

1 SCOPE

This Method Statement has been developed for instrument calibration activities.

2 METHOD SUMMARY

Field equipment used for on-site measurements will be calibrated in accordance with the manufacturer's specification before and after field use each day, or at a frequency recommended by the equipment manufacturer or industry practice. **All manufacturer calibration records must accompany the equipment for each rental.**

PID

The PID will be calibrated to manufacturer specifications by the rental operator and accompanied with a Calibration Certificate. The PID will be calibrated prior to the sampling event.

YSI Pro Plus Multiparameter Meter

- YSI Pro Plus Multiparameter Instrument calibration is needed for Electrical Conductivity (EC), and pH 4 and pH 7. Calibration to pH 7 and pH 10 may be required when working in alkaline or marine environments.
- YSI multi parameter meter is to be calibrated prior to use (daily) and in line with the Manufacturers Calibration Manual.
- Daily calibration must be documented.

METHOD STATEMENT

Low Flow Purging and Sampling – Peristaltic Pump

1 SCOPE

This Method Statement has been developed for groundwater sampling activities using a Peristaltic pump.

2 METHOD SUMMARY

The low stress (low flow) purging and sampling methodology is applied to the collection of groundwater samples from appropriately constructed monitoring wells. The purpose for using this technique is to collect groundwater samples that reflect the total mobile organic and inorganic loads (dissolved and colloidal sized fractions) transported through the subsurface under ambient flow conditions, with minimal physical and chemical alterations from the sampling operations.

This Method Statement promotes procedures that minimise hydraulic stress at the well screen interface with the nominated saturated zone of the aquifer system by maintaining low water level drawdowns, and by using low pumping rates during purging and sampling operations.

This Method Statement has been designed specifically for the use of a Peristaltic Pump.

3 REFERENCES

This Method Statement references the following literature:

- *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells*, EQASOP-GW-001, Rev 3, US EPA Region 1, 19 January 2010
- Sundaram B, Feitz, A.J., de Caritat P, et al. *Groundwater Sampling and Analysis - A Field Guide*, GeoCat #68901 Record 2009/27, Geoscience Australia, Government of Australia, 2009.
- *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1)*, National Environmental Protection Council, Government of Australia

4 EQUIPMENT AND SUPPLIES

Equipment	Supplies
<ul style="list-style-type: none">• GPS• Peristaltic pump• Groundwater Multiparameter Instrument• Interface Meter• Silicon Tubing• HDPE tubing	<ul style="list-style-type: none">• Laboratory supplied sample containers• Eskies• Cooled Ice Bricks or ice• Decon 90 Cleaning Agent (non-phosphate)• Deionised Water• Nitrile gloves• Decontamination buckets• Rubbish bags• Spray bottle

5 CALIBRATION

All rental equipment will be calibrated to manufacturer specifications by the rental operator and accompanied with a Calibration Certificate prior to the field work.

6 PROCEDURES

The following is undertaken in a stepped approach:

Step 1: Monitoring Well – Pre-Sampling Set Up

1. Prior to initiating groundwater monitoring, remove the well cap from each of the wells to be sampled to allow the cased bore to depressurise over a period of approximately 15 minutes.
→ *Document well integrity and identify any missing monitoring well equipment (i.e., gatic cover screws, well caps. This will be applied to GMEs following well installation.*

METHOD STATEMENT

Low Flow Purging and Sampling – Peristaltic Pump

2. Following depressurisation, collect static water-level measurements and depth to bottom of well measurements using an electronic interface water level (for the wells being sampled only). Recorded measurements should be to a 3 millimetre (mm) accuracy.

→ *Document the readings and document if phase separated liquids is encountered and thickness.*

Step 2: Initiate Low-Flow Purging and Sampling

1. Proceed to first nominated monitoring well.
2. Set up the Peristaltic pump, silicone tubing and LPDE tubing and accompanying YSI Pro Plus Multiparameter Instrument and Flow-Through-Cell.
3. Place the Flow-Through-Cell (with Silicon tubing) adjacent to the well.
4. Ensure a clean unused bucket is set next to the well to capture purged water.
5. Lower the plastic tubing within the well and install the end of the tubing to the pre-determined depth within the well screen interval. Default placement is mid-screen.

→ *Document the depth.*

6. Collect depth to water measurement using the Electronic Interface Meter.

→ *Document the depth*

7. Start the Peristaltic Pump and initiate low flow purging. Start the pump at low speed and slowly increase the speed until discharge occurs. Adjust pump speed until there is little (i.e., less than 9 cm) or no water level drawdown. Maintain pump speed to this specification.

→ *Document the start time.*

8. Monitor and record the water level and pumping rate every 3 to five minutes during purging. Collect the following field parameter measurements: temperature, dissolved oxygen, specific conductivity (SPC), electrical conductivity (EC), pH, redox and total dissolved solids (TDS) at the same time that depth to water measurements are collection.

→ *Document the depth.*

9. Continue purging until stabilisation is achieved based on the change in the measured field parameter readings being within the criteria identified in Table A. Field parameter readings are considered stabilised when three consecutive readings are within the limits shown in Table A.

10. Collect groundwater samples in the same low flow manner as described above. Ensure that the groundwater samples are collected over a bucket to capture excess water.

→ *Collect nominated QC samples in accordance with the project –specific QAP.*

→ *Field filter metals samples using a 45 micron filter prior to collection in the sample bottle*

11. Once sampling is complete, replace the well cap and gatic over.
12. Remove the LPDE tubing and silicone tubing and place in nominated waste management plastic bag.
13. Decon the interface probe and YSI in line with the Decontamination
14. Complete the above procedures at each new well.

Table A: Stabilisation Criteria

METHOD STATEMENT

Low Flow Purging and Sampling – Peristaltic Pump

PARAMETER	STABILISATION CRITERIA
EC	5% $\mu\text{S}/\text{cm}$
pH	± 0.1 pH units
Temp	0.2 $^{\circ}\text{C}$
DO	10 %
Redox	± 10 mV

7 DOCUMENTATION

The following 360 Environmental Forms are required:

- Project Field Log (per day)
- Groundwater Monitoring Sheet

8 DECONTAMINATION

All sampling equipment will be decontaminated by the environmental consultant with Decon 90 and rinsate water between each use.

9 WASTE MANAGEMENT

The following investigation derived waste can be disposed of onsite, as follows:

- Groundwater derived waste from purging can be disposed in an approved waste disposal area as nominated by the site.

If no appropriate onsite disposal facility is available, investigation derived waste can be disposed offsite, as follows:

- All investigation derived waste will be placed in structurally sound container supplied by the nominated waste carrier. Once investigation works are completed, the containers should be taken offsite for disposal.

Appendix B

Field Documentation

PROJECT FIELD LOG (DAILY)

Date: 27/6/22 Project Number: 5142 Project Name: Causeway Bridge Drilling
 Arrived: 0640 Departed: _____ Weather: DRY, Sunny
 PM: L. Donnetti
 Field Personnel: J. Heaton
 Contractors: National Geotech under Golders
 Client Contact: Mathieu Site Contact: LuRo

Purpose of Visit (Tick Appropriate Box):

Site Inspection Well Integrity Assessment
 Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling
 Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling
 Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling
 Remediation Works Oversight Other (Specify): _____

Equipment Used:
N/A
PID

Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:

Sampling Conducted: Y N Matrix: Soil Water Air
 CoC Completed: Y N
 Primary Lab: ALS Secondary Lab: _____

Description of Activities:

0:6,44 - arrive site.

0:7,05 - Pre-start

0:7,45 - re-commence CPCB-BH08 @ ~~23m~~ 23m.

09:10 - sample BH08-25: SAND w/clay, m-c grained, brown/black

PID = 1.4 ppm

BH08-26: ~~clay~~ SAND - F-c grained, black, less sand w/ depth

PID = 1.0 ppm

BH08-27: SAND, F-c grained, orange

PID = 1.2 ppm

BH08-30: SAND, M-c grained, orange,

PID = 1.5 ppm

BH08-30.5 - 30.95' SAND, M-c grained orange-brown

PID = 1.7 ppm

BH08 32-32.45' SAND, M-c grained, brownish

PID =

orange - yellowish

PID = 1.8 ppm

BH08 33.5 - 33.95' SAND, M-c grained, ~~telluric~~

C (light), brown (pale)

PID = 1.4 ppm

BH08 35 - 35.45' SAND, M-c grained, pale brown

to yellow.

PID = 0.8 ppm

BH08 36.5 - 36.95' SAND, M-c grained, pale

brown, yellow

PID = 0.3 ppm

BH08 32 - 32.45' SAND, M-c grained, brown

PID = 1.1 ppm

BH08 39.5 - 39.45' SAND, M-c ground, grey

brown

PID:

11:35 - left the site.

PROJECT FIELD LOG (DAILY)

Date: 23/6/22 Project Number: 5412 Project Name: Causeway bridge drilling
 Arrived: 7:05 Departed: 4:40 Weather: Sunny
 PM: C. Bonnetti
 Field Personnel: P. W
 Contractors: National Brestech under Golden
 Client Contact: Mathieu Site Contact: _____
Purpose of Visit (Tick Appropriate Box):
 Site Inspection Well Integrity Assessment
 Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling
 Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling
 Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling
 Remediation Works Oversight Other (Specify): _____
Equipment Used:
N/A
PID equipment (for gas)
 Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:
 Sampling Conducted: Y N Matrix: Soil Water Air
 CoC Completed: Y N
 Primary Lab: ALS Secondary Lab: _____

Description of Activities:

7:05 - arrived at site

7:10 - Pre start

Sample:

BH07 3.5m, ~~Dark grey~~, clay, dark grey, shell, fragmented, low plasticity

(No PID sampled in jar only)

BH07 6.5-6.95m, clay, low plasticity, dark, grey, mottled brown (10-15cm), fragmented shells

PID: 0.9 PPM

BH07 8m, clayey sand, low to medium plasticity, little fragmented shells

PID: 0.7 PPM

BH07 9.5-9.95m clayey sand, medium to high plasticity, Grey

PID: 0.9 ppm

BH07 11-11.45m, clay, high plasticity, brown, mottled grey

PID: 1.0 ppm

BH07 12.5-12.95m, Grey mottled, clayey sand, m-c graded sand, 1-5cm

PID: 0.9 ppm

BH07 14-14.45m clay, high plasticity, yellow-brown, mottled

PID: 1.1 ppm

BH07 15.5-15.95m clay, high plasticity, grey, mottled red (1-3 cm)

PID: 1.5 ppm

BH07 17-17.45m Clay, mottled brown, grey (mostly)

PID: 0.8 ppm

Description of Activities:

BH07, 13.5-13.95m, ^{Clay} ~~Clay~~, Dark Grey, Very high
plasticity

PID: 0.8 ppm

BH07, 20m, clay, dark grey, very high plasticity,
Traces of fragmented shells.

PID: 1.0 ppm

left the site at 4:40 pm.

PROJECT FIELD LOG (DAILY)

Date: _____ Project Number: _____ Project Name: _____

Arrived: _____ Departed: _____ Weather: _____

PM: _____

Field Personnel: _____

Contractors: _____

Client Contact: _____ Site Contact: _____

Purpose of Visit (Tick Appropriate Box):

Site Inspection Well Integrity Assessment

Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling

Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling

Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling

Remediation Works Oversight Other (Specify): _____

Equipment Used:

Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:

Sampling Conducted: Y N Matrix: Soil Water Air

CoC Completed: Y N

Primary Lab: _____ Secondary Lab: _____

PROJECT FIELD LOG (DAILY)

Date: 29/07 Project Number: 5412 Project Name: Causeway Bridge Drilling
 Arrived: 7:30am Departed: 4:45pm Weather: Sunny
 PM: Chris Bonetti
 Field Personnel: P. W.
 Contractors: National Geotech under Golder
 Client Contact: Mathew Site Contact: heko

Purpose of Visit (Tick Appropriate Box):

Site Inspection Well Integrity Assessment
 Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling
 Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling
 Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling
 Remediation Works Oversight Other (Specify):

Equipment Used:
N/A
PID (for gas)

Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:

Sampling Conducted: Y N Matrix: Soil Water Air
 CoC Completed: Y N
 Primary Lab: ALS Secondary Lab: _____

Description of Activities:

7:30 am - Arrived at site

7:45 am - Pre start -

8:40 am sampling:

BH07 23m clay, dark grey, few fragmented quartz
found, high plasticity PID: 0.8 ppm

BH07 24.5m, sand, grey, ~~fine~~ fine to medium
coarse grained (me-grained), SA, SR PID: 0.7 ppm

BH07 26m, 10-15m sand (high coarse) ^{yellow, orange}
_{grained}, 1-5cm
C. clayens), grey, ~~1-5cm~~ coarse grained, SA, SR PID: 0.6 ppm

BH07 27.5m, sand, mottled red, grey, brown, M-C
grained, gravels spotted (few) ~~in matrix~~ PID: 0.3 ppm

BH07 29m, sand, grey, fine to M-C grained, SA, SR PID: 0.7 ppm

BH07 30.5 Sand, grey, M-C grained, SA, SR PID: 1.5 ppm

BH07 32m sand, grey, mottled red, brown,
medium-high coarse grained, gravels, PID: 0.8 ppm

BH07 33.5 sand, yellow brown, M-C grained
SA, SR PID: 1.0 ppm

Left the site at 4:45 pm

PROJECT FIELD LOG (DAILY)

Date: 30/6/23 Project Number: 5412 Project Name: Causeway Bridge drilling
 Arrived: 7:00am Departed: 4:40pm Weather: Sunny
 PM: Chris Donnetti
 Field Personnel: Phuntsho Wangchi
 Contractors: National Geotech under Golder
 Client Contact: Mathieu Site Contact: Luke

Purpose of Visit (Tick Appropriate Box):

Site Inspection Well Integrity Assessment
 Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling
 Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling
 Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling
 Remediation Works Oversight Other (Specify):

Equipment Used:
N/A
PIB tester (for gas only)

Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:

Sampling Conducted: Y N Matrix: Soil Water Air
 CoC Completed: Y N
 Primary Lab: ALS Secondary Lab: _____

Description of Activities:

7:00 am Arrived at the site

7:10 am Prestart

Drilling resumed;

BH07-35m. * Sand, yellow brown, SA-SR, M-c grained PID: 0.5 ppm

BH07-36.5m, sand, yellow-brown, grey, SA-SR, m-c grained PID: 0.5 ppm

BH07-38m, sand, yellow-brown, SA-SR, m-c coarse grained PID: 0.6 ppm

BH07-40m, sand, brown-grey, white (1-10cm), SA-SR, F-m.c grained PID: 0.8 ppm

New Bore hole:

BH06-2-2.5m, clayey sand, orange-brown, red (1-5cm) m-c grained, fragmented shells. PID: 0.6 ppm

BH06-3.5-4m, sandy clay (1-5cm), ~~tan~~ sand with fragmented shells (1-2.5cm), brown color, M.C grained PID: 0.7 ppm

BH06-5m, sandy clay (1-5cm), dark grey, sand grey, SA-SR, m-c grained PID: 0.6 ppm

BH06-9.5m silty sand, brown, grey, fragmented shells PID: 0.5 ppm

(10-35m) clay, grey, PID: 2.3 ppm

Description of Activities:

BH06 14m Sand, yellow-brown, grey, SA-SR.

M-c grained

PID: 1.4ppm

BH06-15.5m Sand, yellow-grey, brown, SA-SR,

M-c grained

PID: 2.8ppm

BH06 17m Sand, brown-yellow (1-7cm), grey,

SA-SR, M-c grained

PID: 1.7ppm

Left the site at 4:40pm

PROJECT FIELD LOG (DAILY)

Date: 01/07/22 Project Number: 5412 Project Name: Causeway bridge drilling
 Arrived: 7:05am Departed: 4:00pm Weather: Sunny
 PM: Chris Donnetti
 Field Personnel: P.W.
 Contractors: National Geo tech under Boulder - WSP
 Client Contact: Mathieu Site Contact: Luke

Purpose of Visit (Tick Appropriate Box):

Site Inspection Well Integrity Assessment

Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling

Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling

Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling

Remediation Works Oversight Other (Specify):

Equipment Used:
N/A
POD tester (for gas check only)

Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:

Sampling Conducted: Y N Matrix: Soil Water Air

CoC Completed: Y N

Primary Lab: ALS Secondary Lab: _____

Description of Activities:

7:05 am arrived at the site

7:10 am Prestart.

7:15 am Resumed drilling.

BH06 - 18.5' clay, grey, mottled brown, very high plasticity

PID: 0.5 ppm

BH06 - 20m clay, grey, mottled brown, medium to high plasticity

PID: 0.4 ppm

BH06 - 21.5m clay, grey, medium to high plasticity

PID: 0.9 ppm

BH06 - 23m silty clay, grey, low-medium plasticity
f-m c grained →

PID: 0.3 ppm

BH06 - 24.5m clay, grey, sand (1-10cm), brown
medium plasticity (clay)

PID: 0.7 ppm

BH06 - 26m, clayey sand, yellow brown, low plasticity
fine coarse of sand

PID: 0.3 ppm

BH06 - ~~27.5~~ 27m, sand, grey, SA-SR, F-C sand

PID: 1.2 ppm

BH06 29m, silty sandy clay, F-C sand, SA-SR,
grey, brown

PID: 1.0 ppm

BH06 30.5m, sand, grey, brown, yellow, f-m (sand,
grained), clay (1-10cm) grey, medium plasticity

PID: 0.7 ppm

BH06 32m, sand, brown, yellow, grey, M-H C
grained, gravels fragments observed

PID: 1.8 ppm

Left the site at 4:00 pm

PROJECT FIELD LOG (DAILY)

Date: 4/7/12 Project Number: 5412 Project Name: Causeway bridge Drilling
 Arrived: 7:05 Departed: 4:15pm Weather: Sunny
 PM: Chris Donnetti
 Field Personnel: P.W.
 Contractors: A National Beech under Bolder.
 Client Contact: Mathieu Site Contact: Luke
 Purpose of Visit (Tick Appropriate Box):
 Site Inspection Well Integrity Assessment
 Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling
 Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling
 Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling
 Remediation Works Oversight Other (Specify):
 Equipment Used:
N/A
PID Tester (Gas only)
 Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:
 Sampling Conducted: Y N Matrix: Soil Water Air
 CoC Completed: Y N
 Primary Lab: ALS Secondary Lab: _____

Quality Control Details:

QC	Type	Date and time	Primary	Media
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				
QC				

QC	Collection Point	Collection Location	Date and time	Rinsate water batch #
RS				
RS				
RS				
RS				
RS				

QC	Date and time	Trip blank batch #
TB		
TB		
TB		
TB		
TB		

QC	Date and time	Collection Location	Blank water batch #
FB			
FB			
FB			
FB			
FB			

Description of Activities:

7:05 am arrived at site

7:10 am Pre start

7:30 am Resumed drilling

BH06-33.5m sand, white, ~~grey~~^{brown}, gravels^(few), SA-SR
medium - c grained PID: 0.7 ppm

BH06-35m, sand, yellow, brown, gravels (few), SA-SR,
medium - c grained PID: 0.4 ppm

BH06-36.5m Sand, Yellow brown, SA-SR, F-M-C
grained PID: 0.5 ppm

BH06-38m Sand, Yellow, grey, SA-SR, P-M-C grained PID: 0.5 ppm

BH06-40m Sand, Yellow grey, SA-SR, P-M-C grained PID: 1.2 ppm

Bore hole 5.

BH05-2m sand, brown, grey, SA-SR-P-M-C grained PID: 1.0 ppm

BH05-6.5m Silty clay, ~~grey~~ grey, black, fragmented
shells, medium plasticity PID: 0.2 ppm

BH05-9.5m silty sand, brown, fine particles PID: 0.5 ppm

Left the site at 4:15 pm

PROJECT FIELD LOG (DAILY)

Date: 5/7/12 Project Number: 5412 Project Name: Causeway bridge drilling
 Arrived: 7:12am Departed: 4:50pm Weather: cloudy / Rainy
 PM: Chris Donnetti
 Field Personnel: P.W.
 Contractors: Natural Brestech under Golder
 Client Contact: Mathew Site Contact: Luke

Purpose of Visit (Tick Appropriate Box):

Site Inspection Well Integrity Assessment

Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling

Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling

Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling

Remediation Works Oversight Other (Specify):

Equipment Used:

N/A

PID tester (gas only)

Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:

Sampling Conducted: Y N Matrix: Soil Water Air

CoC Completed: Y N

Primary Lab: ALS Secondary Lab: _____

Quality Control Details:

QC	Type	Date and time	Primary	Media
QC				
QC				
QC				
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QC				
QC				
QC				
QC				

QC	Collection Point	Collection Location	Date and time	Rinsate water batch #
RS				
RS				
RS				
RS				
RS				

QC	Date and time	Trip blank batch #
TB		
TB		
TB		
TB		
TB		

QC	Date and time	Collection Location	Blank water batch #
FB			
FB			
FB			
FB			
FB			

Description of Activities:

7:00 arrived at site

7:05 pre start.

7:10 a dolly resumed.

BH05 - 12.5m, ~~br~~ Sand, brown, fine sand particles, PID: 0.2ppm

BH05 - 14m, sand, brown, fine particles. PID: 0.4ppm

BH05 - 15.5m, sand, brown, F-M coarse grained PID: 0.3ppm

BH05 - 17m, sand, brown, F-M c grained PID: 1.3ppm

BH05 - 18.5m, clayey silt, gravels, (SR-SA), brown, mottled red PID: 0.7ppm

BH05 - 20-20.5m, sand, brown, ~~sr~~ SR-SA, F-M coarse grained PID: 0.3ppm

BH05 - 21.5m, sand, grey, fine particles, PID: 0.5ppm

BH05 - 23m, silty sand, mottled red/white/yellow/brown gravels. PID: 1.0ppm

BH05 - 24.5m, clay, mottled red, grey, medium plasticity PID: 0.9ppm

New Bore hole - BH04.

BH04 - 2m, sand, light to dark grey, medium c. grained PID: 1.3ppm

BH04 - 3.5m sand, grey, medium c grained PID: 0.4ppm

BH04 - 5m, silty clay, dark grey, medium plasticity traces of fragmented shells PID: 2.3ppm

Description of Activities:

BH04 - 6.5 m, silty clay, dark grey, medium plasticity
traces of fragmented shells.

PID: 1.3 ppm

BH04 - 8 m, silty clay, dark grey, medium plasticity

BH04 - 9.5 m, silty clay, dark grey, low to medium plasticity

PID: 1.4 ppm

PID: 1.9 ppm

BH04 - 11 m, clayey silt, brown, grey, low to medium plasticity

PID: 1.1 ppm

Left the site at 4:50 pm

PROJECT FIELD LOG (DAILY)

Date: _____ Project Number: _____ Project Name: _____

Arrived: _____ Departed: _____ Weather: _____

PM: _____

Field Personnel: _____

Contractors: _____

Client Contact: _____ Site Contact: _____

Purpose of Visit (Tick Appropriate Box):

Site Inspection Well Integrity Assessment

Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling

Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling

Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling

Remediation Works Oversight Other (Specify): _____

Equipment Used:

Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:

Sampling Conducted: Y N Matrix: Soil Water Air

CoC Completed: Y N

Primary Lab: _____ Secondary Lab: _____

PROJECT FIELD LOG (DAILY)

Date: 6/7/22 Project Number: 5412 Project Name: Cause way bridge dalks
 Arrived: 7:00am Departed: 4:40 pm Weather: Sunny
 PM: Chris Bonetti
 Field Personnel: P.W.
 Contractors: National Geotech - Golder
 Client Contact: Mathieu Site Contact: luke
Purpose of Visit (Tick Appropriate Box):
 Site Inspection Well Integrity Assessment
 Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling
 Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling
 Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling
 Remediation Works Oversight Other (Specify):
Equipment Used:
N/A
PID tester (gas only)
 Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:
 Sampling Conducted: Y N Matrix: Soil Water Air
 CoC Completed: Y N
 Primary Lab: ALS Secondary Lab: _____

Quality Control Details:

QC	Type	Date and time	Primary	Media
QC				
QC				
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QC				

QC	Collection Point	Collection Location	Date and time	Rinsate water batch #
RS				
RS				
RS				
RS				
RS				

QC	Date and time	Trip blank batch #
TB		
TB		
TB		
TB		
TB		

QC	Date and time	Collection Location	Blank water batch #
FB			
FB			
FB			
FB			
FB			

Description of Activities:

7:05 am	arrived at site	
7:15 am	Pre start	
7:20 am	Resumed drilling work.	
BH04-12m	sandy silt, brown, sand (1-10cm), fine coarse grained.	PID: 0.8 ppm
BH04-14m	Clayey silt, brown, low plasticity	PID: 0.7 ppm
BH04-15.5m	sand, brown, fine grained	PID: 0.8 ppm
BH04-17m	sand, yellow-brown, F-M coarse grained	
SA-SR		PID: 1.1 ppm
BH04-18.5	clay, brown, mottled grey, traces of sand	PID: 1.4 ppm
BH04-20m	Clayey silt, brown, traces of sand, low to medium plasticity	PID: 1.2 ppm
BH04-21.5m	clayey silt, brown, low to medium plasticity	PID: 0.5 ppm
BH04-23m	silty sand, grey, mottled brown, stiff	PID: 0.9 ppm
BH04-24.5m	clay, traces of sand, mottled brown, grey, low to medium plasticity	PID: 1.1 ppm
BH04-26m	silty sandy clay, yellow, brown, grey, low plasticity	PID: 1.9 ppm
BH04-27.5m	sand, fine particles, grey-brown	PID: 0.5 ppm

Description of Activities:

BH04- 30.5 m, sand, grey, f-m c grained, SA-SR PID: 0.7 ppm

BH04- 32 m, sand, dark grey / black, f-m-c grained
SA-SR PID: 1.2 ppm

BH04- 33.5 m, sand, grey, brown, mottled red,
f-m c grained, SA-SR PID: 0.8 ppm

Left the site at 4:40 pm

PROJECT FIELD LOG (DAILY)

Date: 7/7/22 Project Number: 5212 Project Name: cause way bridge drilling
 Arrived: 7:00am Departed: _____ Weather: sunny / cloudy
 PM: Chris Bonnetti
 Field Personnel: P.W
 Contractors: National Geotech under Golden
 Client Contact: Malheix Site Contact: heke

Purpose of Visit (Tick Appropriate Box):

Site Inspection Well Integrity Assessment

Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling

Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling

Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling

Remediation Works Oversight Other (Specify): _____

Equipment Used:
N/A
PID tester (gas only)

Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:

Sampling Conducted: Y N Matrix: Soil Water Air

CoC Completed: Y N

Primary Lab: ALS Secondary Lab: _____

Quality Control Details:

QC	Type	Date and time	Primary	Media
QC				
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QC				

QC	Collection Point	Collection Location	Date and time	Rinsate water batch #
RS				
RS				
RS				
RS				
RS				

QC	Date and time	Trip blank batch #
TB		
TB		
TB		
TB		
TB		

QC	Date and time	Collection Location	Blank water batch #
FB			
FB			
FB			
FB			
FB			

Description of Activities:

7:00 am arrived at site

7:05 am Pre start

7:10 am Remind daily woble

BH04-35m, Sand, grey, brown, SA-SR, P-m
grained

PID: 0.5 ppm

BH04-36.5m, sand, brown, grey, SA-SR, P-m-
grained

PID: 0.5 ppm

BH04-38m, sand, white (1-5cm), brown-grey, SA-SR,
P-m coarse grained

PID: 0.6 ppm

BH04-39.5m Sand, grey, brown, melted red, SA-SR,
P-m coarse grained

PID: 1.1 ppm

BH04-41m, sand, grey, white, SA-SR, P-m coarse
grained

PID: 0.9 ppm

BH04-43.5m, sand, grey-brown, SA-SR-P-m coarse
grained

PID: 1.1 ppm

BH04-44m, clayey sand, dark grey-black, P-m
coarse grained

PID: 1.2 ppm

left site at 4:30 pm

PROJECT FIELD LOG (DAILY)

Date: 8/2/12 Project Number: 5412 Project Name: Causeway bridge drilling
 Arrived: 7:00am Departed: 4:15pm Weather: Sunny
 PM: Chris Donnelly
 Field Personnel: P.W
 Contractors: National Geotech under Golden
 Client Contact: Mallan Site Contact: Leeke
 Purpose of Visit (Tick Appropriate Box):
 Site Inspection Well Integrity Assessment
 Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling
 Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling
 Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling
 Remediation Works Oversight Other (Specify):
 Equipment Used:
N/A
PID (gas only)
 Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:
 Sampling Conducted: Y N Matrix: Soil Water Air
 CoC Completed: Y N
 Primary Lab: ALS Secondary Lab: _____

Quality Control Details:

QC	Type	Date and time	Primary	Media
QC				
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QC	Collection Point	Collection Location	Date and time	Rinsate water batch #
RS				
RS				
RS				
RS				
RS				

QC	Date and time	Trip blank batch #
TB		
TB		
TB		
TB		
TB		

QC	Date and time	Collection Location	Blank water batch #
FB			
FB			
FB			
FB			
FB			

Description of Activities:

7:00 am Arrived at the site

7:10 am Prestart-

7:15 am Drilling started

BH01- ^{2m} 1.5m sand, grey-brown, SA-SR, f-m c sand	PID: 0.4 ppm
BH01-3.5m sand, grey, SA-SR, f-m c sand grad.	PID: 0.6 ppm
BH01-5m, sand, white, grey, SA-SR, f-m c sand grad.	PID: 0.6 ppm
BH01-6.5m clay, dark grey/black, traces of sand & shells, low-medium plasticity	PID: 2.6 ppm
BH01-9.5m, clay, dark grey/black, medium to high plasticity	PID: 1.2 ppm
BH01-12.5m, clay, dark grey, traces of shells, high plasticity	PID: 0.9 ppm
BH01-15.5m, silty clay, dark grey, traces of shells, low-medium plasticity	PID: 0.7 ppm
BH01-17m, clayey sand, grey-brown, fine sand, low plasticity	PID: 0.6 ppm
BH01-18.5m, sand, brown, grey, fine sand,	PID: 0.9 ppm
BH01-20m sand, gravels, brown, yellow, mottled red.	PID: 1.8 ppm
BH01-21.5m sand, fine sand particles, grey to brown	PID: 1.3 ppm

PROJECT FIELD LOG (DAILY)

Date: _____ Project Number: _____ Project Name: _____

Arrived: _____ Departed: _____ Weather: _____

PM: _____

Field Personnel: _____

Contractors: _____

Client Contact: _____ Site Contact: _____

Purpose of Visit (Tick Appropriate Box):

Site Inspection Well Integrity Assessment

Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling

Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling

Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling

Remediation Works Oversight Other (Specify): _____

Equipment Used:

Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:

Sampling Conducted: Y N Matrix: Soil Water Air

CoC Completed: Y N

Primary Lab: _____ Secondary Lab: _____

Description of Activities:

BH01 23 m, sand, grey, brown, fine particle PID: 1.2 ppm
Left the site at 4:05 pm

PROJECT FIELD LOG (DAILY)

Date: 12-7-22 Project Number: 5412 Project Name: Causeway bridge drilling
 Arrived: 7:00 Departed: _____ Weather: odd, clear, fine
 PM: JH
 Field Personnel: BC
 Contractors: _____
 Client Contact: Calvin (holder) Site Contact: _____
 Purpose of Visit (Tick Appropriate Box):
 Site Inspection Well Integrity Assessment
 Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling
 Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling
 Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling
 Remediation Works Oversight Other (Specify): _____
 Equipment Used:
N/A
PID (Gas only)
 Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:
 Sampling Conducted: Y N Matrix: Soil Water Air
 CoC Completed: Y N
 Primary Lab: ALS Secondary Lab: _____

Description of Activities:

7:00 am - Arrive on site

7:15 am - Prestart meeting

BH02 - 2.0 - ^{no SPT sample} (SAND, ^{clayey} dark brown, f-mg, sa-sr, poorly graded
3.5 - PID - 1.2

5.0 - ~~Dark~~ grey CLAY, high plasticity PID - 3.7

6.5 - " + shell fragments PID - 4.5

8.0 - " no shell fragments PID - 4.5

9.5 - " + shells PID - 5.7

11.0 - " + shells PID - 4.2

12.5 - " + shells PID - 3.2

14.0 - silty brown grey sand, shell fragments + worm tubes PID - 5.4

15.5 - brown clayey silty sand, shell + worm tubes PID - 9.2

17.0 - " PID - 5.2

18.5 - brown ^{sandy} silty clay w. lime gravel PID - 2.5

20.0 - orange brown ^{fravelly} silty SAND PID -

f-coarse grained, poorly graded

} strong slow
no slow

PROJECT FIELD LOG (DAILY)

Date: 13/7/22 Project Number: 5412 Project Name: Causeway Drilling

Arrived: 0645 Departed: _____ Weather: clear, sunny.

PM: R.D.

Field Personnel: J. Headon

Contractors: Golders, Nat Geo

Client Contact: _____ Site Contact: _____

Purpose of Visit (Tick Appropriate Box):

- Site Inspection Well Integrity Assessment
- Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling
- Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling
- Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling
- Remediation Works Oversight Other (Specify):

Equipment Used:

PID.

Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:

Sampling Conducted: Y N Matrix: Soil Water Air

CoC Completed: Y N

Primary Lab: _____ Secondary Lab: _____

Quality Control Details:

QC	Type	Date and time	Primary	Media
QC				
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QC				

QC	Collection Point	Collection Location	Date and time	Rinsate water batch #
RS				
RS				
RS				
RS				
RS				

QC	Date and time	Trip blank batch #
TB		
TB		
TB		
TB		
TB		

QC	Date and time	Collection Location	Blank water batch #
FB			
FB			
FB			
FB			
FB			

5412

Description of Activities:

0700- Pre-start

0720- start drilling.

BH02-21.5: orange, med-coarse SAND, w/ fine silt. PID: 5.6 ppm.

BH02-23.0: Pale orange, med-coarse SAND. PID: 0.7 ppm.

BH02-24.5: Dark orange, med-coarse, clayey SAND, clay w/ silt. PID: 0.8 ppm.

BH02-26.0: Dark orange brown, ^{sandy} CLAY, soft, high plasticity PID: 0.0 ppm

BH02-27.5: Dark brown, clayey SAND, medium grained, poorly graded PID: 0.5 ppm

BH02-29: Dark brown, ^{low-mod} sandy CLAY, ^{high} plasticity, hard PID: 0.5 ppm

BH02-30.5: Dark brown " " " " PID: 0.6 ppm

BH02-32.0: " clayey SAND, ^{med} medium grained, ^{poorly} graded = 0.8 ppm

BH02-33.5: - No sample



Leave site 3-30

PROJECT FIELD LOG (DAILY)

Date: 14/7/22 Project Number: _____ Project Name: CAUSEWAY
Arrived: 6.45 Departed: _____ Weather: FIRE - RAIN PREDICTED
PM: CD
Field Personnel: CD
Contractors: NATIONAL GEOTECH / GOLDER WSP
Client Contact: _____ Site Contact: _____
Purpose of Visit (Tick Appropriate Box):
 Site Inspection Well Integrity Assessment
 Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling
 Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling
 Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling
 Remediation Works Oversight Other (Specify): _____
Equipment Used: _____

Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:
Sampling Conducted: Y N Matrix: Soil Water Air
CoC Completed: Y N
Primary Lab: ALS Secondary Lab: _____

Quality Control Details:

QC	Type	Date and time	Primary	Media
QC				
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QC				

QC	Collection Point	Collection Location	Date and time	Rinsate water batch #
RS				
RS				
RS				
RS				
RS				

QC	Date and time	Trip blank batch #
TB		
TB		
TB		
TB		
TB		

QC	Date and time	Collection Location	Blank water batch #
FB			
FB			
FB			
FB			
FB			

Description of Activities:

Re-Start: 6:45 AM. - 30x30 RULE - LIGHTNING STRIKE - 30 MINUTES.
Starting at BH03. → SURFACE

JAR GL-2M - NDD. → BH3 @ 2.0M. - 2.3 PPM

JAR+BAG BH3 @ 3.5-4.0M - 2.6 PPM

JAR+BAG BH3 @ 5.0-5.5M - 4.0 PPM

JAR+BAG BH3 @ 6.5-7.0M - 4.0 PPM

JAR+BAG BH3 @ 8.0M - 4.0 PPM

JAR+BAG BH3 @ 9.5M - 4.7 PPM

JAR+BAG BH3 @ 11.0M - 0.4 PPM

JAR+BAG BH3 @ 12.5-13M - 0.18 PPM

JAR+BAG BH3 @ 14.0 - 1.4 PPM

JAR+BAG BH3 - 15-15.5 - 1.2 PPM

JAR+BAG BH3 @ 16M - 0.6 PPM

JAR+BAG BH3 @ 18.5-18.95 - 1.7 PPM

JAR+BAG BH3 @ 20M - 0.2 PPM

JAR+BAG BH3 @ 21.5-21.95 1.7 PPM

JAR+BAG BH3 @ 23 - 1.0 PPM

JAR+BAG BH3 @ 24.5 - 1.22 PPM

JAR+BAG BH3 @ 25.5-26 - 1.0 PPM

PROJECT FIELD LOG (DAILY)

Date: 4/3/17 Project Number: 5412 Project Name: Case Way GME
 Arrived: 8:10a Departed: 1:45pm Weather: Cloudy/Rainy
 PM: Chris Donetti
 Field Personnel: P.W.
 Contractors: -
 Client Contact: Seymour Site Contact: _____
Purpose of Visit (Tick Appropriate Box):
 Site Inspection Well Integrity Assessment
 Soil Bore Advancement (Drill Rig) Hand Augering Test Pits Soil Sampling
 Monitoring Well Installation (Drill Rig) Groundwater Monitoring Sediment Sampling
 Sub-slab Vapour Probe Installation Landfill Gas Well Installation Gas/ Vapour Sampling
 Remediation Works Oversight Other (Specify): _____
Equipment Used:
Compu + XSI
 Calibration Certificate Received : _____ Calibration Undertaken: _____

Sampling:
 Sampling Conducted: Y N Matrix: Soil Water Air
 CoC Completed: Y N
 Primary Lab: ALS Secondary Lab: _____

Quality Control Details:

QC	Type	Date and time	Primary	Media
QC				
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QC				

QC	Collection Point	Collection Location	Date and time	Rinsate water batch #
RS				
RS				
RS				
RS				
RS				

QC	Date and time	Trip blank batch #
TB		
TB		
TB		
TB		
TB		

QC	Date and time	Collection Location	Blank water batch #
FB			
FB			
FB			
FB			
FB			

Description of Activities:

Arrived at site - 8:15am

Sampling conducted for following sites
BH02, BH05, BH07, BH11

-1 Raining & cloudy weather. Had tough time finding BH02 as it is covered up fully by mud & grass.

Left site at 1:45pm

Groundwater Low Flow Purging: Water Quality Measurement Form

Client: Symons White Constⁿ
 Project: causeway GME
 360 Job No.: 5412
 Location: Point Fraser
 360 Field Representative: P.W.
 Date: 4/2/72
 Pump Type: Pumpup Total Volume purged: _____
 Pump Intake (mbTOC): _____

Monitoring Well ID: CPR- B110210
 Inner Diameter: _____
 Depth to Water (mbTOC): 0.36m
 Depth of Well (mbTOC): 4.53m
 Top of Well Screen (mbTOC): _____
 Bottom of Well Screen (mbTOC): _____
 Height of Riser*(m above/below ground) _____
 Presence & thickness of LNAPL: _____

Time ¹	Depth to groundwater (mbTOC) ²	Purge rate (mL/min) ³	Temp (°C)		D.O ⁴ (mg/L)		10%		Spec. Cond. (µS/cm)		3%		pH (unit)		± 0.1		ORP (mV)		±10		Comments
			Reading	% between readings	Reading	% between readings	Reading	% between readings	Reading	% between readings	Reading	% between readings	Reading	± between readings	Reading	± between readings	Reading	± between readings			
Start:	Start:																				
9:41	0.36m		15.5		2.90				2401				7.62				-56.2				
9:46	0.87m		15.4		0.73				2348	7.3			7.32				-89.6				light yellow, non/meltable
9:51	0.87m		15.5		0.50				2293				7.32				-103.4				smell, medium turbidity
9:56	0.87m		15.5		0.48				2258				7.30				-105.9				
SAMPLING:																					

Notes:
¹ Readings to be collected every five minutes or greater.
² Drawdown should not exceed 9 cm ONCE first set of readings obtained. This allows for natural drawdown stabilisation to occur.
³ Must be such that the drawdown doesn't exceed 9 cm, or if it does exceed, remains stable.
⁴ 10% for values greater than 0.5 mg/L; if three DO values are less than 0.5 mg/L, consider these values as stabilised.
 The depth to groundwater measurement must be recorded before SAMPLING
 VOC samples must be collected first
 Pump intake should be located within the screen interval & at the mid point of the saturated screen length
 * Gatic cover riser height should be a negative value
 In the event that the recharge is very slow and the well runs dry, the readings may be collected at intervals of less than 5 minutes or for every litres purged
 If a well runs dry, it is assumed that stabilisation will have occurred once the it has recharged and that samples can be collected straight after
 A minimum of 4 readings are required, unless the well runs dry
 To calculate % difference, use the following equation: $((R2-R1)/((R2+R1)/2))*100$

Legend:
 mbTOC= metres below top of casing
 DO = dissolved oxygen
 ORP = oxygen reduction potential

Groundwater Low Flow Purging: Water Quality Measurement Form

Client: Seymour Whyte Constⁿ
 Project: Causeway CRME
 360 Job No.: 5412
 Location: Herring Island
 360 Field Representative: P.H.
 Date: 4/8/22
 Pump Type: Peristaltic Total Volume purged: _____
 Pump Intake (mbTOC): _____

Monitoring Well ID: CPB-BH05H
 Inner Diameter: _____
 Depth to Water (mbTOC): 1.13m
 Depth of Well (mbTOC): 6m
 Top of Well Screen (mbTOC): _____
 Bottom of Well Screen (mbTOC): _____
 Height of Riser*(m above/below ground) _____
 Presence & thickness of LNAPL: _____

Time ¹	Depth to groundwater (mbTOC) ²	Purge rate (mL/min) ³	Temp (°C)		D.O ⁴ (mg/L)		Spec. Cond. (µS/cm)		pH (unit)		ORP (mV)		Comments
			Reading	% between readings	Reading	% between readings	Reading	% between readings	Reading	± 0.1	Reading	± 10	
Start:	Start:												
11.01	1.13		18.7		0.39		39624		6.57		-71.6		Colours, odourless, Low turbidity
11.06	1.30m		19.3		0.26		36915		6.06		-39.6		
11.11	1.30m		18.3		0.23		37300		6.02		-50.8		
11.16 11.16	4		18.1		0.34		37422		6.03		-64.0		
11.21	4		18.1		0.35		37464		6.10		-62.1		
SAMPLING:													

Notes:
¹ Readings to be collected every five minutes or greater.
² Drawdown should not exceed 9 cm ONCE first set of readings obtained. This allows for natural drawdown stabilisation to occur.
³ Must be such that the drawdown doesn't exceed 9 cm, or if it does exceed, remains stable.
⁴ 10% for values greater than 0.5 mg/L; if three DO values are less than 0.5 mg/L, consider these values as stabilised.
 The depth to groundwater measurement must be recorded before SAMPLING
 VOC samples must be collected first
 Pump intake should be located within the screen interval & at the mid point of the saturated screen length
 * Gatic cover riser height should be a negative value
 In the event that the recharge is very slow and the well runs dry, the readings may be collected at intervals of less than 5 minutes or for every litres purged
 If a well runs dry, it is assumed that stabilisation will have occurred once the it has recharged and that samples can be collected straight after
 A minimum of 4 readings are required, unless the well runs dry
 To calculate % difference, use the following equation: $((R2-R1)/((R2+R1)/2))*100$

Legend:
 mbTOC = metres below top of casing
 DO = dissolved oxygen
 ORP = oxygen reduction potential

Groundwater Low Flow Purging: Water Quality Measurement Form

Client: Seymour Whyte Constⁿ
 Project: Caseberg GME
 360 Job No.: 5412
 Location: Herrison Island
 360 Field Representative: _____
 Date: 4/8/22
 Pump Type: Peristaltic Total Volume purged: _____

Monitoring Well ID: BH07
 Inner Diameter: _____
 Depth to Water (mbTOC): 2.75m
 Depth of Well (mbTOC): 12.3m
 Top of Well Screen (mbTOC): _____
 Bottom of Well Screen (mbTOC): _____
 Height of Riser*(m above/below ground) _____
 Presence & thickness of LNAPL: _____

Time ¹	Depth to groundwater (mbTOC) ²	Purge rate (mL/min) ³	Temp (°C)		D.O. ⁴ (mg/L)		Spec. Cond. (µS/cm)		pH (unit)		ORP (mV)		Comments
			Reading	% between readings	Reading	% between readings	Reading	% between readings	Reading	± between readings	Reading	± between readings	
Start:	Start:												
11:52	2.75m		20.6		0.56		3437		7.12		-121.2		Colored, pungent odour, medium turbidity
11:57	3.54m		20.5		0.37		34591		7.13		-145.7		
12:02	3.66m		20.7		0.20		34759		7.12		-156.8		
12:07	3.73m		20.8		0.18		35035		7.11		-160.4		
SAMPLING:													

Notes:
¹ Readings to be collected every five minutes or greater.
² Drawdown should not exceed 9 cm ONCE first set of readings obtained. This allows for natural drawdown stabilisation to occur.
³ Must be such that the drawdown doesn't exceed 9 cm, or if it does exceed, remains stable.
⁴ 10% for values greater than 0.5 mg/L; if three DO values are less than 0.5 mg/L, consider these values as stabilised.
 The depth to groundwater measurement must be recorded before SAMPLING
 VOC samples must be collected first
 Pump intake should be located within the screen interval & at the mid point of the saturated screen length
 * Gatic cover riser height should be a negative value
 In the event that the recharge is very slow and the well runs dry, the readings may be collected at intervals of less than 5 minutes or for every litres purged
 If a well runs dry, it is assumed that stabilisation will have occurred once the it has recharged and that samples can be collected straight after
 A minimum of 4 readings are required, unless the well runs dry
 To calculate % difference, use the following equation: $((R2-R1)/((R2+R1)/2))*100$

Legend:
 mbTOC = metres below top of casing
 DO = dissolved oxygen
 ORP = oxygen reduction potential

Groundwater Low Flow Purging: Water Quality Measurement Form

Client: Seymour's Whyle coastⁿ
 Project: cause way 5, m6
 360 Job No.: 5412
 Location: McCallum Park
 360 Field Representative: P. W
 Date: 4/2/22
 Pump Type: Pump Total Volume purged: _____

Monitoring Well ID: BH14
 Inner Diameter: _____
 Depth to Water (mbTOC): 0.65m
 Depth of Well (mbTOC): 6.2m
 Top of Well Screen (mbTOC): _____
 Bottom of Well Screen (mbTOC): _____
 Height of Riser*(m above/below ground) _____
 Presence & thickness of LNAPL: _____

Pump Intake (mbTOC): _____

Time ¹	Depth to groundwater (mbTOC) ²	Purge rate (mL/min) ³	Temp (°C)	3%	D.O ⁴ (mg/L)	10%	Spec. Cond. (µS/cm)	3%	pH (unit)	± 0.1	ORP (mV)	±10	Comments
			Reading	% between readings	Reading	% between readings	Reading	% between readings	Reading	% between readings	Reading	± between readings	
Start:	Start:												
13.04	0.65m		19.3		0.59		48677		7.34		-136.7		colorless, odorless, medium turbid, fey
13.09	0.77m		19.2		0.17		49573		7.30		-138.4		
13.14	0.75m		19.3		0.16		49631		7.25		-134.3		
13.19	0.72m		19.2		0.17		21983 ³		7.24		-133.3		
GAGC taken here													
SAMPLING:													

Notes:
¹ Readings to be collected every five minutes or greater.
² Drawdown should not exceed 9 cm ONCE first set of readings obtained. This allows for natural drawdown stabilisation to occur.
³ Must be such that the drawdown doesn't exceed 9 cm, or if it does exceed, remains stable.
⁴ 10% for values greater than 0.5 mg/L; if three DO values are less than 0.5 mg/L, consider these values as stabilised.
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 To calculate % difference, use the following equation: $((R2-R1)/((R2+R1)/2))*100$

Legend:
 mbTOC = metres below top of casing
 DO = dissolved oxygen
 ORP = oxygen reduction potential

JOB HAZARD ANALYSIS (JHA) DEVELOPMENT & APPROVAL

The completion of a quality JHA has 4 steps:

STEP 1 – PLANNING & PREPARATION

1. Check items 1-6 on the *JHA Development Checklist* to ensure the correct people are involved in the development of this JHA
2. Check if there are any existing procedures or JHA's relevant to the work
3. Check to see if you will be travelling more than three hours one way. Please complete a [HSE-FO-01203 - Journey Management Plan](#) if this is required.

JHA DEVELOPMENT CHECKLIST	
These items are required to complete a quality JHA	
1. Must involve people performing the job	<input checked="" type="checkbox"/>
2. Must involve people with knowledge of the job	<input checked="" type="checkbox"/>
3. Is there a work procedure or JHA to be reviewed?	<input checked="" type="checkbox"/>
4. Are chemicals involved? Review MSDS and hazardous materials register N/A	<input type="checkbox"/>
5. Are required permits, isolations and hold points listed?	<input checked="" type="checkbox"/>
6. Appropriate standards and work practices referenced N/A	<input type="checkbox"/>

STEP 2 – JHA DEVELOPMENT

1. Individual going to site must write up the JHA
2. *The JHA must be hand written should it be required for a client site*
3. Break down job into a sequence of specific steps
4. Use **Potential Hazards List and Hazard Mechanisms** (page 2) as a prompt to identify hazards
5. Identify the potential risks or hazardous conditions for each job step
6. Refer to the Risk Assessment Matrix (page 7) to determine **inherent risk level**
7. Devise safe work practices or controls for each step
8. Use the **Hierarchy of Control** (below) to manage hazards to a level As Low As Reasonably Practicable (ALARP)
9. Using the **Risk Assessment Matrix** (page 8) complete the **residual risk level** with the identified controls in place

HIERARCHY OF CONTROL	
Eliminate	Eliminate the hazard
Substitute	Substitute with alternative procedure/equipment

Engineer	Engineering controls (e.g. redesign the task step)
Administration	Procedures/training
PPE	Personal Protective Equipment

STEP 3 – APPROVALS & DOCUMENT CONTROL

1. JHA must be reviewed and approved by the Project Manager. If they are not available the HSEQ Coordinator or Team Leader can approve the document
2. The JHA must be entered into 360 Environmental JHA register; [..\6.06 Registers\HSE-RE-00401 - JHA Register.xlsx](#); in order to obtain the JHA reference number.
3. Call in details must be entered into the JHA as well as the [Call in Register](#)
4. Once in the field; **JHA must be reviewed and amended to include site specific hazards and signed daily** by all personnel at the daily Toolbox meeting
5. Hard copy of JHA must be returned to HSEQ Coordinator for filing following a field visit

STEP 4 – JOB TASK CONSIDERATIONS

1. Take-5 prior to commencing a new task
2. Is there an easier/safer way to carry out the task
3. Can the job be moved to a safer location?
4. Consider others working nearby
5. Ensure all personnel wear correct PPE
6. Ensure all manual handling in accordance with Manual Handling Procedure
7. *If job scope changes, stop work, revise JHA, review before resuming task*
8. Ensure permits are entered into JHA, and understood

POTENTIAL HAZARDS LIST			POTENTIAL HAZARD EXPOSURE MECHANISMS
Review the job steps and identify any of the following hazards that are applicable			Review the hazards identified and identify potential hazard exposure mechanisms
<input type="checkbox"/> Electricity <input type="checkbox"/> Hot/Cold Objects <input checked="" type="checkbox"/> Rotating Equipment <input checked="" type="checkbox"/> Vehicles <input checked="" type="checkbox"/> Muscular Stress <input checked="" type="checkbox"/> Mental Stress <input checked="" type="checkbox"/> Repetitive Stress <input type="checkbox"/> Heights <input type="checkbox"/> Lone Worker <input type="checkbox"/> Vibration <input checked="" type="checkbox"/> Moving objects <input type="checkbox"/> Confined Spaces <input type="checkbox"/> Asbestos	<input checked="" type="checkbox"/> Weather <input checked="" type="checkbox"/> Insect/Animal Bites <input type="checkbox"/> Lighting <input checked="" type="checkbox"/> Driving Hazards <input type="checkbox"/> Falling Objects <input type="checkbox"/> Noise <input type="checkbox"/> Radiation <input type="checkbox"/> Hydrocarbon/Gas Release <input type="checkbox"/> Surfaces <input checked="" type="checkbox"/> Tools/Equipment <input checked="" type="checkbox"/> Human Factors <input checked="" type="checkbox"/> New to Site <input type="checkbox"/> New Employee (SSE) <input checked="" type="checkbox"/> Off-Road	<input checked="" type="checkbox"/> Chemicals <input checked="" type="checkbox"/> Excavations/Earthworks <input type="checkbox"/> Fire <input type="checkbox"/> Introduced Animals/plants <input type="checkbox"/> Historical Sites <input type="checkbox"/> Bush clearing <input type="checkbox"/> Spills leaks <input checked="" type="checkbox"/> Mobile/Stationary Equipment <input type="checkbox"/> Pressure (Stored energy) <input checked="" type="checkbox"/> Fumes/Vapour/Dust <input checked="" type="checkbox"/> Depths	<input checked="" type="checkbox"/> Struck – by/against <input checked="" type="checkbox"/> Contact with <input checked="" type="checkbox"/> Contacted by <input checked="" type="checkbox"/> Caught – in/on/under/between/against <input checked="" type="checkbox"/> Exposure – temperature/chemicals/noise/dust <input checked="" type="checkbox"/> Slip, Trip or Fall – from heights/same level <input checked="" type="checkbox"/> Overexertion/excessive force – lifting/pushing/pulling <input checked="" type="checkbox"/> Escape of Product – oil spill/gas release <input checked="" type="checkbox"/> Human Factors <ul style="list-style-type: none"> <input type="checkbox"/> Incorrect use of tools <input type="checkbox"/> repetitive work <input type="checkbox"/> perceived pressure/haste <input type="checkbox"/> arduous tasks <input type="checkbox"/> uncomfortable work position <input type="checkbox"/> mundane work <input type="checkbox"/> training <input type="checkbox"/> communications/instruction <input checked="" type="checkbox"/> Weather conditions <ul style="list-style-type: none"> <input type="checkbox"/> hot/dry <input type="checkbox"/> humid <input type="checkbox"/> wet <input type="checkbox"/> windy <input type="checkbox"/> cold <input type="checkbox"/> cyclone <input type="checkbox"/> electrical storm <input type="checkbox"/> flooding
<i>Where applicable the following items of PPE or safety equipment are required:</i>			
<input checked="" type="checkbox"/> Eye/Face protection <input checked="" type="checkbox"/> Head protection <input checked="" type="checkbox"/> Foot protection <input checked="" type="checkbox"/> Body protection <input checked="" type="checkbox"/> Hearing protection	<input checked="" type="checkbox"/> Hand protection <input type="checkbox"/> Gas Detector <input checked="" type="checkbox"/> Sunscreen <input type="checkbox"/> Safety/Rescue line	<input type="checkbox"/> Respiratory protection <input type="checkbox"/> Safety harness	Contractor List: N/A

JOB HAZARD ANALYSIS

DATE JHA completed: 25/06/2022		PROJECT NAME & ADDRESS: McCallum Park, Garland Street, Victoria Park WA Herisson Island, East Perth, WA Point Fraser, East Perth		JOB NUMBER: 5142	
DATE/s of travel: 27/6/2022 – 15/7/2022					
DESCRIPTION OF WORK SCOPE: Collection of soil samples from soil bores and test pits undertaken by 3 rd Parties. Gauging and collection of groundwater samples from 4 existing wells.					
EMPLOYEE/S IN FIELD: James Headon, Phuntsho Wangdi SUBCONTRACTORS: N/A					
JHA DEVELOPED BY: James Headon					JHA REFERENCE NO: 1857
CALL IN TIMES : Various times	INITIAL DETAILS ENTERED INTO CALL IN REGISTER BY THE EMPLOYEE TRAVELLING IN THE FIELD Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		NAME OF DCD (DEFAULTS TO ADMIN DURING OFFICE HOURS. IF OUT OF OFFICE HOURS THIS WILL BE THE PM, TL OR HSEQ) Julie Palich/James Headon		REMINDER TO DCD: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
DESIGNATED MUSTER POINT:	Site Office/Muster Point				
LOCAL EMERGENCY SERVICE CONTACT:	000 Royal Perth Hospital (Victoria Square, Perth 6000) (08 9224 2244) – approx. 10 mins from site.				
ALLERGIES AND MEDICATION OF PEOPLE TRAVELLING IN THE FIELD: Nil					
360ENV PROJECT MANAGER: Chris Donnetti		360ENV HSEQ Representative: Paul Monaco		CLIENT PROJECT MANAGER: Mathieu Lemoine	
EMAIL: Chrisdonnetti@360environmental.com.au		EMAIL: Paulmonaco@360environmental.com.au		EMAIL: Mathieu.Lemoine@seymourwhyte.com.au	
PHONE: (08) 9388 8360		PHONE: +61 8 9388 8360		PHONE:	
MOBILE: 0415 803 884		MOBILE: 0434 152 590		MOBILE: 0428 430 616	

STEP# JOB STEPS (SEQUENCE OF EVENTS)	HAZARDS (REFER TO POTENTIAL HAZARDS LIST)		RISK MANAGEMENT		
	POTENTIAL HAZARDS	INHERENT RISK	CONTROLS	RESIDUAL RISK	ACTION BY
1. Travel to/from site	Car accident	H	<ul style="list-style-type: none"> Use all car safety features (e.g. seat belt, head lights) Drive to weather and conditions, Obey all road rules and signage Contact 360 representative to inform arriving at site and when leaving at end of work day Take Sunglasses, Mobile phone and first aid kit in car 	L	ALL
2. Working on site	Exposure to weather	M	<ul style="list-style-type: none"> Sun protective clothing/glasses/sunscreen/hat/winter jackets according to weather Ensure adequate hydration Take regular breaks If feeling lightheaded, stop work and take a break before continuing. 	L	ALL
	Muscular stress	M	<ul style="list-style-type: none"> Share loads/ask for assistance when lifting heavy objects Use correct lifting technique 	L	ALL
	Contact with contaminants	M	<ul style="list-style-type: none"> No eating, drinking or smoking in vicinity of sampling works, wash hands after sampling and before eating and drinking. Avoid touching bare skin, mouth or eyes with used gloves. Wear appropriate PPE at all times when sampling. (boots, gloves, hard hat, safety glasses) If contaminant of risk to human health contacted, stop work, don appropriate PPE and make project manager aware of situation. If light headedness occurs when sampling the stop work and contact site manager. Take regular breaks from working area 	L	ALL
	Animal bites/stings	L	<ul style="list-style-type: none"> Remain alert when if working near/moving through overgrown areas for snakes and insects. Avoid walking through tall grass if possible Wear appropriate PPE at all times when sampling (boots, long sleeves and pants). 	L	ALL
	Slip/trip/fall (uneven ground)	L	<ul style="list-style-type: none"> Watch footing and surrounding Establish and maintain a clear work area Wear appropriate PPE (boots) Avoid areas with uneven surfaces and dense vegetation 	L	ALL
	Working near roads	H	<ul style="list-style-type: none"> All works will be undertaken within the areas marked by Seymour White. 	L	ALL

Test pitting / Drilling	Working near plant (moving parts)	High	<ul style="list-style-type: none"> Establish safe working area in vicinity of excavator with signage and/or barricading as appropriate. 5m exclusion zone from excavator whilst in use Always have radio or be in the vision of operator Maintain positive eye contact and await signal to approach excavator. Always ensure bucket is grounded and machine is powered down when approaching excavator. Do not enter test pits. <p>Samples will be brought outside the 5m radius from the rig for sample collection.</p>	Low	All
	Dust	Medium	<ul style="list-style-type: none"> Be aware of potential dust issues on site and prepared to stop work if required. Conduct test pitting when wind is at its lowest. 	Low	All
	Contact with buried services	Medium	<ul style="list-style-type: none"> Request and review DBYD and available underground services information. Service locator to mark out all services detected at surface using marking paint. Service locator to clear all services within proposed test pit area (2m x 2m box) Service locator to clear all services withing proposed drill location. Sampling locations relocated away from crucial services (minimum 5 m) where possible 	Low	WSP - Golders
	Noise	Medium	<ul style="list-style-type: none"> Use appropriate hearing protection. Wear ear plugs where appropriate 	Low	All
	Site Users	Medium	<ul style="list-style-type: none"> Ensure excavator is cordoned off from site users with hazard tape / cones / bollards. Spotter to ensure site users do not enter marked off area. 	Low	WSP- Golders
	Muscular stress	Medium	<ul style="list-style-type: none"> Share loads/ask for assistance when lifting heavy objects (eskys full of sample bottles) Use correct lifting techniques. 	Low	All
	Pinch points	Medium	<ul style="list-style-type: none"> Be aware of pinch points in sampling equipment 	Low	All

	TestPit - Fall into excavations	Medium	<ul style="list-style-type: none"> All excavations will be back-filled once logging and sampling are complete, and the archaeologist is satisfied that no items of heritage have been discovered. Once backfilled the area will be tracked over to ensure compaction. Ensure work area is ready for pedestrian (tourist) traffic upon completion. 	Low	All
	River.	High	<ul style="list-style-type: none"> Stays 2m away from edge. 	Low	ALL

JHA APPROVALS

All personnel involved in approval of this JHA shall enter their names below and sign to confirm they have read and approved the conditions of the JHA.

POSITION	NAME	SIGNATURE	DATE	COMPANY
Project Manager	Chris Donnetti	<i>Chris Donnetti</i>	26/6/22	360 Environmental

RISK = CONSEQUENCE X LIKELIHOOD

Step 1: Identify the consequence; the outcome of an event

	INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC
SAFETY	Low level short term subjective inconvenience or symptoms. Typically a first aid and no medical treatment	Reversible injuries requiring treatment, but does not lead to restricted duties. Typically a medical treatment	Reversible injury or moderate irreversible damage or impairment to one or more persons. Typically a lost time injury	Single fatality and/or severe irreversible damage or severe impairment to one or more persons	Multiple fatalities or permanent damage to multiple people
HEALTH	Reversible health effects, requiring first aid treatment at most. Can include minor irritations of eyes, throat, nose and or skin, or minor unaccustomed muscular discomfort	Reversible health effects that would typically result in medical treatment. Can include temperature effects; travel effects; stress; minor cuts and sunburn	Severe, reversible health effects that would typically result in a lost time illness. Can include acute/short-term effects associated with extreme temperature effects; muscular-skeletal effects; vibration effects; nervous system effects; some infectious diseases	Single fatality or irreversible health effects or disabling illness. Can include progressive chronic conditions and / or acute / short-term high-risk effects	Multiple fatalities or serious disabling illness to multiple people. Can include effects of carcinogens, mutagens, teratogens and reproductive toxicants (known and suspected), and life threatening respiratory sensitization and malaria
REPUTATIONAL	Internal Only: Damage to reputation or values of reputation of work area within a work area or team	Internal Only: Damage to reputation or values of several work areas or team for a single issue on one project	Damage to reputation of 360 Environmental values (professionalism, trust). One off public exposure in local media, word of mouth or local mythologies	Criticism which impacts credibility with clients/government and other stakeholders. Minor exposure in local media	Criticism which impacts credibility with clients, government and other stakeholders. Impacts key stakeholders/clients, and has a long-term effect on business. Significant public exposure in local or national media
CONFORMANCE/ COMPLIANCE	Non-conformance with internal procedure with low potential for impact	Non-compliance with external standard, contract or procedure with low potential for impact - Root Cause Analysis may be required	Non-compliance with moderate potential for impact e.g. one-off noncompliance with licence; fine for breach of permit or licence	Breach of licences, legislation, regulation or repeated non-compliance with high potential for prosecution. Non-conformance with corporate standards	Legal dispute directly attributable to professional negligence
ENVIRONMENT	Temporary, readily reversible impact; localised event location of little environmental value. No impact or disruption to project delivery	Temporary change to the environmental conditions of an area or system; isolated and localised environmental impact requiring some work to reverse; Minor, temporary disruption to project delivery	Direct or indirect environmental impacts to an area or system; stakeholder concern over environmental nuisance. Reportable to regulators. Some disruption to project delivery	Actual or potential environmental harm either temporary or permanent, requiring immediate attention; Moderate environmental impact. Reportable to regulators; Possible prosecution	Serious environmental harm causing actual or potential environmental impacts that are irreversible; of high impact or widespread. Substantial failure of environmental control system. Reportable to regulators; Likely prosecution resulting in fine
FINANCIAL	Up to \$1,000 loss or less than 0.25% impact on revenue	Up to \$5,000 loss or up to 5% impact on revenue	Up to \$50,000 loss or between 5-10% impact on revenue	Up to \$500,000 loss or between 10-25% impact on revenue	Greater than \$500,000 loss or more than 25% impact on revenue

Step 2: Determine the likelihood; the chance of something happening

LIKELIHOOD	LIKELIHOOD DESCRIPTION	FREQUENCY	PROBABILITY
ALMOST CERTAIN	Is expected to occur in most circumstances	Occurs more than twice per year	>1 in 10
LIKELY	Will probably occur	Typically occurs once or twice per year	1 in 10-100
POSSIBLE	Might occur at some time in the future	Typically occurs in 1-10 years	1 in 100-1,000
UNLIKELY	Could occur but doubtful	Typically occurs in 10-100 years	1 in 1,000 -10,000
RARE	May occur but only in exceptional circumstances	Greater than 100 year event	1 in 10,000-100,000

Step 3: Determine the risk

LIKELIHOOD	CONSEQUENCE					RISK ACCEPTANCE THRESHOLD
	INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC	
ALMOST CERTAIN	M	H	H	E	E	L – Risks are below risk acceptance threshold; do not require active management
LIKELY	M	M	H	H	E	M – Risks lie on the risk acceptance threshold; require active monitoring
POSSIBLE	L	M	M	H	E	H – Risks exceed risk acceptance threshold; require active management
UNLIKELY	L	M	M	H	H	E – Risks significantly exceed risk acceptance threshold; need urgent and immediate attention
RARE	L	L	M	M	H	

Appendix C

Laboratory Certification of Analysis



CHAIN OF CUSTODY

ALS Laboratory please tick ->

LADELAIDE 21 Burma Road Puerako SA 5096
Ph: 08 8358 0890 E: adelaide@alsglobal.com

MACKAY 78 Harbour Road Mackay QLD 4740
Ph: 07 4944 0177 E: mackay@alsglobal.com

NEWCASTLE 5 Rose Glen Road Waratah NSW 2304
Ph: 02 4668 9133 E: samples.newcastle@alsglobal.com

SYDNEY 277-289 Woodbank Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

CLIENT: 360 Environmental

TURNAROUND REQUIREMENTS: Standard TAT (List due date): 06/07/2022

OFFICE: 10 Bermondsey Street, West Leederville

(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)

PROJECT: 5412 - Causeway Pedestrian Bridge

ALS QUOTE NO.: EP/469/22

ORDER NUMBER: 5412-002

PROJECT MANAGER: Chris Donnetti

CONTACT PH: 0415 803 864

SAMPLER: Phunsto Wangdi

SAMPLER MOBILE: 0433 907 756

RELINQUISHED BY: [Signature]

RECEIVED BY: SP

RECEIVED BY: [Signature]

COC emailed to ALS? (YES / NO)

EDD FORMAT (or default): Estdat +Excel

DATE/TIME: 29.6.22

DATE/TIME: 1600 29/6/22

DATE/TIME:

Email Reports to (will default to PM if no other addresses are listed): labresults@360environmental.com.au & chrisdonnetti@360environmental.com.au

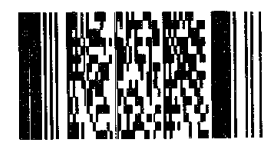
Email Invoice to (will default to PM if no other addresses are listed): accounts@360environmental.com.au

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

Table with columns: LAB ID, SAMPLE ID, DATE / TIME, MATRIX, TYPE & PRESERVATIVE, TOTAL CONTAINERS, pH, CRS Suite, Suite S24 - TRH (CS-C40) / BTEX / PAH / Phenols, S12 - OC/OP Pesticides, Suite N18 S- Total Nitrogen, TRN, NOx, NO2, NO3, NH3, Total Phosphorus, HOLD, Additional Information.

22. BH08@35-35.45

Environmental Division Perth Work Order Reference EP2208112



Telephone : - 61-8-9406 1301

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cl Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airflight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airflight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solids; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order	: EP2208112	Page	: 1 of 13
Amendment	: 1	Laboratory	: Environmental Division Perth
Client	: 360 ENVIRONMENTAL PTY LTD	Contact	: Natalie Duncan
Contact	: CHRIS DONNETTI	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Address	: 10 Bermondsey St West Leederville 6007	Telephone	: +61-8-9406 1301
Telephone	: 9388 8360	Date Samples Received	: 29-Jun-2022 16:00
Project	: 5412 - Causeway Pedestrian Bridge	Date Analysis Commenced	: 30-Jun-2022
Order number	: 5412-002	Issue Date	: 17-Aug-2022 16:40
C-O-C number	: ----		
Sampler	: Phunsto Wangdi		
Site	: ----		
Quote number	: EP/469/22		
No. of samples received	: 22		
No. of samples analysed	: 8		



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
- Surrogate Control Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, Western Australia
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, Western Australia
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, Western Australia



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 Contract 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.

- EK061G and EK067G conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- Amendment (11/08/2022): This report has been amended and re-released to allow the reporting of additional analytical data, specifically method EA033-WA.
- ASS: EA033 (CRS Suite): ANC not required for sample #1 and #16 because pH KCl less than 6.5
- 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'.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH08 @26 m	BH08 @ 30 m	BH08 @ 33.5 -33.95 m	BH08 @ 39.5 -39.45 m	BH07 @ 3.5 m
Sampling date / time				27-Jun-2022 00:00	27-Jun-2022 00:00	27-Jun-2022 00:00	27-Jun-2022 00:00	28-Jun-2022 00:00	
Compound	CAS Number	LOR	Unit	EP2208112-001	EP2208112-003	EP2208112-006	EP2208112-009	EP2208112-010	
				Result	Result	Result	Result	Result	
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit	6.4	8.1	7.5	7.6	8.8	
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit	5.6	6.9	6.9	6.8	----	
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	42	<2	<2	<2	----	
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.07	<0.02	<0.02	<0.02	----	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S	2.77	0.006	0.006	0.032	----	
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	1730	<10	<10	20	----	
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	13.6	0.17	0.10	----	
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	2710	34	19	----	
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	4.35	0.05	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	2.84	<0.02	<0.02	<0.02	----	
Net Acidity (acidity units)	----	10	mole H+ / t	1770	<10	<10	<10	----	
Liming Rate	----	1	kg CaCO3/t	133	<1	<1	1	----	
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	2.84	<0.02	<0.02	0.03	----	
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	1770	<10	<10	20	----	
Liming Rate excluding ANC	----	1	kg CaCO3/t	133	<1	<1	1	----	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	14.3	21.7	21.7	19.4	40.2	
EK055: Ammonia as N									
Ammonia as N	7664-41-7	20	mg/kg	<20	<20	<20	<20	<20	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	0.2	0.2	0.4	0.1	<0.1	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	0.2	0.2	0.4	0.1	<0.1	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH08 @26 m	BH08 @ 30 m	BH08 @ 33.5 -33.95 m	BH08 @ 39.5 -39.45 m	BH07 @ 3.5 m
Sampling date / time				27-Jun-2022 00:00	27-Jun-2022 00:00	27-Jun-2022 00:00	27-Jun-2022 00:00	28-Jun-2022 00:00	
Compound	CAS Number	LOR	Unit	EP2208112-001	EP2208112-003	EP2208112-006	EP2208112-009	EP2208112-010	
				Result	Result	Result	Result	Result	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser - Continued									
Total Kjeldahl Nitrogen as N	----	20	mg/kg	380	40	20	20	690	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	380	40	20	20	690	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	56	79	34	30	147	
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	



Analytical Results

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Sampling date / time				27-Jun-2022 00:00	27-Jun-2022 00:00	27-Jun-2022 00:00	27-Jun-2022 00:00	28-Jun-2022 00:00	
Compound	CAS Number	LOR	Unit	EP2208112-001	EP2208112-003	EP2208112-006	EP2208112-009	EP2208112-010	
				Result	Result	Result	Result	Result	
EP068B: Organophosphorus Pesticides (OP) - Continued									
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1	
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH08 @26 m	BH08 @ 30 m	BH08 @ 33.5 -33.95 m	BH08 @ 39.5 -39.45 m	BH07 @ 3.5 m
Sampling date / time					27-Jun-2022 00:00	27-Jun-2022 00:00	27-Jun-2022 00:00	27-Jun-2022 00:00	28-Jun-2022 00:00
Compound	CAS Number	LOR	Unit	EP2208112-001	EP2208112-003	EP2208112-006	EP2208112-009	EP2208112-010	
				Result	Result	Result	Result	Result	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10	
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50	
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10	
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50	
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50	
EP080: BTEXN									



Analytical Results

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Compound	CAS Number	LOR	Unit	EP2208112-001	EP2208112-003	EP2208112-006	EP2208112-009	EP2208112-010	
				Result	Result	Result	Result	Result	
EP080: BTEXN - Continued									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	92.4	93.3	82.0	82.1	82.3	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%	123	121	83.4	101	95.9	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	69.4	72.4	73.0	69.4	85.0	
2-Chlorophenol-D4	93951-73-6	0.5	%	77.3	77.8	81.3	77.7	85.4	
2,4,6-Tribromophenol	118-79-6	0.5	%	83.4	88.0	88.6	82.4	82.6	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%	86.7	84.2	88.8	87.0	89.3	
Anthracene-d10	1719-06-8	0.5	%	81.5	84.8	85.6	82.0	82.9	
4-Terphenyl-d14	1718-51-0	0.5	%	83.5	122	92.7	88.5	83.8	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	82.9	84.4	84.0	83.0	76.1	
Toluene-D8	2037-26-5	0.2	%	91.0	89.8	90.3	89.1	79.5	
4-Bromofluorobenzene	460-00-4	0.2	%	92.6	92.1	94.7	85.2	85.9	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH7 @ 6.5-6.95 m	BH7 @ 14.0-14.45 m	BH7 @ 20.0 m	----	----
Sampling date / time				28-Jun-2022 00:00	28-Jun-2022 00:00	28-Jun-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2208112-011	EP2208112-016	EP2208112-020	-----	-----	
				Result	Result	Result	----	----	
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit	8.2	6.4	8.1	----	----	
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit	8.6	5.1	8.1	----	----	
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	33	<2	----	----	
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	0.05	<0.02	----	----	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.892	<0.005	2.40	----	----	
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	556	<10	1500	----	----	
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	2.24	----	13.0	----	----	
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	447	----	2600	----	----	
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.72	----	4.17	----	----	
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	----	----	
Net Acidity (sulfur units)	----	0.02	% S	0.41	0.06	<0.02	----	----	
Net Acidity (acidity units)	----	10	mole H+ / t	258	35	<10	----	----	
Liming Rate	----	1	kg CaCO3/t	19	3	<1	----	----	
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.89	0.06	2.40	----	----	
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	556	35	1500	----	----	
Liming Rate excluding ANC	----	1	kg CaCO3/t	42	3	112	----	----	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	27.4	31.2	40.2	----	----	
EK055: Ammonia as N									
Ammonia as N	7664-41-7	20	mg/kg	<20	<20	<20	----	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	<0.1	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	0.2	0.5	0.2	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	0.2	0.5	0.2	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH7 @ 6.5-6.95 m	BH7 @ 14.0-14.45 m	BH7 @ 20.0 m	----	----
Sampling date / time				28-Jun-2022 00:00	28-Jun-2022 00:00	28-Jun-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2208112-011	EP2208112-016	EP2208112-020	-----	-----	
				Result	Result	Result	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser - Continued									
Total Kjeldahl Nitrogen as N	----	20	mg/kg	390	290	2090	----	----	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	390	290	2090	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	133	528	1250	----	----	
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH7 @ 6.5-6.95 m	BH7 @ 14.0-14.45 m	BH7 @ 20.0 m	----	----
Sampling date / time					28-Jun-2022 00:00	28-Jun-2022 00:00	28-Jun-2022 00:00	----	----
Compound	CAS Number	LOR	Unit		EP2208112-011	EP2208112-016	EP2208112-020	-----	-----
					Result	Result	Result	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued									
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Fenthion	55-38-9	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Parathion	56-38-2	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2-Methylphenol	95-48-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	<1	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2,4-Dimethylphenol	105-67-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2,4-Dichlorophenol	120-83-2	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2,6-Dichlorophenol	87-65-0	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Pentachlorophenol	87-86-5	2	mg/kg		<2	<2	<2	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH7 @ 6.5-6.95 m	BH7 @ 14.0-14.45 m	BH7 @ 20.0 m	----	----
Sampling date / time					28-Jun-2022 00:00	28-Jun-2022 00:00	28-Jun-2022 00:00	----	----
Compound	CAS Number	LOR	Unit		EP2208112-011	EP2208112-016	EP2208112-020	-----	-----
				Result	Result	Result	----	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	----	----	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	----	----	
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	----	----	
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	----	----	
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	----	----	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	----	----	
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	----	----	
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	140	----	----	
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	----	----	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	140	----	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	----	----	
EP080: BTEXN									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH7 @ 6.5-6.95 m	BH7 @ 14.0-14.45 m	BH7 @ 20.0 m	----	----
Sampling date / time				28-Jun-2022 00:00	28-Jun-2022 00:00	28-Jun-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2208112-011	EP2208112-016	EP2208112-020	-----	-----	
				Result	Result	Result	----	----	
EP080: BTEXN - Continued									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	----	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	94.4	90.3	89.6	----	----	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%	116	115	114	----	----	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	69.4	70.5	81.5	----	----	
2-Chlorophenol-D4	93951-73-6	0.5	%	76.8	81.1	88.6	----	----	
2,4,6-Tribromophenol	118-79-6	0.5	%	81.4	89.3	83.2	----	----	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%	84.4	92.7	88.4	----	----	
Anthracene-d10	1719-06-8	0.5	%	83.1	81.5	83.6	----	----	
4-Terphenyl-d14	1718-51-0	0.5	%	93.9	90.4	88.1	----	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	81.0	77.0	82.1	----	----	
Toluene-D8	2037-26-5	0.2	%	88.8	84.4	83.9	----	----	
4-Bromofluorobenzene	460-00-4	0.2	%	94.7	86.2	87.1	----	----	



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	53	152
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	28	152
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	57	119
2-Chlorophenol-D4	93951-73-6	52	130
2,4,6-Tribromophenol	118-79-6	40	132
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	53	139
Anthracene-d10	1719-06-8	68	124
4-Terphenyl-d14	1718-51-0	66	132
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	63	132
Toluene-D8	2037-26-5	66	125
4-Bromofluorobenzene	460-00-4	60	124

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EK061G: Total Kjeldahl Nitrogen By Discrete Analyser

(SOIL) EK067G: Total Phosphorus as P by Discrete Analyser

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2208112	Page	: 1 of 10
Amendment	: 1		
Client	: 360 ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Perth
Contact	: CHRIS DONNETTI	Telephone	: +61-8-9406 1301
Project	: 5412 - Causeway Pedestrian Bridge	Date Samples Received	: 29-Jun-2022
Site	: ----	Issue Date	: 17-Aug-2022
Sampler	: Phunsto Wangdi	No. of samples received	: 22
Order number	: 5412-002	No. of samples analysed	: 8

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	
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	04-Jul-2022	04-Jul-2022	✓	04-Jul-2022	04-Jul-2022	✓
Soil Glass Jar - Unpreserved (EA002) BH07 @ 3.5 m, BH7 @ 14.0-14.45 m,	BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	28-Jun-2022	04-Jul-2022	05-Jul-2022	✓	04-Jul-2022	04-Jul-2022	✓
EA033-A: Actual Acidity								
80* dried soil (EA033) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	15-Aug-2022	27-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
80* dried soil (EA033) BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	BH7 @ 14.0-14.45 m,	28-Jun-2022	15-Aug-2022	28-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
EA033-B: Potential Acidity								
80* dried soil (EA033) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	15-Aug-2022	27-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
80* dried soil (EA033) BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	BH7 @ 14.0-14.45 m,	28-Jun-2022	15-Aug-2022	28-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
EA033-C: Acid Neutralising Capacity								
80* dried soil (EA033) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	15-Aug-2022	27-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
80* dried soil (EA033) BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	BH7 @ 14.0-14.45 m,	28-Jun-2022	15-Aug-2022	28-Jun-2023	✓	15-Aug-2022	13-Nov-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-D: Retained Acidity								
80* dried soil (EA033) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	15-Aug-2022	27-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
80* dried soil (EA033) BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	BH7 @ 14.0-14.45 m,	28-Jun-2022	15-Aug-2022	28-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
EA033-E: Acid Base Accounting								
80* dried soil (EA033) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	15-Aug-2022	27-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
80* dried soil (EA033) BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	BH7 @ 14.0-14.45 m,	28-Jun-2022	15-Aug-2022	28-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	----	----	----	04-Jul-2022	11-Jul-2022	✓
Soil Glass Jar - Unpreserved (EA055) BH07 @ 3.5 m, BH7 @ 14.0-14.45 m,	BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	28-Jun-2022	----	----	----	04-Jul-2022	12-Jul-2022	✓
EK055: Ammonia as N								
Soil Glass Jar - Unpreserved (EK055) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	----	----	----	04-Jul-2022	25-Jul-2022	✓
Soil Glass Jar - Unpreserved (EK055) BH07 @ 3.5 m, BH7 @ 14.0-14.45 m,	BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	28-Jun-2022	----	----	----	04-Jul-2022	26-Jul-2022	✓
EK057G: Nitrite as N by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK057G) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	04-Jul-2022	04-Jul-2022	✓	04-Jul-2022	06-Jul-2022	✓
Soil Glass Jar - Unpreserved (EK057G) BH07 @ 3.5 m, BH7 @ 14.0-14.45 m,	BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	28-Jun-2022	04-Jul-2022	05-Jul-2022	✓	04-Jul-2022	06-Jul-2022	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK059G) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	04-Jul-2022	25-Jul-2022	✓	04-Jul-2022	06-Jul-2022	✓
Soil Glass Jar - Unpreserved (EK059G) BH07 @ 3.5 m, BH7 @ 14.0-14.45 m,	BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	28-Jun-2022	04-Jul-2022	26-Jul-2022	✓	04-Jul-2022	06-Jul-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	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Snap Lock Bag - frozen on receipt at ALS (EK061G) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	05-Jul-2022	25-Jul-2022	✓	05-Jul-2022	02-Aug-2022	✓
Snap Lock Bag - frozen on receipt at ALS (EK061G) BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	BH7 @ 14.0-14.45 m,	28-Jun-2022	05-Jul-2022	26-Jul-2022	✓	05-Jul-2022	02-Aug-2022	✓
Soil Glass Jar - Unpreserved (EK061G) BH07 @ 3.5 m		28-Jun-2022	05-Jul-2022	26-Jul-2022	✓	05-Jul-2022	02-Aug-2022	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Snap Lock Bag - frozen on receipt at ALS (EK067G) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	05-Jul-2022	25-Jul-2022	✓	05-Jul-2022	02-Aug-2022	✓
Snap Lock Bag - frozen on receipt at ALS (EK067G) BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	BH7 @ 14.0-14.45 m,	28-Jun-2022	05-Jul-2022	26-Jul-2022	✓	05-Jul-2022	02-Aug-2022	✓
Soil Glass Jar - Unpreserved (EK067G) BH07 @ 3.5 m		28-Jun-2022	05-Jul-2022	26-Jul-2022	✓	05-Jul-2022	02-Aug-2022	✓
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	01-Jul-2022	11-Jul-2022	✓	04-Jul-2022	10-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP068) BH07 @ 3.5 m, BH7 @ 14.0-14.45 m,	BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	28-Jun-2022	01-Jul-2022	12-Jul-2022	✓	04-Jul-2022	10-Aug-2022	✓
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	01-Jul-2022	11-Jul-2022	✓	04-Jul-2022	10-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP068) BH07 @ 3.5 m, BH7 @ 14.0-14.45 m,	BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	28-Jun-2022	01-Jul-2022	12-Jul-2022	✓	04-Jul-2022	10-Aug-2022	✓
EP075(SIM)A: Phenolic Compounds								
Soil Glass Jar - Unpreserved (EP075(SIM)) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	01-Jul-2022	11-Jul-2022	✓	04-Jul-2022	10-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH07 @ 3.5 m, BH7 @ 14.0-14.45 m,	BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	28-Jun-2022	01-Jul-2022	12-Jul-2022	✓	04-Jul-2022	10-Aug-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	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM)) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	01-Jul-2022	11-Jul-2022	✓	04-Jul-2022	10-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH07 @ 3.5 m, BH7 @ 14.0-14.45 m,	BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	28-Jun-2022	01-Jul-2022	12-Jul-2022	✓	04-Jul-2022	10-Aug-2022	✓
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	01-Jul-2022	11-Jul-2022	✓	01-Jul-2022	11-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	01-Jul-2022	11-Jul-2022	✓	04-Jul-2022	10-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	BH7 @ 14.0-14.45 m,	28-Jun-2022	01-Jul-2022	12-Jul-2022	✓	01-Jul-2022	12-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH07 @ 3.5 m, BH7 @ 14.0-14.45 m,	BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	28-Jun-2022	01-Jul-2022	12-Jul-2022	✓	04-Jul-2022	10-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH07 @ 3.5 m		28-Jun-2022	30-Jun-2022	12-Jul-2022	✓	30-Jun-2022	12-Jul-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	01-Jul-2022	11-Jul-2022	✓	01-Jul-2022	11-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH08 @26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	01-Jul-2022	11-Jul-2022	✓	04-Jul-2022	10-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	BH7 @ 14.0-14.45 m,	28-Jun-2022	01-Jul-2022	12-Jul-2022	✓	01-Jul-2022	12-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH07 @ 3.5 m, BH7 @ 14.0-14.45 m,	BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	28-Jun-2022	01-Jul-2022	12-Jul-2022	✓	04-Jul-2022	10-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH07 @ 3.5 m		28-Jun-2022	30-Jun-2022	12-Jul-2022	✓	30-Jun-2022	12-Jul-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	
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) BH08 @ 26 m, BH08 @ 33.5 -33.95 m,	BH08 @ 30 m, BH08 @ 39.5 -39.45 m	27-Jun-2022	01-Jul-2022	11-Jul-2022	✓	01-Jul-2022	11-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH7 @ 6.5-6.95 m, BH7 @ 20.0 m	BH7 @ 14.0-14.45 m,	28-Jun-2022	01-Jul-2022	12-Jul-2022	✓	01-Jul-2022	12-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH07 @ 3.5 m		28-Jun-2022	30-Jun-2022	12-Jul-2022	✓	30-Jun-2022	12-Jul-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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Buchi Ammonia	EK055	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	8	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	8	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	2	19	10.53	9.52	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	EP071	2	8	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	8	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Buchi Ammonia	EK055	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	8	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	8	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	3	19	15.79	14.29	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	3	17	17.65	15.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	EP071	2	8	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	8	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Buchi Ammonia	EK055	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	8	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	8	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	19	5.26	4.76	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **SOIL** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction	EP071	2	8	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	8	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Buchi Ammonia	EK055	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	19	5.26	4.76	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	8	12.50	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
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
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.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Buchi Ammonia	EK055	SOIL	In house: Referenced to APHA 4500-NH3 B&G, H Samples are steam distilled (Buchi) prior to analysis and quantified using titration, FIA or Discrete Analyser.
Nitrite as N - Soluble by Discrete Analyser	EK057G	SOIL	In house: Referenced to APHA 4500-NO3- B. Nitrite in a water extract is determined by direct colourimetry by Discrete Analyser.
Nitrate as N - Soluble by Discrete Analyser	EK058G	SOIL	In house: Referenced to APHA 4500-NO3- F. Nitrate in the 1:5 soil:water extract is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	SOIL	In house: Thermo Scientific Method D08727 and NEMI (National Environmental Method Index) Method ID: 9171. This method covers the determination of total oxidised nitrogen (NOx-N) and nitrate (NO3-N) by calculation, Combined oxidised Nitrogen (NO2+NO3) in a water extract is determined by direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	In house: Referenced to APHA 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Nitrogen as N (TKN + NOx) By Discrete Analyser	EK062G	SOIL	In house: Referenced to APHA 4500 Norg/NO3- Total Nitrogen is determined as the sum of TKN and Oxidised Nitrogen, each determined seperately as N.
Total Phosphorus By Discrete Analyser	EK067G	SOIL	In house: Referenced to APHA 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatle Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.

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 Project : 5412 - Causeway Pedestrian Bridge



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TKN/TP Digestion	EK061/EK067	SOIL	In house: Referenced to APHA 4500 Norg- D; APHA 4500 P - H. Macro Kjeldahl digestion.
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

QUALITY CONTROL REPORT

Work Order	: EP2208112	Page	: 1 of 16
Amendment	: 1		
Client	: 360 ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Perth
Contact	: CHRIS DONNETTI	Contact	: Natalie Duncan
Address	: 10 Bermondsey St West Leederville 6007	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: 9388 8360	Telephone	: +61-8-9406 1301
Project	: 5412 - Causeway Pedestrian Bridge	Date Samples Received	: 29-Jun-2022
Order number	: 5412-002	Date Analysis Commenced	: 30-Jun-2022
C-O-C number	: ----	Issue Date	: 17-Aug-2022
Sampler	: Phunsto Wangdi		
Site	: ----		
Quote number	: EP/469/22		
No. of samples received	: 22		
No. of samples analysed	: 8		



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, Western Australia
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, Western Australia
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, Western Australia



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 (%)
EA002: pH 1:5 (Soils) (QC Lot: 4436561)									
EP2208231-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	7.3	7.0	3.6	0% - 20%
EP2208112-001	BH08 @26 m	EA002: pH Value	----	0.1	pH Unit	6.4	6.4	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 4519116)									
EP2208112-001	BH08 @26 m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.07	0.08	13.3	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	42	48	11.2	0% - 20%
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.6	5.6	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 4519116)									
EP2208112-001	BH08 @26 m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	2.77	2.78	0.4	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	1730	1740	0.4	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 4519116)									
EP2208112-001	BH08 @26 m	EA033: Net Acidity (sulfur units)	----	0.02	% S	2.84	2.86	0.7	0% - 20%
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	2.84	2.86	0.7	0% - 20%
		EA033: Liming Rate	----	1	kg CaCO3/t	133	134	0.7	0% - 20%
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	133	134	0.7	0% - 20%
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	1770	1780	0.7	0% - 20%
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	1770	1780	0.7	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4437730)									
EP2208112-001	BH08 @26 m	EA055: Moisture Content	----	0.1	%	14.3	13.7	4.3	0% - 50%
EK055: Ammonia as N (QC Lot: 4436676)									
EP2207942-001	Anonymous	EK055: Ammonia as N	7664-41-7	20	mg/kg	<20	<20	0.0	No Limit
EP2208112-009	BH08 @ 39.5 -39.45 m	EK055: Ammonia as N	7664-41-7	20	mg/kg	<20	<20	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4436564)									



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 (%)
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4436564) - continued									
EP2208112-001	BH08 @26 m	EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4436566)									
EP2208112-001	BH08 @26 m	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	0.2	0.2	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4438877)									
EP2208052-005	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	1390	1360	2.2	0% - 20%
EP2208112-003	BH08 @ 30 m	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	40	40	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4438876)									
EP2208052-005	Anonymous	EK067G: Total Phosphorus as P	----	2	mg/kg	225	273	19.1	0% - 20%
EP2208112-003	BH08 @ 30 m	EK067G: Total Phosphorus as P	----	2	mg/kg	79	91	14.6	0% - 20%
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4432298)									
EP2208112-010	BH07 @ 3.5 m	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit		
EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit		
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit		
EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit		
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit		
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4433947)									
EP2208112-001	BH08 @26 m	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	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 (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4433947) - continued									
EP2208112-001	BH08 @26 m	EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit		
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit		
EP068: 4.4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit		
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit		
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4432298)									
EP2208112-010	BH07 @ 3.5 m	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	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 (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4432298) - continued									
EP2208112-010	BH07 @ 3.5 m	EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4433947)									
EP2208112-001	BH08 @26 m	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit		
EP075(SIM)A: Phenolic Compounds (QC Lot: 4432297)									
EP2208112-010	BH07 @ 3.5 m	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.0	No Limit
		EP075(SIM)A: Phenolic Compounds (QC Lot: 4433946)							



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 (%)	
EP075(SIM)A: Phenolic Compounds (QC Lot: 4433946) - continued										
EP2208112-001	BH08 @26 m	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.0	No Limit	
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.0	No Limit	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4432297)										
EP2208112-010	BH07 @ 3.5 m	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
			205-82-3							
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4433946)										
EP2208112-001	BH08 @26 m	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	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 (%)	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4433946) - continued										
EP2208112-001	BH08 @26 m	EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
			205-82-3							
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4432293)										
EP2208112-010	BH07 @ 3.5 m	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4432296)										
EP2208112-010	BH07 @ 3.5 m	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit	
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit	
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4433944)										
EP2208112-001	BH08 @26 m	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4433945)										
EP2208112-001	BH08 @26 m	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit	
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit	
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4432293)										
EP2208112-010	BH07 @ 3.5 m	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4432296)										
EP2208112-010	BH07 @ 3.5 m	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit	
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit	
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4433944)										
EP2208112-001	BH08 @26 m	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4433945)										
EP2208112-001	BH08 @26 m	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit	
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit	
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit	
EP080: BTEXN (QC Lot: 4432293)										
EP2208112-010	BH07 @ 3.5 m	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit	
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	

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 Work Order : EP2208112 Amendment 1
 Client : 360 ENVIRONMENTAL PTY LTD
 Project : 5412 - Causeway Pedestrian Bridge



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 (%)
EP080: BTEXN (QC Lot: 4432293) - continued									
EP2208112-010	BH07 @ 3.5 m	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP080: BTEXN (QC Lot: 4433944)									
EP2208112-001	BH08 @26 m	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit



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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
						LCS	Low	High	
EA002: pH 1:5 (Soils) (QCLot: 4436561)									
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.6	102	
				----	7 pH Unit	100	98.6	102	
EA033-A: Actual Acidity (QCLot: 4519116)									
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	92.4	83.3	112	
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----	
EA033-B: Potential Acidity (QCLot: 4519116)									
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	97.5	79.0	109	
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----	
EA033-C: Acid Neutralising Capacity (QCLot: 4519116)									
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.7	105	
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: 4519116)									
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	----	----	----	----	
EK055: Ammonia as N (QCLot: 4436676)									
EK055: Ammonia as N	7664-41-7	20	mg/kg	<20	50 mg/kg	91.3	76.1	110	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4436564)									
EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	2.5 mg/kg	103	94.1	110	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4436566)									
EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	2.5 mg/kg	93.7	88.5	110	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4438877)									
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	1000 mg/kg	100	72.0	106	
				<20	100 mg/kg	120	70.0	122	
				<20	500 mg/kg	96.7	70.0	130	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4438876)									
EK067G: Total Phosphorus as P	----	2	mg/kg	<2	442 mg/kg	95.5	76.0	108	
				<2	44.2 mg/kg	114	70.0	118	
				<2	100 mg/kg	98.8	70.0	130	
EP068A: Organochlorine Pesticides (OC) (QCLot: 4432298)									
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	99.6	46.0	116	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike	Spike Recovery (%)	Acceptable Limits (%)	
					Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4432298) - continued								
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	105	53.0	133
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	105	45.0	117
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	104	46.0	122
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	103	47.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	101	40.0	118
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	108	47.0	123
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	87.7	41.0	119
EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	110	43.0	119
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	116	41.0	131
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	111	41.0	119
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	112	41.0	127
EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	110	44.0	122
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	115	37.0	129
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	120	41.0	127
EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	117	42.0	122
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	51.7	31.2	117
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	83.8	38.0	120
EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	82.5	31.4	125
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	88.4	31.2	123
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	84.2	24.7	125
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60- 57-1	0.05	mg/kg	<0.05	----	----	----	----
EP068A: Organochlorine Pesticides (OC) (QCLot: 4433947)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	97.1	46.0	116
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	102	53.0	133
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	102	45.0	117
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	101	46.0	122
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	101	47.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	99.0	40.0	118
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	105	47.0	123
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	85.5	41.0	119
EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	107	43.0	119
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	113	41.0	131
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	108	41.0	119



Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
						LCS	Low	High	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4433947) - continued									
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	110	41.0	127	
EP068: 4.4'-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	108	44.0	122	
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	111	37.0	129	
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	115	41.0	127	
EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----	
EP068: 4.4'-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	114	42.0	122	
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	68.7	31.2	117	
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	82.6	38.0	120	
EP068: 4.4'-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	79.8	31.4	125	
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	87.1	31.2	123	
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	82.3	24.7	125	
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5-9/50-2	0.05	mg/kg	<0.05	----	----	----	----	
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----	
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4432298)									
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	95.1	61.0	141	
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	83.4	39.0	147	
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	74.8	4.10	154	
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	101	40.0	136	
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	118	59.0	133	
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	112	57.0	135	
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	105	39.0	133	
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	105	53.0	131	
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	107	53.0	133	
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	105	57.0	135	
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	104	45.0	131	
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	92.7	53.0	137	
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	99.6	53.0	133	
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	108	49.0	133	
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	115	39.0	137	
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	108	57.0	137	
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	113	53.0	135	
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	78.7	52.0	134	
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	91.3	20.4	154	
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4433947)									
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	93.4	61.0	141	
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	80.9	39.0	147	
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	72.0	4.10	154	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Acceptable Limits (%)	
					Concentration	LCS	Low	High	
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4433947) - continued									
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	97.7	40.0	136	
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	114	59.0	133	
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	109	57.0	135	
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	102	39.0	133	
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	102	53.0	131	
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	105	53.0	133	
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	103	57.0	135	
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	102	45.0	131	
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	108	53.0	137	
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	97.0	53.0	133	
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	106	49.0	133	
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	109	39.0	137	
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	106	57.0	137	
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	109	53.0	135	
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	76.9	52.0	134	
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	89.8	20.4	154	
EP075(SIM)A: Phenolic Compounds (QCLot: 4432297)									
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	3 mg/kg	95.2	61.0	125	
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	3 mg/kg	96.7	66.0	124	
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	3 mg/kg	95.4	62.0	126	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	6 mg/kg	89.5	63.0	129	
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	3 mg/kg	87.3	61.0	131	
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	3 mg/kg	86.8	60.0	132	
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	3 mg/kg	94.1	63.0	131	
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	3 mg/kg	91.8	67.0	123	
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	3 mg/kg	95.1	65.0	125	
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	3 mg/kg	96.6	52.0	132	
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	3 mg/kg	98.8	64.0	130	
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	3 mg/kg	78.9	34.0	138	
EP075(SIM)A: Phenolic Compounds (QCLot: 4433946)									
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	3 mg/kg	82.8	61.0	125	
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	3 mg/kg	87.8	66.0	124	
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	3 mg/kg	93.3	62.0	126	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	6 mg/kg	90.5	63.0	129	
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	3 mg/kg	93.8	61.0	131	
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	3 mg/kg	94.0	60.0	132	
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	3 mg/kg	95.6	63.0	131	
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	3 mg/kg	92.6	67.0	123	
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	3 mg/kg	94.6	65.0	125	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Acceptable Limits (%)	
					Concentration	LCS	Low	High	
EP075(SIM)A: Phenolic Compounds (QCLot: 4433946) - continued									
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	3 mg/kg	97.3	52.0	132	
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	3 mg/kg	100.0	64.0	130	
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	3 mg/kg	82.5	34.0	138	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4432297)									
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	92.5	71.0	123	
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	91.1	69.0	129	
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	91.7	65.0	125	
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	91.3	71.0	125	
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	88.0	66.0	124	
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	86.3	60.0	112	
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	86.4	67.0	127	
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	90.3	65.0	127	
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	95.0	57.0	125	
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	89.8	57.0	131	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	3 mg/kg	90.8	65.0	125	
	205-82-3								
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	91.2	69.0	127	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	92.6	63.0	121	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	77.8	61.0	121	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	87.9	52.0	128	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	88.9	65.0	125	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4433946)									
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	90.7	71.0	123	
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	90.7	69.0	129	
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	90.8	65.0	125	
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	88.3	71.0	125	
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	87.3	66.0	124	
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	85.6	60.0	112	
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	88.4	67.0	127	
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	90.1	65.0	127	
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	92.8	57.0	125	
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	87.2	57.0	131	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	3 mg/kg	84.7	65.0	125	
	205-82-3								
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	85.6	69.0	127	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	85.3	63.0	121	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	68.8	61.0	121	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	71.5	52.0	128	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	75.2	65.0	125	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4432293)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	35 mg/kg	102	66.0	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4432296)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1468 mg/kg	90.4	70.0	111
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3111 mg/kg	107	71.9	109
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	436 mg/kg	103	63.8	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4433944)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	35 mg/kg	101	66.0	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4433945)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1468 mg/kg	91.0	70.0	111
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3111 mg/kg	107	71.9	109
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	436 mg/kg	103	63.8	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4432293)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	101	66.0	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4432296)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	2234 mg/kg	94.5	72.8	110
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2553 mg/kg	113	67.8	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	108	50.3	123
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4433944)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	99.8	66.0	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4433945)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	2234 mg/kg	95.0	72.8	110
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2553 mg/kg	113	67.8	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	105	50.3	123
EP080: BTEXN (QCLot: 4432293)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	103	72.0	122
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	111	75.0	119
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	105	73.0	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	110	74.0	122
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	108	75.0	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	105	64.0	126
EP080: BTEXN (QCLot: 4433944)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	98.0	72.0	122
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	108	75.0	119
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	106	73.0	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	108	74.0	122



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
EP080: BTEXN (QCLot: 4433944) - continued								
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	105	75.0	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	107	64.0	126

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.

Sub-Matrix: SOIL

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Acceptable Limits (%)	
						Low	High
EK055: Ammonia as N (QCLot: 4436676)							
EP2207942-002	Anonymous	EK055: Ammonia as N	7664-41-7	50 mg/kg	94.9	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4436564)							
EP2208112-003	BH08 @ 30 m	EK057G: Nitrite as N (Sol.)	14797-65-0	2.5 mg/kg	108	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4436566)							
EP2208112-003	BH08 @ 30 m	EK059G: Nitrite + Nitrate as N (Sol.)	----	2.5 mg/kg	93.9	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4438877)							
EP2208052-005	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	78.1	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4438876)							
EP2208052-005	Anonymous	EK067G: Total Phosphorus as P	----	100 mg/kg	99.8	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 4433947)							
EP2208112-003	BH08 @ 30 m	EP068: gamma-BHC	58-89-9	0.5 mg/kg	107	57.9	124
		EP068: Heptachlor	76-44-8	0.5 mg/kg	91.3	57.4	135
		EP068: Aldrin	309-00-2	0.5 mg/kg	99.7	59.6	125
		EP068: Dieldrin	60-57-1	0.5 mg/kg	117	62.2	131
		EP068: Endrin	72-20-8	0.5 mg/kg	120	55.8	138
		EP068: 4,4'-DDT	50-29-3	0.5 mg/kg	68.7	50.5	145
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4433947)							
EP2208112-003	BH08 @ 30 m	EP068: Diazinon	333-41-5	0.5 mg/kg	94.0	59.5	128
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	114	60.3	128
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	101	58.8	127
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	102	60.7	128
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	106	60.0	129
EP075(SIM)A: Phenolic Compounds (QCLot: 4433946)							
EP2208112-003	BH08 @ 30 m	EP075(SIM): Phenol	108-95-2	3 mg/kg	78.5	73.4	135
		EP075(SIM): 2-Chlorophenol	95-57-8	3 mg/kg	87.9	71.7	136



Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 4433946) - continued							
EP2208112-003	BH08 @ 30 m	EP075(SIM): 2-Nitrophenol	88-75-5	3 mg/kg	71.3	62.8	137
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	96.2	73.6	128
		EP075(SIM): Pentachlorophenol	87-86-5	3 mg/kg	93.5	18.0	152
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4433946)							
EP2208112-003	BH08 @ 30 m	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	90.4	73.5	125
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	98.7	70.8	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4433944)							
EP2208112-003	BH08 @ 30 m	EP080: C6 - C9 Fraction	----	24 mg/kg	86.6	69.1	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4433945)							
EP2208112-003	BH08 @ 30 m	EP071: C10 - C14 Fraction	----	1468 mg/kg	91.6	64.7	126
		EP071: C15 - C28 Fraction	----	3111 mg/kg	107	61.7	124
		EP071: C29 - C36 Fraction	----	436 mg/kg	104	64.6	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4433944)							
EP2208112-003	BH08 @ 30 m	EP080: C6 - C10 Fraction	C6_C10	29 mg/kg	85.4	69.1	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4433945)							
EP2208112-003	BH08 @ 30 m	EP071: >C10 - C16 Fraction	----	2234 mg/kg	95.4	64.7	126
		EP071: >C16 - C34 Fraction	----	2553 mg/kg	113	61.7	124
		EP071: >C34 - C40 Fraction	----	150 mg/kg	110	64.6	131
EP080: BTEXN (QCLot: 4433944)							
EP2208112-003	BH08 @ 30 m	EP080: Benzene	71-43-2	2 mg/kg	90.1	76.4	118
		EP080: Toluene	108-88-3	2 mg/kg	95.4	67.4	112



CHAIN OF CUSTODY

3100 LUGB 31 Evans Road Perth WA 6005

CAMPBELL 18 Hobson Road Perth WA 6007

JERONGMATTLE 5 Ross Glen Road Perth WA 6008

WEDGEMOY 271-287 Willsdon Road Perth WA 6008

CLIENT: S&B Environmental
OFFICE: 10 Belmont Street, West Leederville
PROJECT: 5412 - Casuarina Pedestrian Bridge

TURNAROUND REQUIREMENTS:
Standard TAT (List due date): 06/07/2022
Non Standard or urgent TAT (List due date):
AL3 QUOTE NO.: EP145872

RECEIVED BY:
DATE/TIME: 6/17/22 12 NOON

RECEIVED BY:
DATE/TIME: 6/17/22

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

Table with columns: LAB ID, SAMPLE ID, DATE / TIME, MATRIX, TYPE & PRESERVATIVE, TOTAL CONTAINERS, ANALYSIS REQUIRED (pH, CR6, etc.), and Additional Information. Rows 1-50 contain sample data.

Environmental Division
Perth
Work Order Reference
EP2208579



Telephone : -- 61-8-9406 1301

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2208579	Page	: 1 of 10
Amendment	: 1		
Client	: 360 ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Perth
Contact	: CHRIS DONNETTI	Telephone	: +61-8-9406 1301
Project	: 5412 - Causeway Pedestrian Bridge	Date Samples Received	: 06-Jul-2022
Site	: ----	Issue Date	: 17-Aug-2022
Sampler	: Phunsto Wangdi	No. of samples received	: 54
Order number	: 5412-002	No. of samples analysed	: 7

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

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

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



Outliers : Analysis Holding Time Compliance

Matrix: SOIL

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved BH05_2,	BH05_6.5	15-Jul-2022	08-Jul-2022	7	----	----	----
Soil Glass Jar - Unpreserved BH04_2,	BH04_3.5	15-Jul-2022	12-Jul-2022	3	----	----	----
Soil Glass Jar - Unpreserved BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	15-Jul-2022	07-Jul-2022	8	----	----	----
EK057G: Nitrite as N by Discrete Analyser							
Soil Glass Jar - Unpreserved BH05_2,	BH05_6.5	15-Jul-2022	08-Jul-2022	7	----	----	----
Soil Glass Jar - Unpreserved BH04_2,	BH04_3.5	15-Jul-2022	12-Jul-2022	3	----	----	----
Soil Glass Jar - Unpreserved BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	15-Jul-2022	07-Jul-2022	8	----	----	----

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	Sample Date	Extraction / Preparation			Analysis			
		Container / Client Sample ID(s)	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002) BH05_2,	BH05_6.5	01-Jul-2022	15-Jul-2022	08-Jul-2022	✖	15-Jul-2022	15-Jul-2022	✔
Soil Glass Jar - Unpreserved (EA002) BH04_2,	BH04_3.5	05-Jul-2022	15-Jul-2022	12-Jul-2022	✖	15-Jul-2022	15-Jul-2022	✔
Soil Glass Jar - Unpreserved (EA002) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	15-Jul-2022	07-Jul-2022	✖	15-Jul-2022	15-Jul-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-A: Actual Acidity								
Snap Lock Bag - frozen on receipt at ALS (EA033) BH05_2,	BH05_6.5	01-Jul-2022	15-Aug-2022	01-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓
Snap Lock Bag - frozen on receipt at ALS (EA033) BH04_2,	BH04_3.5	05-Jul-2022	15-Aug-2022	05-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓
Snap Lock Bag - frozen on receipt at ALS (EA033) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	15-Aug-2022	30-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
EA033-B: Potential Acidity								
Snap Lock Bag - frozen on receipt at ALS (EA033) BH05_2,	BH05_6.5	01-Jul-2022	15-Aug-2022	01-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓
Snap Lock Bag - frozen on receipt at ALS (EA033) BH04_2,	BH04_3.5	05-Jul-2022	15-Aug-2022	05-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓
Snap Lock Bag - frozen on receipt at ALS (EA033) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	15-Aug-2022	30-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen on receipt at ALS (EA033) BH05_2,	BH05_6.5	01-Jul-2022	15-Aug-2022	01-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓
Snap Lock Bag - frozen on receipt at ALS (EA033) BH04_2,	BH04_3.5	05-Jul-2022	15-Aug-2022	05-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓
Snap Lock Bag - frozen on receipt at ALS (EA033) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	15-Aug-2022	30-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
EA033-D: Retained Acidity								
Snap Lock Bag - frozen on receipt at ALS (EA033) BH05_2,	BH05_6.5	01-Jul-2022	15-Aug-2022	01-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓
Snap Lock Bag - frozen on receipt at ALS (EA033) BH04_2,	BH04_3.5	05-Jul-2022	15-Aug-2022	05-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓
Snap Lock Bag - frozen on receipt at ALS (EA033) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	15-Aug-2022	30-Jun-2023	✓	15-Aug-2022	13-Nov-2022	✓
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen on receipt at ALS (EA033) BH05_2,	BH05_6.5	01-Jul-2022	15-Aug-2022	01-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓
Snap Lock Bag - frozen on receipt at ALS (EA033) BH04_2,	BH04_3.5	05-Jul-2022	15-Aug-2022	05-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓
Snap Lock Bag - frozen on receipt at ALS (EA033) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	15-Aug-2022	30-Jun-2023	✓	15-Aug-2022	13-Nov-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	
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055) BH05_2,	BH05_6.5	01-Jul-2022	----	----	----	14-Jul-2022	15-Jul-2022	✔
Soil Glass Jar - Unpreserved (EA055) BH04_2,	BH04_3.5	05-Jul-2022	----	----	----	14-Jul-2022	19-Jul-2022	✔
Soil Glass Jar - Unpreserved (EA055) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	----	----	----	14-Jul-2022	14-Jul-2022	✔
EK055: Ammonia as N								
Soil Glass Jar - Unpreserved (EK055) BH05_2,	BH05_6.5	01-Jul-2022	----	----	----	13-Jul-2022	29-Jul-2022	✔
Soil Glass Jar - Unpreserved (EK055) BH04_2,	BH04_3.5	05-Jul-2022	----	----	----	13-Jul-2022	02-Aug-2022	✔
Soil Glass Jar - Unpreserved (EK055) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	----	----	----	13-Jul-2022	28-Jul-2022	✔
EK057G: Nitrite as N by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK057G) BH05_2,	BH05_6.5	01-Jul-2022	15-Jul-2022	08-Jul-2022	✘	15-Jul-2022	17-Jul-2022	✔
Soil Glass Jar - Unpreserved (EK057G) BH04_2,	BH04_3.5	05-Jul-2022	15-Jul-2022	12-Jul-2022	✘	15-Jul-2022	17-Jul-2022	✔
Soil Glass Jar - Unpreserved (EK057G) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	15-Jul-2022	07-Jul-2022	✘	15-Jul-2022	17-Jul-2022	✔
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK059G) BH05_2,	BH05_6.5	01-Jul-2022	15-Jul-2022	29-Jul-2022	✔	15-Jul-2022	17-Jul-2022	✔
Soil Glass Jar - Unpreserved (EK059G) BH04_2,	BH04_3.5	05-Jul-2022	15-Jul-2022	02-Aug-2022	✔	15-Jul-2022	17-Jul-2022	✔
Soil Glass Jar - Unpreserved (EK059G) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	15-Jul-2022	28-Jul-2022	✔	15-Jul-2022	17-Jul-2022	✔
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Soil Glass Jar - Unpreserved (EK061G) BH05_2,	BH05_6.5	01-Jul-2022	14-Jul-2022	29-Jul-2022	✔	18-Jul-2022	11-Aug-2022	✔
Soil Glass Jar - Unpreserved (EK061G) BH04_2,	BH04_3.5	05-Jul-2022	14-Jul-2022	02-Aug-2022	✔	18-Jul-2022	11-Aug-2022	✔
Soil Glass Jar - Unpreserved (EK061G) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	14-Jul-2022	28-Jul-2022	✔	18-Jul-2022	11-Aug-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	
EK067G: Total Phosphorus as P by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK067G) BH05_2,	BH05_6.5	01-Jul-2022	14-Jul-2022	29-Jul-2022	✓	18-Jul-2022	11-Aug-2022	✓
Soil Glass Jar - Unpreserved (EK067G) BH04_2,	BH04_3.5	05-Jul-2022	14-Jul-2022	02-Aug-2022	✓	18-Jul-2022	11-Aug-2022	✓
Soil Glass Jar - Unpreserved (EK067G) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	14-Jul-2022	28-Jul-2022	✓	18-Jul-2022	11-Aug-2022	✓
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068) BH05_2,	BH05_6.5	01-Jul-2022	14-Jul-2022	15-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP068) BH04_2,	BH04_3.5	05-Jul-2022	14-Jul-2022	19-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP068) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	14-Jul-2022	14-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068) BH05_2,	BH05_6.5	01-Jul-2022	14-Jul-2022	15-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP068) BH04_2,	BH04_3.5	05-Jul-2022	14-Jul-2022	19-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP068) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	14-Jul-2022	14-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
EP075(SIM)A: Phenolic Compounds								
Soil Glass Jar - Unpreserved (EP075(SIM)) BH05_2,	BH05_6.5	01-Jul-2022	14-Jul-2022	15-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH04_2,	BH04_3.5	05-Jul-2022	14-Jul-2022	19-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	14-Jul-2022	14-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM)) BH05_2,	BH05_6.5	01-Jul-2022	14-Jul-2022	15-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH04_2,	BH04_3.5	05-Jul-2022	14-Jul-2022	19-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	14-Jul-2022	14-Jul-2022	✓	15-Jul-2022	23-Aug-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	
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080) BH05_2,	BH05_6.5	01-Jul-2022	14-Jul-2022	15-Jul-2022	✓	14-Jul-2022	15-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH05_2,	BH05_6.5	01-Jul-2022	14-Jul-2022	15-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH04_2,	BH04_3.5	05-Jul-2022	14-Jul-2022	19-Jul-2022	✓	14-Jul-2022	19-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH04_2,	BH04_3.5	05-Jul-2022	14-Jul-2022	19-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	14-Jul-2022	14-Jul-2022	✓	14-Jul-2022	14-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	14-Jul-2022	14-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080) BH05_2,	BH05_6.5	01-Jul-2022	14-Jul-2022	15-Jul-2022	✓	14-Jul-2022	15-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH05_2,	BH05_6.5	01-Jul-2022	14-Jul-2022	15-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH04_2,	BH04_3.5	05-Jul-2022	14-Jul-2022	19-Jul-2022	✓	14-Jul-2022	19-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH04_2,	BH04_3.5	05-Jul-2022	14-Jul-2022	19-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	14-Jul-2022	14-Jul-2022	✓	14-Jul-2022	14-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	14-Jul-2022	14-Jul-2022	✓	15-Jul-2022	23-Aug-2022	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) BH05_2,	BH05_6.5	01-Jul-2022	14-Jul-2022	15-Jul-2022	✓	14-Jul-2022	15-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH04_2,	BH04_3.5	05-Jul-2022	14-Jul-2022	19-Jul-2022	✓	14-Jul-2022	19-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH06_2-2.5, BH06_5.0	BH06_3.5-4.0,	30-Jun-2022	14-Jul-2022	14-Jul-2022	✓	14-Jul-2022	14-Jul-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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Buchi Ammonia	EK055	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	EP071	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Buchi Ammonia	EK055	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	EP071	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Buchi Ammonia	EK055	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **SOIL**

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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction	EP071	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Buchi Ammonia	EK055	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	7	14.29	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
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
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.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Buchi Ammonia	EK055	SOIL	In house: Referenced to APHA 4500-NH3 B&G, H Samples are steam distilled (Buchi) prior to analysis and quantified using titration, FIA or Discrete Analyser.
Nitrite as N - Soluble by Discrete Analyser	EK057G	SOIL	In house: Referenced to APHA 4500-NO3- B. Nitrite in a water extract is determined by direct colourimetry by Discrete Analyser.
Nitrate as N - Soluble by Discrete Analyser	EK058G	SOIL	In house: Referenced to APHA 4500-NO3- F. Nitrate in the 1:5 soil:water extract is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	SOIL	In house: Thermo Scientific Method D08727 and NEMI (National Environmental Method Index) Method ID: 9171. This method covers the determination of total oxidised nitrogen (NOx-N) and nitrate (NO3-N) by calculation, Combined oxidised Nitrogen (NO2+NO3) in a water extract is determined by direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	In house: Referenced to APHA 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Nitrogen as N (TKN + NOx) By Discrete Analyser	EK062G	SOIL	In house: Referenced to APHA 4500 Norg/NO3- Total Nitrogen is determined as the sum of TKN and Oxidised Nitrogen, each determined seperately as N.
Total Phosphorus By Discrete Analyser	EK067G	SOIL	In house: Referenced to APHA 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatle Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.

Page : 10 of 10
Work Order : EP2208579 Amendment 1
Client : 360 ENVIRONMENTAL PTY LTD
Project : 5412 - Causeway Pedestrian Bridge



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TKN/TP Digestion	EK061/EK067	SOIL	In house: Referenced to APHA 4500 Norg- D; APHA 4500 P - H. Macro Kjeldahl digestion.
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.



Telephone : -- 61-8-9406 1301

	<p>CHAIN OF CUSTODY</p> <p>ALS Laboratory: please tick -></p>	<p>DADELAIDE 21 Burma Road Pooraka SA 5095 Ph 08 8359 0890 E adelaid@alsglobal.com</p> <p>BRISBANE 32 Shand Street Stafford QLD 4053 Ph 07 3243 7222 E. samples.brisbane@alsglobal.com</p> <p>GLADSTONE 46 Callimondah Drive Clinton QLD 4680 Ph 07 7471 5000 E. gladstone@alsglobal.com</p>	<p>MACKAY 76 Harbour Road Mackay QLD 4740 Ph 07 4944 0177 E. mackay@alsglobal.com</p> <p>MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph 03 8549 8600 E. samples.melbourne@alsglobal.com</p> <p>MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph 02 6372 6735 E. mudgee.mai@alsglobal.com</p>	<p>NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph 02 4968 9433 E. samples.newcastle@alsglobal.com</p> <p>NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph 024423 2063 E. nowra@alsglobal.com</p> <p>PERTH 10 Hod Way Malaga WA 6090 Ph 08 9209 7655 E. samples.perth@alsglobal.com</p>
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CLIENT: 360 Environmental	TURNAROUND REQUIREMENTS : <input type="checkbox"/> Standard TAT (List due date): 06/07/2022	FOR LABORATORY USE ONLY (Circle)
OFFICE: 10 Bermondsey Street, West Leederville	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: 5412 - Causeway Pedestrian Bridge	ALS QUOTE NO.: EP/469/22	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: 5412-002		Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Chris Donnetti	CONTACT PH: 0415 803 884	Other comment:
SAMPLER: Phunsto Wangdi	SAMPLER MOBILE: 0433 907 756	RECEIVED BY: <i>AS 1230pm</i>
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default): Esdat +Excel	DATE/TIME: <i>11/7/22</i>
Email Reports to (will default to PM if no other addresses are listed): labresults@360environmental.com.au & chrisdonnetti@360environmental.com.au	RELINQUISHED BY: <i>COLIN 1673</i>	DATE/TIME: <i>9-30</i>
Email Invoice to (will default to PM if no other addresses are listed): accounts@360environmental.com.au	DATE/TIME: <i>Ch</i>	DATE/TIME: <i>11/7/22</i>

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS		CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price)							Additional Information		
	MATRIX: SOLID (S) WATER (W)				Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <i>to codes below</i>	(refer)	TOTAL CONTAINERS	pH	CRS Suite	Suite S24 - TRH (C6-C40) / BTEXN / PAH / Phenols	S12 - OC/OP Pesticides	Suite NTB S- Total Nitrogen, TKN, NO ₃ , NO ₂ , NH ₄ , Total Phosphorus	HOLD		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH04_12	06/07/2022	S	ASS+1 glass soil jar		2						X		
2	BH04_14	06/07/2022	S	ASS+1 glass soil jar		2						X		
3	BH04_15.5	06/07/2022	S	ASS+1 glass soil jar		2						X		
4	BH04_17	06/07/2022	S	ASS+1 glass soil jar		2						X		
5	BH04_18.5	06/07/2022	S	ASS+1 glass soil jar		2						X		
6	BH04_20	06/07/2022	S	ASS+1 glass soil jar		2						X		
7	BH04_21.5	06/07/2022	S	ASS+1 glass soil jar		2						X		
8	BH04_23	06/07/2022	S	ASS+1 glass soil jar		2						X		
9	BH04_24.5	06/07/2022	S	ASS+1 glass soil jar		2						X		
10	BH04_26	06/07/2022	S	ASS+1 glass soil jar		2						X		
11	BH04_27.5	06/07/2022	S	ASS+1 glass soil jar		2						X		
12	BH04_30.5	06/07/2022	S	ASS+1 glass soil jar		2						X		
13	BH04_32	06/07/2022	S	ASS+1 glass soil jar		2						X		
14	BH04_33.5	06/07/2022	S	ASS+1 glass soil jar		2						X		
15	BH04_35	07/07/2022	S	ASS+1 glass soil jar		2						X		
16	BH04_36.5	07/07/2022	S	ASS+1 glass soil jar		2						X		
17	BH04_38	07/07/2022	S	ASS+1 glass soil jar		2						X		
18	BH04_39.5	07/07/2022	S	ASS+1 glass soil jar		2						X		
19	BH04_41	07/07/2022	S	ASS+1 glass soil jar		2						X		
20	BH04_43.5	07/07/2022	S	ASS+1 glass soil jar		2						X		
21	BH04_44	07/07/2022	S	ASS+1 glass soil jar		2						X		
22	BH01_2	08/07/2022	S	ASS+1 glass soil jar		2	X	X	X	X	X			
23	BH01_3.5	08/07/2022	S	ASS+1 glass soil jar		2	X	X	X	X	X			
24	BH01_5	08/07/2022	S	ASS+1 glass soil jar		2	X	X	X	X	X			
25	BH01_6.5	08/07/2022	S	ASS+1 glass soil jar		2						X		
26	BH01_9.5	08/07/2022	S	ASS+1 glass soil jar		2						X		
27	BH01_12.5	08/07/2022	S	ASS+1 glass soil jar		2						X		
28	BH01_15.5	08/07/2022	S	ASS+1 glass soil jar		2						X		
29	BH01_17	08/07/2022	S	ASS+1 glass soil jar		2						X		
30	BH01_18.5	08/07/2022	S	ASS+1 glass soil jar		2						X		
31	BH01_20	08/07/2022	S	ASS+1 glass soil jar		2						X		
32	BH01_21.5	08/07/2022	S	ASS+1 glass soil jar		2						X		
33	BH01_23	08/07/2022	S	ASS+1 glass soil jar		2						X		
TOTAL						33								

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order : EP2208826 Amendment : 1 Client : 360 ENVIRONMENTAL PTY LTD Contact : CHRIS DONNETTI Address : 10 Bermondsey St West Leederville 6007 Telephone : 9388 8360 Project : 5412 - Causeway Pedestrian Bridge Order number : 5412-002 C-O-C number : ---- Sampler : Phunsto Wangdi Site : ---- Quote number : EP/469/22 No. of samples received : 33 No. of samples analysed : 3	Page : 1 of 8 Laboratory : Environmental Division Perth Contact : Natalie Duncan Address : 26 Rigali Way Wangara Western Australia Australia 6065 Telephone : +61-8-9406 1301 Date Samples Received : 11-Jul-2022 12:30 Date Analysis Commenced : 15-Jul-2022 Issue Date : 17-Aug-2022 18:16
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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
- Surrogate Control Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, Western Australia
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, Western Australia
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, Western Australia



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 Contract 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.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- Amendment (11/08/2022): This report has been amended and re-released to allow the reporting of additional analytical data, specifically method EA033-WA.
- 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'.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Sample ID		BH01_2	BH01_3.5	BH01_5	----	----
		Sampling date / time		08-Jul-2022 00:00	08-Jul-2022 00:00	08-Jul-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2208826-022	EP2208826-023	EP2208826-024	-----	-----
				Result	Result	Result	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	7.1	7.1	7.7	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	8.8	7.3	7.2	----	----
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	----	----
sulfidic - Titrateable 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	0.014	0.137	0.048	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	86	30	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.81	0.10	0.14	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	161	20	29	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.26	0.03	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	0.12	0.02	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	72	11	----	----
Liming Rate	----	1	kg CaCO3/t	<1	5	1	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	0.14	0.05	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	86	30	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	1	6	2	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	25.7	23.1	22.5	----	----
EK055: Ammonia as N								
Ammonia as N	7664-41-7	20	mg/kg	<20	<20	<20	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH01_2	BH01_3.5	BH01_5	----	----
Sampling date / time				08-Jul-2022 00:00	08-Jul-2022 00:00	08-Jul-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2208826-022	EP2208826-023	EP2208826-024	-----	-----	
				Result	Result	Result	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser - Continued									
Total Kjeldahl Nitrogen as N	----	20	mg/kg	310	60	150	----	----	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	310	60	150	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	63	10	62	----	----	
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH01_2	BH01_3.5	BH01_5	----	----
Sampling date / time				08-Jul-2022 00:00	08-Jul-2022 00:00	08-Jul-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2208826-022	EP2208826-023	EP2208826-024	-----	-----	
				Result	Result	Result	----	----	
EP068B: Organophosphorus Pesticides (OP) - Continued									
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	----	----	
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	----	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH01_2	BH01_3.5	BH01_5	----	----
Sampling date / time					08-Jul-2022 00:00	08-Jul-2022 00:00	08-Jul-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2208826-022	EP2208826-023	EP2208826-024	-----	-----	
				Result	Result	Result	----	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	----	----	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	----	----	
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	----	----	
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	----	----	
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	----	----	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	----	----	
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	----	----	
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	----	----	
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	----	----	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	----	----	
EP080: BTEXN									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH01_2	BH01_3.5	BH01_5	----	----
Sampling date / time				08-Jul-2022 00:00	08-Jul-2022 00:00	08-Jul-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2208826-022	EP2208826-023	EP2208826-024	-----	-----	
				Result	Result	Result	----	----	
EP080: BTEXN - Continued									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	----	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	98.1	102	112	----	----	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%	109	103	103	----	----	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	103	99.6	85.4	----	----	
2-Chlorophenol-D4	93951-73-6	0.5	%	102	94.9	94.7	----	----	
2,4,6-Tribromophenol	118-79-6	0.5	%	127	117	109	----	----	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%	101	97.7	95.5	----	----	
Anthracene-d10	1719-06-8	0.5	%	96.8	93.0	91.4	----	----	
4-Terphenyl-d14	1718-51-0	0.5	%	111	107	104	----	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	83.5	87.2	88.9	----	----	
Toluene-D8	2037-26-5	0.2	%	76.1	81.3	81.4	----	----	
4-Bromofluorobenzene	460-00-4	0.2	%	76.8	87.8	84.9	----	----	



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	53	152
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	28	152
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	57	119
2-Chlorophenol-D4	93951-73-6	52	130
2,4,6-Tribromophenol	118-79-6	40	132
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	53	139
Anthracene-d10	1719-06-8	68	124
4-Terphenyl-d14	1718-51-0	66	132
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	63	132
Toluene-D8	2037-26-5	66	125
4-Bromofluorobenzene	460-00-4	60	124

QUALITY CONTROL REPORT

Work Order : EP2208826

Page : 1 of 16

Amendment : 1

 Client : **360 ENVIRONMENTAL PTY LTD**

Laboratory : Environmental Division Perth

Contact : CHRIS DONNETTI

Contact : Natalie Duncan

 Address : 10 Bermondsey St
West Leederville 6007

Address : 26 Rigali Way Wangara Western Australia Australia 6065

Telephone : 9388 8360

Telephone : +61-8-9406 1301

Project : 5412 - Causeway Pedestrian Bridge

Date Samples Received : 11-Jul-2022

Order number : 5412-002

Date Analysis Commenced : 15-Jul-2022

C-O-C number : ----

Issue Date : 17-Aug-2022

Sampler : Phunsto Wangdi

Site : ----

Quote number : EP/469/22

No. of samples received : 33

No. of samples analysed : 3



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, Western Australia
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, Western Australia
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, Western Australia



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 (%)
EA002: pH 1:5 (Soils) (QC Lot: 4466985)									
EP2208655-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.9	9.0	0.0	0% - 20%
EP2208732-002	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.7	9.7	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 4519118)									
EP2208826-022	BH01_2	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%
EA033-B: Potential Acidity (QC Lot: 4519118)									
EP2208826-022	BH01_2	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.014	0.015	6.9	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: 4519118)									
EP2208826-022	BH01_2	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.81	0.82	1.2	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.26	0.26	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	161	164	2.0	0% - 50%
EA033-E: Acid Base Accounting (QC Lot: 4519118)									
EP2208826-022	BH01_2	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



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 (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4464185)									
EP2208826-022	BH01_2	EA055: Moisture Content	----	0.1	%	25.7	26.8	4.3	0% - 20%
EK055: Ammonia as N (QC Lot: 4460876)									
EP2208403-005	Anonymous	EK055: Ammonia as N	7664-41-7	20	mg/kg	<20	<20	0.0	No Limit
EP2208403-024	Anonymous	EK055: Ammonia as N	7664-41-7	20	mg/kg	<20	<20	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4466990)									
EP2208826-022	BH01_2	EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4466991)									
EP2208826-022	BH01_2	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4464412)									
EP2208826-022	BH01_2	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	310	280	11.0	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4464411)									
EP2208826-022	BH01_2	EK067G: Total Phosphorus as P	----	2	mg/kg	63	63	0.0	0% - 20%
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4460817)									
EP2208628-001	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	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 (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4460817) - continued									
EP2208628-001	Anonymous	EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4460830)									
EP2208826-023	BH01_3.5	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit		
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4460817)									
EP2208628-001	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	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 (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4460817) - continued									
EP2208628-001	Anonymous	EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4460830)									
EP2208826-023	BH01_3.5	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.07	33.2	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 4460829)									
EP2208826-023	BH01_3.5	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	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 (%)
EP075(SIM)A: Phenolic Compounds (QC Lot: 4460829) - continued									
EP2208826-023	BH01_3.5	EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4460829)									
EP2208826-023	BH01_3.5	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit		
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4460818)									
EP2208628-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4460827)									
EP2208826-023	BH01_3.5	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4460828)									
EP2208826-023	BH01_3.5	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4460818)									
EP2208628-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4460827)									
EP2208826-023	BH01_3.5	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4460828)									
EP2208826-023	BH01_3.5	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit

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 Work Order : EP2208826 Amendment 1
 Client : 360 ENVIRONMENTAL PTY LTD
 Project : 5412 - Causeway Pedestrian Bridge



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 (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4460828) - continued									
EP2208826-023	BH01_3.5	EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 4460827)									
EP2208826-023	BH01_3.5	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit



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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
EA002: pH 1:5 (Soils) (QCLot: 4466985)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.6	102
				----	7 pH Unit	100	98.6	102
EA033-A: Actual Acidity (QCLot: 4519118)								
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	92.4	83.3	112
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4519118)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	95.0	79.0	109
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 4519118)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.7	105
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: 4519118)								
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	----	----	----	----
EK055: Ammonia as N (QCLot: 4460876)								
EK055: Ammonia as N	7664-41-7	20	mg/kg	<20	50 mg/kg	101	76.1	110
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4466990)								
EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	2.5 mg/kg	95.9	94.1	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4466991)								
EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	2.5 mg/kg	95.8	88.5	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4464412)								
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	1000 mg/kg	88.6	78.0	128
				<20	100 mg/kg	102	70.0	128
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4464411)								
EK067G: Total Phosphorus as P	----	2	mg/kg	<2	440 mg/kg	90.6	90.0	125
				<2	44 mg/kg	104	90.0	125
EP068A: Organochlorine Pesticides (OC) (QCLot: 4460817)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	91.9	46.0	116
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	96.6	53.0	133
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	90.3	45.0	117



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Acceptable Limits (%)	
					Concentration	LCS	Low	High	
EP068A: Organochlorine Pesticides (OC) (QCLot: 4460817) - continued									
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	95.4	46.0	122	
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	86.2	47.0	117	
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	87.3	40.0	118	
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	112	47.0	123	
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	92.5	41.0	119	
EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----	
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	92.0	43.0	119	
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	114	41.0	131	
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.3	41.0	119	
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	94.0	41.0	127	
EP068: 4.4'-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	92.0	44.0	122	
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	89.0	37.0	129	
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	97.8	41.0	127	
EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----	
EP068: 4.4'-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	103	42.0	122	
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	79.3	31.2	117	
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	82.3	38.0	120	
EP068: 4.4'-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	69.5	31.4	125	
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	88.7	31.2	123	
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	66.6	24.7	125	
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.05	mg/kg	<0.05	----	----	----	----	
EP068: Sum of Aldrin + Dieldrin	309-00-2/60- 57-1	0.05	mg/kg	<0.05	----	----	----	----	
EP068A: Organochlorine Pesticides (OC) (QCLot: 4460830)									
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	91.8	46.0	116	
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	96.2	53.0	133	
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	90.3	45.0	117	
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	96.0	46.0	122	
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	86.3	47.0	117	
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	87.3	40.0	118	
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	112	47.0	123	
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	91.5	41.0	119	
EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----	
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	92.5	43.0	119	
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	111	41.0	131	
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.7	41.0	119	
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	90.3	41.0	127	
EP068: 4.4'-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	92.9	44.0	122	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
				Result		LCS	Low	High	
EP068A: Organochlorine Pesticides (OC) (QCLot: 4460830) - continued									
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	89.4	37.0	129	
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	97.8	41.0	127	
EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----	
EP068: 4.4'-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	102	42.0	122	
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	62.8	31.2	117	
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	64.2	38.0	120	
EP068: 4.4'-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	55.5	31.4	125	
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	69.8	31.2	123	
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	52.6	24.7	125	
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5-9/50-2	0.05	mg/kg	<0.05	----	----	----	----	
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----	
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4460817)									
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	68.1	61.0	141	
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	75.7	39.0	147	
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	19.0	4.10	154	
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	60.8	40.0	136	
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	92.6	59.0	133	
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	90.2	57.0	135	
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	76.8	39.0	133	
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	74.4	53.0	131	
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.8	53.0	133	
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	92.0	57.0	135	
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	100	45.0	131	
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	93.2	53.0	137	
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	77.4	53.0	133	
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	89.7	49.0	133	
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	79.1	39.0	137	
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	94.8	57.0	137	
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	89.9	53.0	135	
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	85.8	52.0	134	
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	21.5	20.4	154	
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4460830)									
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	69.5	61.0	141	
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	59.6	39.0	147	
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	15.1	4.10	154	
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	69.4	40.0	136	
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	92.4	59.0	133	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike	Spike Recovery (%)	Acceptable Limits (%)	
					Concentration	LCS	Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4460830) - continued								
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	90.0	57.0	135
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	75.2	39.0	133
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	70.0	53.0	131
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.4	53.0	133
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	91.8	57.0	135
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	99.4	45.0	131
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	92.8	53.0	137
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	65.6	53.0	133
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	88.8	49.0	133
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	76.0	39.0	137
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	93.9	57.0	137
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	88.8	53.0	135
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	66.1	52.0	134
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	27.1	20.4	154
EP075(SIM)A: Phenolic Compounds (QCLot: 4460819)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	3 mg/kg	83.8	61.0	125
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	3 mg/kg	91.6	66.0	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	3 mg/kg	95.0	62.0	126
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	6 mg/kg	94.1	63.0	129
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	3 mg/kg	110	61.0	131
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	3 mg/kg	95.2	60.0	132
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	3 mg/kg	85.0	63.0	131
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	3 mg/kg	90.6	67.0	123
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	3 mg/kg	99.0	65.0	125
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	3 mg/kg	83.2	52.0	132
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	3 mg/kg	80.6	64.0	130
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	3 mg/kg	83.9	34.0	138
EP075(SIM)A: Phenolic Compounds (QCLot: 4460829)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	3 mg/kg	83.4	61.0	125
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	3 mg/kg	89.3	66.0	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	3 mg/kg	93.8	62.0	126
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	6 mg/kg	92.4	63.0	129
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	3 mg/kg	115	61.0	131
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	3 mg/kg	99.6	60.0	132
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	3 mg/kg	84.5	63.0	131
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	3 mg/kg	89.6	67.0	123
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	3 mg/kg	98.3	65.0	125
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	3 mg/kg	84.9	52.0	132
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	3 mg/kg	81.7	64.0	130



Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 4460829) - continued								
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	3 mg/kg	112	34.0	138
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4460819)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	91.5	71.0	123
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	95.4	69.0	129
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	95.6	65.0	125
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	94.6	71.0	125
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	91.0	66.0	124
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	90.0	60.0	112
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	90.9	67.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	93.6	65.0	127
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	90.9	57.0	125
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	87.7	57.0	131
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	91.8	65.0	125
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	86.3	69.0	127
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	92.1	63.0	121
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	81.4	61.0	121
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	78.4	52.0	128
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	86.8	65.0	125
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4460829)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	88.1	71.0	123
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	93.9	69.0	129
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	91.2	65.0	125
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	92.3	71.0	125
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	88.0	66.0	124
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	87.2	60.0	112
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	88.8	67.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	91.4	65.0	127
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	89.2	57.0	125
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	84.3	57.0	131
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	87.0	65.0	125
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	82.9	69.0	127
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	90.0	63.0	121
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	88.9	61.0	121
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	86.5	52.0	128
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	86.3	65.0	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4460818)								



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
						LCS	Low	High	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4460818) - continued									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1468 mg/kg	88.0	70.0	111	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3111 mg/kg	94.0	71.9	109	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	436 mg/kg	87.0	63.8	118	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4460827)									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	35 mg/kg	91.8	66.0	122	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4460828)									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1468 mg/kg	92.2	70.0	111	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3111 mg/kg	105	71.9	109	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	436 mg/kg	103	63.8	118	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4460818)									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	2234 mg/kg	89.7	72.8	110	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2553 mg/kg	91.8	67.8	114	
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	89.8	50.3	123	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4460827)									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	90.2	66.0	122	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4460828)									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	2234 mg/kg	96.8	72.8	110	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2553 mg/kg	108	67.8	114	
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	92.6	50.3	123	
EP080: BTEXN (QCLot: 4460827)									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	82.4	72.0	122	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	86.1	75.0	119	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	88.9	73.0	121	
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	86.3	74.0	122	
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	89.8	75.0	121	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	90.8	64.0	126	

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.

Sub-Matrix: SOIL

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report				
				Spike Concentration	Spike Recovery(%)		Acceptable Limits (%)	
					MS	Low	High	
EK055: Ammonia as N (QCLot: 4460876)								
EP2208403-007	Anonymous	EK055: Ammonia as N	7664-41-7	50 mg/kg	95.9	70.0	130	



Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4466990)							
EP2208826-023	BH01_3.5	EK057G: Nitrite as N (Sol.)	14797-65-0	2.5 mg/kg	95.8	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4466991)							
EP2208826-023	BH01_3.5	EK059G: Nitrite + Nitrate as N (Sol.)	----	2.5 mg/kg	90.0	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4464412)							
EP2208826-023	BH01_3.5	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	110	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4464411)							
EP2208826-023	BH01_3.5	EK067G: Total Phosphorus as P	----	100 mg/kg	109	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 4460817)							
EP2208653-001	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	103	57.9	124
		EP068: Heptachlor	76-44-8	0.5 mg/kg	102	57.4	135
		EP068: Aldrin	309-00-2	0.5 mg/kg	78.2	59.6	125
		EP068: Dieldrin	60-57-1	0.5 mg/kg	80.8	62.2	131
		EP068: Endrin	72-20-8	0.5 mg/kg	108	55.8	138
		EP068: 4,4'-DDT	50-29-3	0.5 mg/kg	88.3	50.5	145
EP068A: Organochlorine Pesticides (OC) (QCLot: 4460830)							
EP2208826-024	BH01_5	EP068: gamma-BHC	58-89-9	0.5 mg/kg	98.8	57.9	124
		EP068: Heptachlor	76-44-8	0.5 mg/kg	93.8	57.4	135
		EP068: Aldrin	309-00-2	0.5 mg/kg	114	59.6	125
		EP068: Dieldrin	60-57-1	0.5 mg/kg	103	62.2	131
		EP068: Endrin	72-20-8	0.5 mg/kg	98.4	55.8	138
		EP068: 4,4'-DDT	50-29-3	0.5 mg/kg	82.4	50.5	145
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4460817)							
EP2208653-001	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	97.8	59.5	128
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	108	60.3	128
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	99.1	58.8	127
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	91.2	60.7	128
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	87.0	60.0	129
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4460830)							
EP2208826-024	BH01_5	EP068: Diazinon	333-41-5	0.5 mg/kg	96.0	59.5	128
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	99.7	60.3	128
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	96.6	58.8	127
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	94.7	60.7	128
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	97.1	60.0	129
EP075(SIM)A: Phenolic Compounds (QCLot: 4460819)							
EP2208653-002	Anonymous	EP075(SIM): Phenol	108-95-2	3 mg/kg	83.5	73.4	135
		EP075(SIM): 2-Chlorophenol	95-57-8	3 mg/kg	83.2	71.7	136



Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 4460819) - continued							
EP2208653-002	Anonymous	EP075(SIM): 2-Nitrophenol	88-75-5	3 mg/kg	114	62.8	137
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	91.4	73.6	128
		EP075(SIM): Pentachlorophenol	87-86-5	3 mg/kg	138	18.0	152
EP075(SIM)A: Phenolic Compounds (QCLot: 4460829)							
EP2208826-024	BH01_5	EP075(SIM): Phenol	108-95-2	3 mg/kg	87.4	73.4	135
		EP075(SIM): 2-Chlorophenol	95-57-8	3 mg/kg	94.5	71.7	136
		EP075(SIM): 2-Nitrophenol	88-75-5	3 mg/kg	120	62.8	137
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	104	73.6	128
		EP075(SIM): Pentachlorophenol	87-86-5	3 mg/kg	120	18.0	152
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4460819)							
EP2208653-002	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	78.9	73.5	125
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	95.8	70.8	125
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4460829)							
EP2208826-024	BH01_5	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	90.4	73.5	125
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	95.4	70.8	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4460818)							
EP2208653-001	Anonymous	EP071: C10 - C14 Fraction	----	1468 mg/kg	90.4	64.7	126
		EP071: C15 - C28 Fraction	----	3111 mg/kg	103	61.7	124
		EP071: C29 - C36 Fraction	----	436 mg/kg	105	64.6	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4460827)							
EP2208826-024	BH01_5	EP080: C6 - C9 Fraction	----	24 mg/kg	84.5	69.1	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4460828)							
EP2208826-024	BH01_5	EP071: C10 - C14 Fraction	----	1468 mg/kg	90.4	64.7	126
		EP071: C15 - C28 Fraction	----	3111 mg/kg	104	61.7	124
		EP071: C29 - C36 Fraction	----	436 mg/kg	102	64.6	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4460818)							
EP2208653-001	Anonymous	EP071: >C10 - C16 Fraction	----	2234 mg/kg	94.9	64.7	126
		EP071: >C16 - C34 Fraction	----	2553 mg/kg	108	61.7	124
		EP071: >C34 - C40 Fraction	----	150 mg/kg	94.9	64.6	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4460827)							
EP2208826-024	BH01_5	EP080: C6 - C10 Fraction	C6_C10	29 mg/kg	81.9	69.1	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4460828)							
EP2208826-024	BH01_5	EP071: >C10 - C16 Fraction	----	2234 mg/kg	95.1	64.7	126
		EP071: >C16 - C34 Fraction	----	2553 mg/kg	108	61.7	124
		EP071: >C34 - C40 Fraction	----	150 mg/kg	90.2	64.6	131
EP080: BTEXN (QCLot: 4460827)							

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 Work Order : EP2208826 Amendment 1
 Client : 360 ENVIRONMENTAL PTY LTD
 Project : 5412 - Causeway Pedestrian Bridge



Sub-Matrix: **SOIL**

				<i>Matrix Spike (MS) Report</i>			
				<i>Spike</i>	<i>SpikeRecovery(%)</i>	<i>Acceptable Limits (%)</i>	
<i>Laboratory sample ID</i>	<i>Sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>Concentration</i>	<i>MS</i>	<i>Low</i>	<i>High</i>
EP080: BTEXN (QCLot: 4460827) - continued							
EP2208826-024	BH01_5	EP080: Benzene	71-43-2	2 mg/kg	78.8	76.4	118
		EP080: Toluene	108-88-3	2 mg/kg	81.3	67.4	112

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2208826	Page	: 1 of 8
Amendment	: 1		
Client	: 360 ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Perth
Contact	: CHRIS DONNETTI	Telephone	: +61-8-9406 1301
Project	: 5412 - Causeway Pedestrian Bridge	Date Samples Received	: 11-Jul-2022
Site	: ----	Issue Date	: 17-Aug-2022
Sampler	: Phunsto Wangdi	No. of samples received	: 33
Order number	: 5412-002	No. of samples analysed	: 3

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

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

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



Outliers : Analysis Holding Time Compliance

Matrix: SOIL

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved							
BH01_2, BH01_5	BH01_3,5,	19-Jul-2022	15-Jul-2022	4	----	----	----
EK057G: Nitrite as N by Discrete Analyser							
Soil Glass Jar - Unpreserved							
BH01_2, BH01_5	BH01_3,5,	19-Jul-2022	15-Jul-2022	4	----	----	----

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	Sample Date	Extraction / Preparation			Analysis			
		Container / Client Sample ID(s)	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002)								
BH01_2, BH01_5	08-Jul-2022	BH01_3,5,	19-Jul-2022	15-Jul-2022	✖	19-Jul-2022	19-Jul-2022	✔
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
BH01_2, BH01_5	08-Jul-2022	BH01_3,5,	15-Aug-2022	08-Jul-2023	✔	15-Aug-2022	13-Nov-2022	✔
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
BH01_2, BH01_5	08-Jul-2022	BH01_3,5,	15-Aug-2022	08-Jul-2023	✔	15-Aug-2022	13-Nov-2022	✔
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033)								
BH01_2, BH01_5	08-Jul-2022	BH01_3,5,	15-Aug-2022	08-Jul-2023	✔	15-Aug-2022	13-Nov-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-D: Retained Acidity								
Snap Lock Bag - frozen (EA033) BH01_2, BH01_5	BH01_3,5	08-Jul-2022	15-Aug-2022	08-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033) BH01_2, BH01_5	BH01_3,5	08-Jul-2022	15-Aug-2022	08-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055) BH01_2, BH01_5	BH01_3,5	08-Jul-2022	----	----	----	18-Jul-2022	22-Jul-2022	✓
EK055: Ammonia as N								
Soil Glass Jar - Unpreserved (EK055) BH01_2, BH01_5	BH01_3,5	08-Jul-2022	----	----	----	15-Jul-2022	05-Aug-2022	✓
EK057G: Nitrite as N by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK057G) BH01_2, BH01_5	BH01_3,5	08-Jul-2022	19-Jul-2022	15-Jul-2022	*	19-Jul-2022	21-Jul-2022	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK059G) BH01_2, BH01_5	BH01_3,5	08-Jul-2022	19-Jul-2022	05-Aug-2022	✓	19-Jul-2022	21-Jul-2022	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Soil Glass Jar - Unpreserved (EK061G) BH01_2, BH01_5	BH01_3,5	08-Jul-2022	18-Jul-2022	05-Aug-2022	✓	19-Jul-2022	15-Aug-2022	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK067G) BH01_2, BH01_5	BH01_3,5	08-Jul-2022	18-Jul-2022	05-Aug-2022	✓	19-Jul-2022	15-Aug-2022	✓
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068) BH01_3,5,	BH01_5	08-Jul-2022	15-Jul-2022	22-Jul-2022	✓	18-Jul-2022	24-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP068) BH01_2		08-Jul-2022	16-Jul-2022	22-Jul-2022	✓	18-Jul-2022	25-Aug-2022	✓
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068) BH01_3,5,	BH01_5	08-Jul-2022	15-Jul-2022	22-Jul-2022	✓	18-Jul-2022	24-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP068) BH01_2		08-Jul-2022	16-Jul-2022	22-Jul-2022	✓	18-Jul-2022	25-Aug-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
EP075(SIM)A: Phenolic Compounds							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH01_3.5, BH01_5	08-Jul-2022	15-Jul-2022	22-Jul-2022	✓	18-Jul-2022	24-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH01_2	08-Jul-2022	16-Jul-2022	22-Jul-2022	✓	18-Jul-2022	25-Aug-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH01_3.5, BH01_5	08-Jul-2022	15-Jul-2022	22-Jul-2022	✓	18-Jul-2022	24-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH01_2	08-Jul-2022	16-Jul-2022	22-Jul-2022	✓	18-Jul-2022	25-Aug-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) BH01_2, BH01_5	08-Jul-2022	15-Jul-2022	22-Jul-2022	✓	16-Jul-2022	22-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH01_3.5, BH01_5	08-Jul-2022	15-Jul-2022	22-Jul-2022	✓	18-Jul-2022	24-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH01_2	08-Jul-2022	16-Jul-2022	22-Jul-2022	✓	18-Jul-2022	25-Aug-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) BH01_2, BH01_5	08-Jul-2022	15-Jul-2022	22-Jul-2022	✓	16-Jul-2022	22-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH01_3.5, BH01_5	08-Jul-2022	15-Jul-2022	22-Jul-2022	✓	18-Jul-2022	24-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH01_2	08-Jul-2022	16-Jul-2022	22-Jul-2022	✓	18-Jul-2022	25-Aug-2022	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) BH01_2, BH01_5	08-Jul-2022	15-Jul-2022	22-Jul-2022	✓	16-Jul-2022	22-Jul-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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Buchi Ammonia	EK055	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	3	33.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	3	33.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	3	33.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	3	33.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	6	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	7	28.57	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	7	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	7	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	EP071	2	7	28.57	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	33.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Buchi Ammonia	EK055	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	6	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	7	28.57	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	2	7	28.57	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	2	7	28.57	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	EP071	2	7	28.57	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Buchi Ammonia	EK055	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	6	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	7	28.57	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **SOIL** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction	EP071	2	7	28.57	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Buchi Ammonia	EK055	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	6	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	7	28.57	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	7	28.57	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	33.33	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
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
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.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Buchi Ammonia	EK055	SOIL	In house: Referenced to APHA 4500-NH3 B&G, H Samples are steam distilled (Buchi) prior to analysis and quantified using titration, FIA or Discrete Analyser.
Nitrite as N - Soluble by Discrete Analyser	EK057G	SOIL	In house: Referenced to APHA 4500-NO3- B. Nitrite in a water extract is determined by direct colourimetry by Discrete Analyser.
Nitrate as N - Soluble by Discrete Analyser	EK058G	SOIL	In house: Referenced to APHA 4500-NO3- F. Nitrate in the 1:5 soil:water extract is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	SOIL	In house: Thermo Scientific Method D08727 and NEMI (National Environmental Method Index) Method ID: 9171. This method covers the determination of total oxidised nitrogen (NOx-N) and nitrate (NO3-N) by calculation, Combined oxidised Nitrogen (NO2+NO3) in a water extract is determined by direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	In house: Referenced to APHA 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Nitrogen as N (TKN + NOx) By Discrete Analyser	EK062G	SOIL	In house: Referenced to APHA 4500 Norg/NO3- Total Nitrogen is determined as the sum of TKN and Oxidised Nitrogen, each determined seperately as N.
Total Phosporus By Discrete Analyser	EK067G	SOIL	In house: Referenced to APHA 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatle Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TKN/TP Digestion	EK061/EK067	SOIL	In house: Referenced to APHA 4500 Norg- D; APHA 4500 P - H. Macro Kjeldahl digestion.
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.



CHAIN OF CUSTODY

ALS Laboratory
Phone 08 9398 8884

ALS 2008/09 Performance Audit Report
Approved by: Stuart Lamb (08) 9398 8884
Reviewed by: Stuart Lamb (08) 9398 8884
Date: 17/07/2008
ALS Laboratory
Phone 08 9398 8884

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ALS 2008/09 Performance Audit Report
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Reviewed by: Stuart Lamb (08) 9398 8884
Date: 17/07/2008
ALS Laboratory
Phone 08 9398 8884

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CLIENT: 386 Environmental
OFFICE: 333 Hawthorn Road, Springvale VIC 3172
PROJECT: 5412 - Caseyway Pedestrian Bridge
PROJECT MANAGER: Chris Donnell
CONTACT PH: 0415 983 884
SAMPLER: Ben Graham
SAMPLER MOBILE: 0481 185 287
EOD FORMAT (or default): Eureka - Eureka
COC emailed to: ALS? (YES / NO)
Email Reports to: (will default to PM if no other addresses are listed): ben.donnell@386environmental.com.au & ben.donnell@386environmental.com.au
Email Invoiced to: (will default to PM if no other addresses are listed): account@386environmental.com.au

REQUIREMENTS: Standard TAT (Lab due date) 2007/09/22
 Non Standard or urgent TAT (Lab due date):
COD SEQUENCE NUMBER (Total)
1 2 3 4 5 6 7
OR: 1 2 3 4 5 6 7
RECEIVED BY: *SP*
DATE/TIME: 17/15
18/12/08

RECEIVED BY: _____ DATE/TIME: _____
RECEIVED BY: _____ DATE/TIME: _____

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (to codes below)	TOTAL CONTAINERS <i>refer</i>	ANALYSIS REQUIRED (including SUITE(S) - Suite Codes must be listed to extract suite price) <i>When Metals are required, specify Total (unfiltered bottle required) or Dissolved (acid filtered bottle required)</i>							Additional Information	
						pH	CRS Suite	Suite S24 - TRH (C6-C40) / BTEXN / PAH / Phenols	S12 - OC/OP Pesticides	Suite NT8 S- Total Nitrogen, TKN, NO ₂ , NO ₃ , NH ₄ , Total Phosphorus	HOLD	Comments on this container here, if any. Sample requires special QC methods etc.		
1	BH02_3.5	13/07/2022	S	ASS+1 glass soil jar	2	X	X	X	X	X				
2	BH02_5	13/07/2022	S	ASS+1 glass soil jar	2	X	X	X	X	X				
3	BH02_8.5	13/07/2022	S	ASS+1 glass soil jar	2	X	X	X	X	X				
4	BH02_8	13/07/2022	S	ASS+1 glass soil jar	2	X	X	X	X	X				
5	BH02_9.5	13/07/2022	S	ASS+1 glass soil jar	2	X	X	X	X	X				
6	BH02_11	13/07/2022	S	ASS+1 glass soil jar	2						X			
7	BH02_12.5	13/07/2022	S	ASS+1 glass soil jar	2						X			
8	BH02_14	13/07/2022	S	ASS+1 glass soil jar	2						X			
9	BH02_15.5	13/07/2022	S	ASS+1 glass soil jar	2						X			
10	BH02_17	13/07/2022	S	ASS+1 glass soil jar	2						X			
11	BH02_18.5	13/07/2022	S	ASS+1 glass soil jar	2						X			
12	BH02_20	13/07/2022	S	ASS+1 glass soil jar	2						X			
13	BH02_21.5	13/07/2022	S	ASS+1 glass soil jar	2						X			
14	BH02_23	13/07/2022	S	ASS+1 glass soil jar	2						X			
15	BH02_24.5	13/07/2022	S	ASS+1 glass soil jar	2						X			
16	BH02_26.0	13/07/2022	S	ASS+1 glass soil jar	2						X			
17	BH02_27.5	13/07/2022	S	ASS+1 glass soil jar	2						X			
18	BH02_29.0	13/07/2022	S	ASS+1 glass soil jar	2						X			
19	BH02_30.5	13/07/2022	S	ASS+1 glass soil jar	2						X			
20	BH02_32.0	13/07/2022	S	ASS+1 glass soil jar	2						X			
21	BH3_2.0	14/07/2022	S	ASS+1 glass soil jar	2	X	X	X	X	X				
22	BH3_3.5 - 4.0	14/07/2022	S	ASS+1 glass soil jar	2	X	X	X	X	X				
23	BH3_5.0 - 5.5	14/07/2022	S	ASS+1 glass soil jar	2	X	X	X	X	X				
24	BH3_6.5 - 7.0	14/07/2022	S	ASS+1 glass soil jar	2	X	X	X	X	X				
25	BH3_8.0	14/07/2022	S	ASS+1 glass soil jar	2						X			
26	BH3_9.5	14/07/2022	S	ASS+1 glass soil jar	2						X			
27	BH3_11.0	14/07/2022	S	ASS+1 glass soil jar	2						X			
28	BH3_12.5-13.0	14/07/2022	S	ASS+1 glass soil jar	2						X			
29	BH3_14.0	14/07/2022	S	ASS+1 glass soil jar	2						X			
30	BH3_15.0 - 15.5	14/07/2022	S	ASS+1 glass soil jar	2						X			
31	BH3_16.0	14/07/2022	S	ASS+1 glass soil jar	2						X			
32	BH3_18.5-19.0	14/07/2022	S	ASS+1 glass soil jar	2						X			
33	BH3_20	14/07/2022	S	ASS+1 glass soil jar	2						X			
34	BH3_21-5-21.85	14/07/2022	S	ASS+1 glass soil jar	2						X			
35	BH3_23.0	14/07/2022	S	ASS+1 glass soil jar	2						X			
36	BH3_24.5	14/07/2022	S	ASS+1 glass soil jar	2						X			
37	BH3_25.5-26.0	14/07/2022	S	ASS+1 glass soil jar	2						X			
38	BH3_27-5-27.75	14/07/2022	S	ASS+1 glass soil jar	2						X			
TOTAL						74	8	8	8	8	8	8	30	



Environmental Division
Perth
Work Order Reference
EP2208996

Telephone : - 61-8-9406 1301

Notes/Comments/Code: P = Unpreserved Plastic; N = Nitro Preserved Plastic; CRG = White Preserved CRG; SV = Sodium Hydroxide Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; GP = Airtight Unpreserved Plastic; V = Zinc Amalgam Preserved Plastic; E = EDTA Preserved Plastic; F = Fluoride Preserved Plastic; W = Water Preserved Plastic; M = Metal Preserved Plastic; H = HCl Preserved Plastic; HS = HCl Preserved Specimen Bottle; SP = Sulphur Preserved Plastic; F = Formaldehyde Preserved Glass.

CERTIFICATE OF ANALYSIS

Work Order : EP2208996 Amendment : 1 Client : 360 ENVIRONMENTAL PTY LTD Contact : CHRIS DONNETTI Address : PO BOX 14 WEST PERTH WA, AUSTRALIA 6872 Telephone : 9388 8360 Project : 5412 - Causeway Pedestrian Bridge Order number : 5412-002 C-O-C number : ---- Sampler : Ben Chaine Site : ---- Quote number : EP/469/22 No. of samples received : 38 No. of samples analysed : 8	Page : 1 of 13 Laboratory : Environmental Division Perth Contact : Natalie Duncan Address : 26 Rigali Way Wangara Western Australia Australia 6065 Telephone : +61-8-9406 1301 Date Samples Received : 18-Jul-2022 17:15 Date Analysis Commenced : 20-Jul-2022 Issue Date : 18-Aug-2022 17:35
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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
- Surrogate Control Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, Western Australia
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, Western Australia



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 Contract 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.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EA033-A (Chromium Suite 23A): KCl pH confirmed for sample #2, #22 and #23 by re-preparation and re-analysis.
- ASS: EA033 (CRS Suite): Retained Acidity not required for sample #1, #3, #4 and #24 because pH KCl greater than or equal to 4.5
- Amendment (11/08/2022): This report has been amended and re-released to allow the reporting of additional analytical data, specifically method EA033-WA.
- ASS: EA033 (CRS Suite): ANC not required for sample #1, #2, #22 and #23 because pH KCl less than 6.5
- 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'.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH02_3.5	BH02_5	BH02_6.5	BH02_8	BH3_2.0
Sampling date / time				13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	14-Jul-2022 00:00	
Compound	CAS Number	LOR	Unit	EP2208996-001	EP2208996-002	EP2208996-003	EP2208996-004	EP2208996-021	
				Result	Result	Result	Result	Result	
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit	7.9	8.4	8.7	8.6	----	
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit	6.4	4.0	7.2	7.5	----	
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	166	<2	<2	----	
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	0.27	<0.02	<0.02	----	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.416	2.45	1.93	2.24	----	
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	260	1530	1200	1400	----	
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	1.62	1.29	----	
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	324	258	----	
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	0.52	0.41	----	
EA033-D: Retained Acidity									
Net Acid Soluble Sulfur (20Je)	----	0.02	% S	----	0.89	----	----	----	
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	----	416	----	----	----	
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	----	0.67	----	----	----	
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	0.80	----	----	----	
HCl Extractable Sulfur (20Be)	----	0.02	% S	----	1.24	----	----	----	
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	0.42	3.38	1.58	1.97	----	
Net Acidity (acidity units)	----	10	mole H+ / t	260	2110	988	1230	----	
Liming Rate	----	1	kg CaCO3/t	19	158	74	92	----	
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.42	3.38	1.93	2.24	----	
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	260	2110	1200	1400	----	
Liming Rate excluding ANC	----	1	kg CaCO3/t	19	158	90	105	----	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	39.0	49.9	41.7	41.3	----	
EK055: Ammonia as N									
Ammonia as N	7664-41-7	20	mg/kg	40	80	80	110	----	
EK057G: Nitrite as N by Discrete Analyser									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH02_3.5	BH02_5	BH02_6.5	BH02_8	BH3_2.0
Sampling date / time				13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	14-Jul-2022 00:00	
Compound	CAS Number	LOR	Unit	EP2208996-001	EP2208996-002	EP2208996-003	EP2208996-004	EP2208996-021	
				Result	Result	Result	Result	Result	
EK057G: Nitrite as N by Discrete Analyser - Continued									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	<0.1	<0.1	0.2	0.2	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.2	0.2	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg	2110	2710	2300	1430	----	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	2110	2710	2300	1430	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	175	192	159	181	----	
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
4.4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
4.4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
4.4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH02_3.5	BH02_5	BH02_6.5	BH02_8	BH3_2.0
Sampling date / time				13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	14-Jul-2022 00:00	
Compound	CAS Number	LOR	Unit	EP2208996-001	EP2208996-002	EP2208996-003	EP2208996-004	EP2208996-021	
				Result	Result	Result	Result	Result	
EP068A: Organochlorine Pesticides (OC) - Continued									
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----	
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----	
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1	
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH02_3.5	BH02_5	BH02_6.5	BH02_8	BH3_2.0
Sampling date / time					13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	14-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EP2208996-001	EP2208996-002	EP2208996-003	EP2208996-004	EP2208996-021	
				Result	Result	Result	Result	Result	
EP075(SIM)A: Phenolic Compounds - Continued									
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	2.0	<0.5	<0.5	<0.5	0.6	
Pyrene	129-00-0	0.5	mg/kg	2.0	<0.5	<0.5	<0.5	0.6	
Benzo(a)anthracene	56-55-3	0.5	mg/kg	1.0	<0.5	<0.5	<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg	0.9	<0.5	<0.5	<0.5	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	1.7	<0.5	<0.5	<0.5	0.6	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	0.7	<0.5	<0.5	<0.5	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	1.6	<0.5	<0.5	<0.5	<0.5	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	1.0	<0.5	<0.5	<0.5	<0.5	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	1.1	<0.5	<0.5	<0.5	<0.5	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	12.0	<0.5	<0.5	<0.5	1.8	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	2.1	<0.5	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	2.3	0.6	0.6	0.6	0.6	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	2.6	1.2	1.2	1.2	1.2	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10	
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50	
C15 - C28 Fraction	----	100	mg/kg	120	<100	<100	<100	140	
C29 - C36 Fraction	----	100	mg/kg	120	<100	<100	<100	140	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	240	<50	<50	<50	280	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10	
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH02_3.5	BH02_5	BH02_6.5	BH02_8	BH3_2.0
Sampling date / time				13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	14-Jul-2022 00:00	
Compound	CAS Number	LOR	Unit	EP2208996-001	EP2208996-002	EP2208996-003	EP2208996-004	EP2208996-021	
				Result	Result	Result	Result	Result	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C16 - C34 Fraction	----	100	mg/kg	220	<100	<100	<100	260	
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	220	<50	<50	<50	260	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	85.1	70.9	88.4	84.3	----	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%	115	95.7	87.5	123	----	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	80.9	79.1	81.3	80.0	80.8	
2-Chlorophenol-D4	93951-73-6	0.5	%	75.7	74.9	80.7	78.9	78.7	
2,4,6-Tribromophenol	118-79-6	0.5	%	80.6	82.7	74.5	76.6	84.0	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%	79.0	75.6	78.3	78.3	79.3	
Anthracene-d10	1719-06-8	0.5	%	75.0	71.9	76.0	76.6	77.2	
4-Terphenyl-d14	1718-51-0	0.5	%	88.0	84.6	89.4	90.7	88.3	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	77.8	78.3	79.3	85.1	80.4	
Toluene-D8	2037-26-5	0.2	%	75.2	75.8	74.1	78.0	74.6	
4-Bromofluorobenzene	460-00-4	0.2	%	80.7	79.8	82.1	87.5	80.7	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH3_3.5 - 4.0	BH3_5.0 - 5.5	BH3_6.5 - 7.0	----	----
Sampling date / time				14-Jul-2022 00:00	14-Jul-2022 00:00	14-Jul-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2208996-022	EP2208996-023	EP2208996-024	-----	-----	
				Result	Result	Result	----	----	
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit	8.4	8.6	8.9	----	----	
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit	3.9	4.3	7.9	----	----	
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	126	116	<2	----	----	
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.20	0.19	<0.02	----	----	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S	2.25	2.37	2.24	----	----	
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	1400	1480	1400	----	----	
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	3.65	----	----	
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	729	----	----	
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	1.17	----	----	
EA033-D: Retained Acidity									
Net Acid Soluble Sulfur (20Je)	----	0.02	% S	0.54	0.86	----	----	----	
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	250	403	----	----	----	
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	0.40	0.65	----	----	----	
KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.54	0.77	----	----	----	
HCl Extractable Sulfur (20Be)	----	0.02	% S	0.81	1.20	----	----	----	
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	----	----	
Net Acidity (sulfur units)	----	0.02	% S	2.85	3.21	1.47	----	----	
Net Acidity (acidity units)	----	10	mole H+ / t	1780	2000	914	----	----	
Liming Rate	----	1	kg CaCO3/t	133	150	69	----	----	
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	2.85	3.21	2.24	----	----	
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	1780	2000	1400	----	----	
Liming Rate excluding ANC	----	1	kg CaCO3/t	133	150	105	----	----	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	52.5	45.6	50.7	----	----	
EK055: Ammonia as N									
Ammonia as N	7664-41-7	20	mg/kg	120	100	190	----	----	
EK057G: Nitrite as N by Discrete Analyser									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH3_3.5 - 4.0	BH3_5.0 - 5.5	BH3_6.5 - 7.0	----	----
Sampling date / time				14-Jul-2022 00:00	14-Jul-2022 00:00	14-Jul-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2208996-022	EP2208996-023	EP2208996-024	-----	-----	
				Result	Result	Result	----	----	
EK057G: Nitrite as N by Discrete Analyser - Continued									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	<0.1	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	0.2	0.1	0.2	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	0.2	0.1	0.2	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg	2590	2260	2340	----	----	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	2590	2260	2340	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	160	168	221	----	----	
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
4.4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
4.4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
4.4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH3_3.5 - 4.0	BH3_5.0 - 5.5	BH3_6.5 - 7.0	----	----
Sampling date / time				14-Jul-2022 00:00	14-Jul-2022 00:00	14-Jul-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2208996-022	EP2208996-023	EP2208996-024	-----	-----	
				Result	Result	Result	----	----	
EP068A: Organochlorine Pesticides (OC) - Continued									
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	----	----	
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	----	----	
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH3_3.5 - 4.0	BH3_5.0 - 5.5	BH3_6.5 - 7.0	----	----
Sampling date / time				14-Jul-2022 00:00	14-Jul-2022 00:00	14-Jul-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2208996-022	EP2208996-023	EP2208996-024	-----	-----	
				Result	Result	Result	----	----	
EP075(SIM)A: Phenolic Compounds - Continued									
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	----	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	----	----	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	----	----	
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	----	----	
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	----	----	
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	----	----	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	----	----	
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	----	----	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH3_3.5 - 4.0	BH3_5.0 - 5.5	BH3_6.5 - 7.0	----	----
Sampling date / time				14-Jul-2022 00:00	14-Jul-2022 00:00	14-Jul-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2208996-022	EP2208996-023	EP2208996-024	-----	-----	
				Result	Result	Result	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	----	----	
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	----	----	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	----	----	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	----	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	88.1	93.2	81.1	----	----	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%	92.2	99.6	113	----	----	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	84.0	88.6	84.8	----	----	
2-Chlorophenol-D4	93951-73-6	0.5	%	81.8	86.0	82.2	----	----	
2,4,6-Tribromophenol	118-79-6	0.5	%	85.2	83.5	84.9	----	----	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%	80.2	85.1	81.3	----	----	
Anthracene-d10	1719-06-8	0.5	%	78.0	83.4	78.5	----	----	
4-Terphenyl-d14	1718-51-0	0.5	%	91.8	98.1	93.4	----	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	74.9	75.1	73.4	----	----	
Toluene-D8	2037-26-5	0.2	%	68.4	66.5	67.5	----	----	
4-Bromofluorobenzene	460-00-4	0.2	%	74.0	72.8	73.8	----	----	



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	53	152
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	28	152
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	57	119
2-Chlorophenol-D4	93951-73-6	52	130
2,4,6-Tribromophenol	118-79-6	40	132
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	53	139
Anthracene-d10	1719-06-8	68	124
4-Terphenyl-d14	1718-51-0	66	132
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	63	132
Toluene-D8	2037-26-5	66	125
4-Bromofluorobenzene	460-00-4	60	124

QUALITY CONTROL REPORT

Work Order	: EP2208996	Page	: 1 of 10
Amendment	: 1		
Client	: 360 ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Perth
Contact	: CHRIS DONNETTI	Contact	: Natalie Duncan
Address	: PO BOX 14 WEST PERTH WA, AUSTRALIA 6872	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: 9388 8360	Telephone	: +61-8-9406 1301
Project	: 5412 - Causeway Pedestrian Bridge	Date Samples Received	: 18-Jul-2022
Order number	: 5412-002	Date Analysis Commenced	: 20-Jul-2022
C-O-C number	: ----	Issue Date	: 18-Aug-2022
Sampler	: Ben Chaine		
Site	: ----		
Quote number	: EP/469/22		
No. of samples received	: 38		
No. of samples analysed	: 8		



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, Western Australia
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, Western Australia



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 (%)
EA002: pH 1:5 (Soils) (QC Lot: 4474520)									
EP2208996-001	BH02_3.5	EA002: pH Value	----	0.1	pH Unit	7.9	7.8	1.9	0% - 20%
EA033-A: Actual Acidity (QC Lot: 4519130)									
EP2208996-001	BH02_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	<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: 4519130)									
EP2208996-001	BH02_3.5	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.416	0.419	0.7	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	260	261	0.8	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 4519130)									
EP2208996-001	BH02_3.5	EA033: Net Acidity (sulfur units)	----	0.02	% S	0.42	0.42	0.0	0% - 20%
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.42	0.42	0.0	0% - 20%
		EA033: Liming Rate	----	1	kg CaCO3/t	19	20	5.1	0% - 20%
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	19	20	5.1	0% - 20%
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	260	261	0.4	0% - 20%
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	260	261	0.4	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4471932)									
EP2208996-001	BH02_3.5	EA055: Moisture Content	----	0.1	%	39.0	40.8	4.6	0% - 20%
EK055: Ammonia as N (QC Lot: 4470617)									
EP2208996-001	BH02_3.5	EK055: Ammonia as N	7664-41-7	20	mg/kg	40	40	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4474521)									
EP2208996-001	BH02_3.5	EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4474522)									



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 (%)
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4474522) - continued									
EP2208996-001	BH02_3.5	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	0.1	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4470024)									
EP2208957-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	550	570	4.0	0% - 20%
EP2208996-001	BH02_3.5	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	2110	2080	1.1	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4470025)									
EP2208957-001	Anonymous	EK067G: Total Phosphorus as P	----	2	mg/kg	357	346	3.2	0% - 20%
EP2208996-001	BH02_3.5	EK067G: Total Phosphorus as P	----	2	mg/kg	175	175	0.0	0% - 20%
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4469544)									
EP2208996-001	BH02_3.5	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit		
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit		
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4469544)									
EP2208996-001	BH02_3.5	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	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 (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4469544) - continued									
EP2208996-001	BH02_3.5	EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit		
EP075(SIM)A: Phenolic Compounds (QC Lot: 4469543)									
EP2208996-001	BH02_3.5	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4469543)									
EP2208996-001	BH02_3.5	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	2.0	1.6	26.6	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	2.0	1.5	26.7	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	1.0	0.8	31.9	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	0.9	0.6	37.8	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 (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4469543) - continued									
EP2208996-001	BH02_3.5	EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	1.7	1.2	30.5	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	0.7	0.5	30.4	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	1.6	1.1	33.6	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	1.0	0.8	27.5	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	1.1	0.8	34.6	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4469542)									
EP2208996-001	BH02_3.5	EP071: C15 - C28 Fraction	----	100	mg/kg	120	<100	22.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	120	<100	14.8	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4469552)									
EP2208996-001	BH02_3.5	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4469542)									
EP2208996-001	BH02_3.5	EP071: >C16 - C34 Fraction	----	100	mg/kg	220	170	22.9	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4469552)									
EP2208996-001	BH02_3.5	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 4469552)									
EP2208996-001	BH02_3.5	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit



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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 4474520)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.6	102
				----	7 pH Unit	100	98.6	102
EA033-A: Actual Acidity (QCLot: 4519130)								
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	98.2	83.3	112
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4519130)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	95.5	79.0	109
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 4519130)								
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	----	----	----	----
EK055: Ammonia as N (QCLot: 4470617)								
EK055: Ammonia as N	7664-41-7	20	mg/kg	<20	50 mg/kg	93.9	76.1	110
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4474521)								
EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	2.5 mg/kg	96.3	94.1	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4474522)								
EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	2.5 mg/kg	97.6	88.5	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4470024)								
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	1000 mg/kg	97.8	78.0	128
				<20	100 mg/kg	123	70.0	128
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4470025)								
EK067G: Total Phosphorus as P	----	2	mg/kg	<2	440 mg/kg	90.9	90.0	125
				<2	44 mg/kg	119	90.0	125
EP068A: Organochlorine Pesticides (OC) (QCLot: 4469544)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	100	46.0	116
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	105	53.0	133
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	100	45.0	117
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	88.8	46.0	122
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	94.4	47.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	83.0	40.0	118
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	102	47.0	123



Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Acceptable Limits (%)	
					Concentration	LCS	Low	High	
EP068A: Organochlorine Pesticides (OC) (QCLot: 4469544) - continued									
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	80.8	41.0	119	
EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----	
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	98.8	43.0	119	
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	111	41.0	131	
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	97.3	41.0	119	
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	101	41.0	127	
EP068: 4.4'-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	97.1	44.0	122	
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	105	37.0	129	
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	112	41.0	127	
EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----	
EP068: 4.4'-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.2	42.0	122	
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	104	31.2	117	
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	103	38.0	120	
EP068: 4.4'-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	98.5	31.4	125	
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	106	31.2	123	
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	100	24.7	125	
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5-9/50-2	0.05	mg/kg	<0.05	----	----	----	----	
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----	
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4469544)									
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	91.6	61.0	141	
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	93.0	39.0	147	
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	9.1	4.10	154	
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	66.5	40.0	136	
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	101	59.0	133	
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	102	57.0	135	
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	90.0	39.0	133	
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	81.8	53.0	131	
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	99.1	53.0	133	
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	104	57.0	135	
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	97.4	45.0	131	
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	103	53.0	137	
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	97.6	53.0	133	
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	106	49.0	133	
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	103	39.0	137	
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	103	57.0	137	
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	96.7	53.0	135	
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	117	52.0	134	



Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Acceptable Limits (%)	
					Concentration	LCS	Low	High	
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4469544) - continued									
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	58.1	20.4	154	
EP075(SIM)A: Phenolic Compounds (QCLot: 4469543)									
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	3 mg/kg	85.9	61.0	125	
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	3 mg/kg	81.6	66.0	124	
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	3 mg/kg	80.7	62.0	126	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	6 mg/kg	84.9	63.0	129	
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	3 mg/kg	78.2	61.0	131	
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	3 mg/kg	84.9	60.0	132	
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	3 mg/kg	76.4	63.0	131	
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	3 mg/kg	75.4	67.0	123	
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	3 mg/kg	67.0	65.0	125	
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	3 mg/kg	62.1	52.0	132	
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	3 mg/kg	64.4	64.0	130	
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	3 mg/kg	84.4	34.0	138	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4469543)									
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	78.5	71.0	123	
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	91.1	69.0	129	
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	69.5	65.0	125	
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	73.2	71.0	125	
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	72.9	66.0	124	
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	71.2	60.0	112	
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	70.6	67.0	127	
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	70.1	65.0	127	
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	65.2	57.0	125	
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	73.8	57.0	131	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	3 mg/kg	73.4	65.0	125	
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	74.1	69.0	127	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	63.4	63.0	121	
EP075(SIM): Indeno(1,2,3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	74.4	61.0	121	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	63.0	52.0	128	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	65.9	65.0	125	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4469542)									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1468 mg/kg	90.9	70.0	111	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3111 mg/kg	95.3	71.9	109	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	436 mg/kg	91.6	63.8	118	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4469552)									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	35 mg/kg	92.2	66.0	122	



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4469542)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	2234 mg/kg	92.5	72.8	110
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2553 mg/kg	98.2	67.8	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	77.4	50.3	123
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4469552)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	89.9	66.0	122
EP080: BTEXN (QCLot: 4469552)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	90.6	72.0	122
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	91.8	75.0	119
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	88.2	73.0	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	93.0	74.0	122
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	92.6	75.0	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	93.6	64.0	126

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.

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%) MS	Acceptable Limits (%) Low High	
EK055: Ammonia as N (QCLot: 4470617)							
EP2208996-002	BH02_5	EK055: Ammonia as N	7664-41-7	50 mg/kg	93.7	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4474521)							
EP2208996-002	BH02_5	EK057G: Nitrite as N (Sol.)	14797-65-0	2.5 mg/kg	96.0	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4474522)							
EP2208996-002	BH02_5	EK059G: Nitrite + Nitrate as N (Sol.)	----	2.5 mg/kg	75.2	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4470024)							
EP2208957-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	108	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4470025)							
EP2208957-002	Anonymous	EK067G: Total Phosphorus as P	----	100 mg/kg	71.9	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 4469544)							
EP2208996-002	BH02_5	EP068: gamma-BHC	58-89-9	0.5 mg/kg	107	57.9	124
		EP068: Heptachlor	76-44-8	0.5 mg/kg	93.3	57.4	135
		EP068: Aldrin	309-00-2	0.5 mg/kg	84.8	59.6	125
		EP068: Dieldrin	60-57-1	0.5 mg/kg	93.8	62.2	131
		EP068: Endrin	72-20-8	0.5 mg/kg	104	55.8	138



Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4469544) - continued							
EP2208996-002	BH02_5	EP068: 4.4'-DDT	50-29-3	0.5 mg/kg	55.8	50.5	145
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4469544)							
EP2208996-002	BH02_5	EP068: Diazinon	333-41-5	0.5 mg/kg	100	59.5	128
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	96.1	60.3	128
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	98.2	58.8	127
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	96.7	60.7	128
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	98.6	60.0	129
EP075(SIM)A: Phenolic Compounds (QCLot: 4469543)							
EP2208996-002	BH02_5	EP075(SIM): Phenol	108-95-2	3 mg/kg	88.9	73.4	135
		EP075(SIM): 2-Chlorophenol	95-57-8	3 mg/kg	82.4	71.7	136
		EP075(SIM): 2-Nitrophenol	88-75-5	3 mg/kg	81.8	62.8	137
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	77.3	73.6	128
		EP075(SIM): Pentachlorophenol	87-86-5	3 mg/kg	128	18.0	152
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4469543)							
EP2208996-002	BH02_5	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	78.0	73.5	125
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	77.6	70.8	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4469542)							
EP2208996-002	BH02_5	EP071: C10 - C14 Fraction	----	1468 mg/kg	93.5	64.7	126
		EP071: C15 - C28 Fraction	----	3111 mg/kg	97.6	61.7	124
		EP071: C29 - C36 Fraction	----	436 mg/kg	95.6	64.6	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4469552)							
EP2208996-002	BH02_5	EP080: C6 - C9 Fraction	----	24 mg/kg	75.6	69.1	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4469542)							
EP2208996-002	BH02_5	EP071: >C10 - C16 Fraction	----	2234 mg/kg	94.5	64.7	126
		EP071: >C16 - C34 Fraction	----	2553 mg/kg	101	61.7	124
		EP071: >C34 - C40 Fraction	----	150 mg/kg	84.7	64.6	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4469552)							
EP2208996-002	BH02_5	EP080: C6 - C10 Fraction	C6_C10	29 mg/kg	71.4	69.1	135
EP080: BTEXN (QCLot: 4469552)							
EP2208996-002	BH02_5	EP080: Benzene	71-43-2	2 mg/kg	77.2	76.4	118
		EP080: Toluene	108-88-3	2 mg/kg	77.9	67.4	112

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2208996	Page	: 1 of 10
Amendment	: 1		
Client	: 360 ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Perth
Contact	: CHRIS DONNETTI	Telephone	: +61-8-9406 1301
Project	: 5412 - Causeway Pedestrian Bridge	Date Samples Received	: 18-Jul-2022
Site	: ----	Issue Date	: 18-Aug-2022
Sampler	: Ben Chainé	No. of samples received	: 38
Order number	: 5412-002	No. of samples analysed	: 8

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

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

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



Outliers : Analysis Holding Time Compliance

Matrix: SOIL

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002: pH 1:5 (Soils)						
Soil Glass Jar - Unpreserved BH02_3.5, BH02_6.5, BH02_5, BH02_8	22-Jul-2022	20-Jul-2022	2	----	----	----
Soil Glass Jar - Unpreserved BH3_3.5 - 4.0, BH3_6.5 - 7.0, BH3_5.0 - 5.5,	22-Jul-2022	21-Jul-2022	1	----	----	----
EK057G: Nitrite as N by Discrete Analyser						
Soil Glass Jar - Unpreserved BH02_3.5, BH02_6.5, BH02_5, BH02_8	22-Jul-2022	20-Jul-2022	2	----	----	----
Soil Glass Jar - Unpreserved BH3_3.5 - 4.0, BH3_6.5 - 7.0, BH3_5.0 - 5.5,	22-Jul-2022	21-Jul-2022	1	----	----	----

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
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002) BH02_3.5, BH02_6.5, BH02_5, BH02_8	13-Jul-2022	22-Jul-2022	20-Jul-2022	✘	22-Jul-2022	22-Jul-2022	✔
Soil Glass Jar - Unpreserved (EA002) BH3_3.5 - 4.0, BH3_6.5 - 7.0, BH3_5.0 - 5.5,	14-Jul-2022	22-Jul-2022	21-Jul-2022	✘	22-Jul-2022	22-Jul-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-A: Actual Acidity								
Snap Lock Bag - frozen on receipt at ALS (EA033) BH02_3.5, BH02_6.5, BH02_5, BH02_8	13-Jul-2022	15-Aug-2022	13-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓	
Snap Lock Bag - frozen on receipt at ALS (EA033) BH3_3.5 - 4.0, BH3_6.5 - 7.0, BH3_5.0 - 5.5,	14-Jul-2022	15-Aug-2022	14-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓	
EA033-B: Potential Acidity								
Snap Lock Bag - frozen on receipt at ALS (EA033) BH02_3.5, BH02_6.5, BH02_5, BH02_8	13-Jul-2022	15-Aug-2022	13-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓	
Snap Lock Bag - frozen on receipt at ALS (EA033) BH3_3.5 - 4.0, BH3_6.5 - 7.0, BH3_5.0 - 5.5,	14-Jul-2022	15-Aug-2022	14-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓	
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen on receipt at ALS (EA033) BH02_3.5, BH02_6.5, BH02_5, BH02_8	13-Jul-2022	15-Aug-2022	13-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓	
Snap Lock Bag - frozen on receipt at ALS (EA033) BH3_3.5 - 4.0, BH3_6.5 - 7.0, BH3_5.0 - 5.5,	14-Jul-2022	15-Aug-2022	14-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓	
EA033-D: Retained Acidity								
Snap Lock Bag - frozen on receipt at ALS (EA033) BH02_3.5, BH02_6.5, BH02_5, BH02_8	13-Jul-2022	15-Aug-2022	13-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓	
Snap Lock Bag - frozen on receipt at ALS (EA033) BH3_3.5 - 4.0, BH3_6.5 - 7.0, BH3_5.0 - 5.5,	14-Jul-2022	15-Aug-2022	14-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓	
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen on receipt at ALS (EA033) BH02_3.5, BH02_6.5, BH02_5, BH02_8	13-Jul-2022	15-Aug-2022	13-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓	
Snap Lock Bag - frozen on receipt at ALS (EA033) BH3_3.5 - 4.0, BH3_6.5 - 7.0, BH3_5.0 - 5.5,	14-Jul-2022	15-Aug-2022	14-Jul-2023	✓	15-Aug-2022	13-Nov-2022	✓	
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055) BH02_3.5, BH02_6.5, BH02_5, BH02_8	13-Jul-2022	----	----	----	21-Jul-2022	27-Jul-2022	✓	
Soil Glass Jar - Unpreserved (EA055) BH3_3.5 - 4.0, BH3_6.5 - 7.0, BH3_5.0 - 5.5,	14-Jul-2022	----	----	----	21-Jul-2022	28-Jul-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	
EK055: Ammonia as N								
Soil Glass Jar - Unpreserved (EK055) BH02_3.5, BH02_6.5, BH02_8	BH02_5, BH02_8	13-Jul-2022	----	----	----	20-Jul-2022	10-Aug-2022	✔
Soil Glass Jar - Unpreserved (EK055) BH3_3.5 - 4.0, BH3_6.5 - 7.0	BH3_5.0 - 5.5,	14-Jul-2022	----	----	----	20-Jul-2022	11-Aug-2022	✔
EK057G: Nitrite as N by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK057G) BH02_3.5, BH02_6.5, BH02_8	BH02_5, BH02_8	13-Jul-2022	22-Jul-2022	20-Jul-2022	✖	22-Jul-2022	24-Jul-2022	✔
Soil Glass Jar - Unpreserved (EK057G) BH3_3.5 - 4.0, BH3_6.5 - 7.0	BH3_5.0 - 5.5,	14-Jul-2022	22-Jul-2022	21-Jul-2022	✖	22-Jul-2022	24-Jul-2022	✔
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK059G) BH02_3.5, BH02_6.5, BH02_8	BH02_5, BH02_8	13-Jul-2022	22-Jul-2022	10-Aug-2022	✔	22-Jul-2022	24-Jul-2022	✔
Soil Glass Jar - Unpreserved (EK059G) BH3_3.5 - 4.0, BH3_6.5 - 7.0	BH3_5.0 - 5.5,	14-Jul-2022	22-Jul-2022	11-Aug-2022	✔	22-Jul-2022	24-Jul-2022	✔
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Soil Glass Jar - Unpreserved (EK061G) BH02_3.5, BH02_6.5, BH02_8	BH02_5, BH02_8	13-Jul-2022	20-Jul-2022	10-Aug-2022	✔	21-Jul-2022	17-Aug-2022	✔
Soil Glass Jar - Unpreserved (EK061G) BH3_3.5 - 4.0, BH3_6.5 - 7.0	BH3_5.0 - 5.5,	14-Jul-2022	20-Jul-2022	11-Aug-2022	✔	21-Jul-2022	17-Aug-2022	✔
EK067G: Total Phosphorus as P by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK067G) BH02_3.5, BH02_6.5, BH02_8	BH02_5, BH02_8	13-Jul-2022	20-Jul-2022	10-Aug-2022	✔	21-Jul-2022	17-Aug-2022	✔
Soil Glass Jar - Unpreserved (EK067G) BH3_3.5 - 4.0, BH3_6.5 - 7.0	BH3_5.0 - 5.5,	14-Jul-2022	20-Jul-2022	11-Aug-2022	✔	21-Jul-2022	17-Aug-2022	✔
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068) BH02_3.5, BH02_6.5, BH02_8	BH02_5, BH02_8	13-Jul-2022	20-Jul-2022	27-Jul-2022	✔	22-Jul-2022	29-Aug-2022	✔
Soil Glass Jar - Unpreserved (EP068) BH3_3.5 - 4.0, BH3_6.5 - 7.0	BH3_5.0 - 5.5,	14-Jul-2022	20-Jul-2022	28-Jul-2022	✔	22-Jul-2022	29-Aug-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	
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068) BH02_3.5, BH02_6.5, BH02_8	BH02_5, BH02_8	13-Jul-2022	20-Jul-2022	27-Jul-2022	✓	22-Jul-2022	29-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP068) BH3_3.5 - 4.0, BH3_6.5 - 7.0	BH3_5.0 - 5.5,	14-Jul-2022	20-Jul-2022	28-Jul-2022	✓	22-Jul-2022	29-Aug-2022	✓
EP075(SIM)A: Phenolic Compounds								
Soil Glass Jar - Unpreserved (EP075(SIM)) BH02_3.5, BH02_6.5, BH02_8	BH02_5, BH02_8	13-Jul-2022	20-Jul-2022	27-Jul-2022	✓	22-Jul-2022	29-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH3_2.0, BH3_5.0 - 5.5,	BH3_3.5 - 4.0, BH3_6.5 - 7.0	14-Jul-2022	20-Jul-2022	28-Jul-2022	✓	22-Jul-2022	29-Aug-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM)) BH02_3.5, BH02_6.5, BH02_8	BH02_5, BH02_8	13-Jul-2022	20-Jul-2022	27-Jul-2022	✓	22-Jul-2022	29-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH3_2.0, BH3_5.0 - 5.5,	BH3_3.5 - 4.0, BH3_6.5 - 7.0	14-Jul-2022	20-Jul-2022	28-Jul-2022	✓	22-Jul-2022	29-Aug-2022	✓
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080) BH02_3.5, BH02_6.5, BH02_8	BH02_5, BH02_8	13-Jul-2022	20-Jul-2022	27-Jul-2022	✓	21-Jul-2022	27-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH02_3.5, BH02_6.5, BH02_8	BH02_5, BH02_8	13-Jul-2022	20-Jul-2022	27-Jul-2022	✓	22-Jul-2022	29-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH3_2.0, BH3_5.0 - 5.5,	BH3_3.5 - 4.0, BH3_6.5 - 7.0	14-Jul-2022	20-Jul-2022	28-Jul-2022	✓	21-Jul-2022	28-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH3_2.0, BH3_5.0 - 5.5,	BH3_3.5 - 4.0, BH3_6.5 - 7.0	14-Jul-2022	20-Jul-2022	28-Jul-2022	✓	22-Jul-2022	29-Aug-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	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080) BH02_3.5, BH02_6.5,	BH02_5, BH02_8	13-Jul-2022	20-Jul-2022	27-Jul-2022	✓	21-Jul-2022	27-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH02_3.5, BH02_6.5,	BH02_5, BH02_8	13-Jul-2022	20-Jul-2022	27-Jul-2022	✓	22-Jul-2022	29-Aug-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH3_2.0, BH3_5.0 - 5.5,	BH3_3.5 - 4.0, BH3_6.5 - 7.0	14-Jul-2022	20-Jul-2022	28-Jul-2022	✓	21-Jul-2022	28-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP071) BH3_2.0, BH3_5.0 - 5.5,	BH3_3.5 - 4.0, BH3_6.5 - 7.0	14-Jul-2022	20-Jul-2022	28-Jul-2022	✓	22-Jul-2022	29-Aug-2022	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) BH02_3.5, BH02_6.5,	BH02_5, BH02_8	13-Jul-2022	20-Jul-2022	27-Jul-2022	✓	21-Jul-2022	27-Jul-2022	✓
Soil Glass Jar - Unpreserved (EP080) BH3_2.0, BH3_5.0 - 5.5,	BH3_3.5 - 4.0, BH3_6.5 - 7.0	14-Jul-2022	20-Jul-2022	28-Jul-2022	✓	21-Jul-2022	28-Jul-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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Buchi Ammonia	EK055	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	EP071	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Buchi Ammonia	EK055	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	7	28.57	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Buchi Ammonia	EK055	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **SOIL**

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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Buchi Ammonia	EK055	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	8	12.50	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
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
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.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Buchi Ammonia	EK055	SOIL	In house: Referenced to APHA 4500-NH3 B&G, H Samples are steam distilled (Buchi) prior to analysis and quantified using titration, FIA or Discrete Analyser.
Nitrite as N - Soluble by Discrete Analyser	EK057G	SOIL	In house: Referenced to APHA 4500-NO3- B. Nitrite in a water extract is determined by direct colourimetry by Discrete Analyser.
Nitrate as N - Soluble by Discrete Analyser	EK058G	SOIL	In house: Referenced to APHA 4500-NO3- F. Nitrate in the 1:5 soil:water extract is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	SOIL	In house: Thermo Scientific Method D08727 and NEMI (National Environmental Method Index) Method ID: 9171. This method covers the determination of total oxidised nitrogen (NOx-N) and nitrate (NO3-N) by calculation, Combined oxidised Nitrogen (NO2+NO3) in a water extract is determined by direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	In house: Referenced to APHA 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Nitrogen as N (TKN + NOx) By Discrete Analyser	EK062G	SOIL	In house: Referenced to APHA 4500 Norg/NO3- Total Nitrogen is determined as the sum of TKN and Oxidised Nitrogen, each determined seperately as N.
Total Phosphorus By Discrete Analyser	EK067G	SOIL	In house: Referenced to APHA 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatle Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.

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 Work Order : EP2208996 Amendment 1
 Client : 360 ENVIRONMENTAL PTY LTD
 Project : 5412 - Causeway Pedestrian Bridge



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TKN/TP Digestion	EK061/EK067	SOIL	In house: Referenced to APHA 4500 Norg- D; APHA 4500 P - H. Macro Kjeldahl digestion.
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

Lewis Duffy

From: ALS Enviro Perth
Sent: Wednesday, 24 August 2022 1:10 PM
To: Samples Perth
Cc: ALS Enviro Perth; CanHuang Ke; Efua Wilson
Subject: 360ENV rebatch request Causeway Samples
Attachments: EP2208112_COC.pdf; EP2208579_COC.pdf; EP2208826_COC.pdf; EP2208996_COC.pdf; EP2209290_COC.pdf

Hi SR Team

Could S2 Suite (8 Metals) please be booked for all non-hold soil samples from the attached 5 WOs? Thanks.

Regards



right solutions.
right partner.

David Brennan
Business Development Officer, Environmental

Australia

M: 0409 355 212
David.Brennan@alsglobal.com
26 Rigali Way
Wangara WA 6065

alsglobal.com

Environmental Division
Perth

Work Order Reference
EP2210761



Telephone : --61-8-9406 1301

From: Chris Donnetti <cdonnetti@slrconsulting.com>
Sent: Wednesday, 24 August 2022 11:36 AM
To: ALS Enviro Perth <ALSEnviro.Perth@ALSGlobal.com>
Subject: RE: [EXTERNAL] - RE: Causeway Samples

Hi David

Thanks for coming back to me. Yes just the soil samples please on the attached work orders.

Many thanks!

Chris



Chris Donnetti
Principal Environmental Consultant

+61 8 9388 8360
+61 415 803 884
cdonnetti@slrconsulting.com

SLR Consulting Australia Pty Ltd
10 Bermondsey Street, West Leederville, WA, Australia, 6007

Confidentiality Notice and Limitation

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From: ALS Enviro Perth <ALSEnviro.Perth@ALSGlobal.com>
Sent: Wednesday, 24 August 2022 11:30 AM
To: Chris Donnetti <cdonnetti@slrconsulting.com>; ALS Enviro Perth <ALSEnviro.Perth@ALSGlobal.com>
Subject: RE: [EXTERNAL] - RE: Causeway Samples

Hi Chris

Unfortunately Natalie is on sick leave today, may I please confirm if the S2 Suite (8 Metals) request relates to all soil samples ALS has received from the Causeway project or only to the specific WO/s that had COCs attached in your original email dated 11/8/22? If for specific WO/s, could I please request the attachments be re-sent as the original email is in Natalie's personal inbox and unable to be accessed by myself. Thank you.

Regards



right solutions.
right partner.

David Brennan
Business Development Officer, Environmental
Australia

M: 0409 355 212
David.Brennan@alsglobal.com
26 Rigali Way
Wangara WA 6065
alsglobal.com

From: Chris Donnetti <cdonnetti@slrconsulting.com>
Sent: Tuesday, 23 August 2022 4:53 PM
To: ALS Enviro Perth <ALSEnviro.Perth@ALSGlobal.com>
Subject: [EXTERNAL] - RE: Causeway Samples

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi Natalie

I hope you are well. Please can you confirm whether you have sufficient sample volumes to run Suite S2 for 8 metals on the Causeway samples please?

If you do, please can I schedule these for analysis.

Thank you

Chris



Chris Donnetti

Principal Environmental Consultant

o +61 8 9388 8360

m +61 415 803 884

e cdonnetti@slrconsulting.com

SLR Consulting Australia Pty Ltd

10 Bermondsey Street, West Leederville, WA, Australia, 6007

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From: Chris Donnetti <cdonnetti@slrconsulting.com>

Sent: Thursday, 11 August 2022 3:40 PM

To: Natalie Duncan <natalie.duncan@ALSGlobal.com>

Cc: Dan Jarvis <djarvis@slrconsulting.com>

Subject: Causeway Samples

Hi Natalie

I hope you are doing well. Per the attached COCs for the Causeway Pedestrian Bridge, we requested the CRS Suite, however we only received CRS as a single analyte on the lab certificates?

Please can you confirm if you have sufficient sample remaining to perform the rest of the suite and whether the samples are still within holding times

Thanks and regards

Chris



Chris Donnetti

Principal Environmental Consultant

o +61 8 9388 8360

m +61 415 803 884

e cdonnetti@slrconsulting.com

SLR Consulting Australia Pty Ltd

10 Bermondsey Street, West Leederville, WA, Australia, 6007



CHAIN OF CUSTODY

ALS Laboratory
please tick →

ADELAIDE 21 Burma Road Pooraka SA 5065
Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street, Stafford QLD 4050
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callamondah Drive Clinton QLD 4880
Ph: 07 7471 5000 E: gladstone@alsglobal.com

MACKAY 78 Harbour Road Mackay QLD 4740
Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850
Ph: 02 8372 8735 E: mudgee@mail@alsglobal.com

NEWCASTLE 5 Ross Gum Road Warabrook NSW 2304
Ph: 02 4988 9433 E: samples.newcastle@alsglobal.com
NOWRA 413 Geary Place North Nowra NSW 2541
Ph: 02 5423 2565 E: nowra@alsglobal.com
PERTH 10 Hod Way M/a ags WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

SYDNEY 277-289 Woodperk Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Deanna Court Beche QLD 4816
Ph: 07 4798 0600 E: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: 360 Environmental		TURNAROUND REQUIREMENTS:		<input type="checkbox"/> Standard TAT (List due date): 26/07/2022	
OFFICE: 10 Bermondsey Street, West Leaderville		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)		<input type="checkbox"/> Non-Standard or urgent TAT (List due date):	
PROJECT: 5412 - Causeway Pedestrian Bridge		ALS QUOTE NO.: EPI469/22		COC SEQUENCE NUMBER (Circle)	
ORDER NUMBER: 5412-002				COC: 1 2 3 4 5 6 7	
PROJECT MANAGER: Chris Donnatti		CONTACT PH: 0415 803 884		OF: 1 2 3 4 5 6 7	
SAMPLER: Ben Chalme		SAMPLER MOBILE: 0481 185 287		RELINQUISHED BY:	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default): Esdat +Excel		RECEIVED BY:	
Email Reports to (will default to PM if no other addresses are listed): labresults@360environmental.com.au & chrisdonnatti@360environmental.com.au				DATE/TIME: 20/7 1400	
Email Invoice to (will default to PM if no other addresses are listed): accounts@360environmental.com.au				RELINQUISHED BY:	
				RECEIVED BY:	
				DATE/TIME:	

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <i>(to codes below)</i>	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).							Additional Information
						pH	CRS Suite	Suite SZ4 - TRH (Cd-Cd0)/ BTEXN / PAH / Phenols	S12 - OC/OP Pesticides	Suite N18 S- Total Nitrogen, TKN, NO ₃ , NO ₂ , NH ₄ , Total Phosphorus	Asbestos (MPPM)	HOLD	
1	T01_0.25	11/07/2022	S	ASS bag, ACM bag+1 glass soil jar	3	x	x	x	x	x	x		
2	T01_0.5	11/07/2022	S	ASS bag, ACM bag+1 glass soil jar	3	x	x	x	x	x	x		
3	T01_1.0	11/07/2022	S	ASS bag, ACM bag+1 glass soil jar	3	x	x	x	x	x	x		
4	T02_0.25	11/07/2022	S	ASS bag, ACM bag+1 glass soil jar	3	x	x	x	x	x	x		
5	T02_0.5	11/07/2022	S	ASS bag, ACM bag+1 glass soil jar	3	x	x	x	x	x	x		
6	T02_1.0	11/07/2022	S	ASS bag, ACM bag+1 glass soil jar	3	x	x	x	x	x	x		
7	BH1_24.5	11/07/2022	S	ASS bag, +1 glass soil jar	2								
8	BH1_26	11/07/2022	S	ASS bag, +1 glass soil jar	2							x	
9	BH1_27.5	11/07/2022	S	ASS bag, +1 glass soil jar	2							x	
10	BH1_29.5	11/07/2022	S	ASS bag, +1 glass soil jar	2							x	
11	BH1_30.5	11/07/2022	S	ASS bag, +1 glass soil jar	2							x	
12	BH1_32.5	11/07/2022	S	ASS bag, +1 glass soil jar	2							x	
13	BH01_33.5	11/07/2022	S	Jar	1							x	
TOTAL:					31	6	6	6	6	6	6		

Environmental Division
Perth
Work Order Reference
EP2209290

Water Container Codes: P = Unpreserved Plastic; N = Nitro Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Specialion bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order : **EP2210761**
Client : **360 ENVIRONMENTAL PTY LTD**
Contact : CHRIS DONNETTI
Address : PO BOX 14
 WEST PERTH WA, AUSTRALIA 6872
Telephone : 9388 8360
Project : 5412 - Causeway Pedestrian Bridge
Order number : 5412-002
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : EP/469/22_V2
No. of samples received : 6
No. of samples analysed : 6

Page : 1 of 4
Laboratory : Environmental Division Perth
Contact : Natalie Duncan
Address : 26 Rigali Way Wangara Western Australia Australia 6065
Telephone : +61-8-9406 1301
Date Samples Received : 20-Jul-2022 14:00
Date Analysis Commenced : 25-Aug-2022
Issue Date : 26-Aug-2022 23:43



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
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, Western Australia



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 Contract 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.

- This workorder is a rebatch of EP2209290.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	T01_0.25	T01_0.5	T01_1.0	T02_0.25	T02_0.5
Sampling date / time				11-Jul-2022 00:00	11-Jul-2022 00:00	11-Jul-2022 00:00	11-Jul-2022 00:00	11-Jul-2022 00:00	
Compound	CAS Number	LOR	Unit	EP2210761-001	EP2210761-002	EP2210761-003	EP2210761-004	EP2210761-005	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	8.2	9.5	13.5	6.1	6.8	
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg	<5	<5	5	<5	<5	
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1	
Chromium	7440-47-3	2	mg/kg	11	12	23	5	9	
Copper	7440-50-8	5	mg/kg	12	12	16	<5	<5	
Lead	7439-92-1	5	mg/kg	76	63	22	9	9	
Nickel	7440-02-0	2	mg/kg	3	2	3	<2	<2	
Zinc	7440-66-6	5	mg/kg	49	52	38	15	14	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	T02_1.0	----	----	----	----
Sampling date / time				11-Jul-2022 00:00	----	----	----	----	
Compound	CAS Number	LOR	Unit	EP2210761-006	-----	-----	-----	-----	
Result				Result	----	----	----	----	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	7.2	----	----	----	----	
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----	
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----	
Chromium	7440-47-3	2	mg/kg	8	----	----	----	----	
Copper	7440-50-8	5	mg/kg	<5	----	----	----	----	
Lead	7439-92-1	5	mg/kg	6	----	----	----	----	
Nickel	7440-02-0	2	mg/kg	<2	----	----	----	----	
Zinc	7440-66-6	5	mg/kg	10	----	----	----	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----	

QUALITY CONTROL REPORT

Work Order	: EP2210761	Page	: 1 of 3
Client	: 360 ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Perth
Contact	: CHRIS DONNETTI	Contact	: Natalie Duncan
Address	: PO BOX 14 WEST PERTH WA, AUSTRALIA 6872	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: 9388 8360	Telephone	: +61-8-9406 1301
Project	: 5412 - Causeway Pedestrian Bridge	Date Samples Received	: 20-Jul-2022
Order number	: 5412-002	Date Analysis Commenced	: 25-Aug-2022
C-O-C number	: ----	Issue Date	: 26-Aug-2022
Sampler	: ----		
Site	: ----		
Quote number	: EP/469/22_V2		
No. of samples received	: 6		
No. of samples analysed	: 6		



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, Western Australia



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 (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4540131)									
EP2210761-001	T01_0.25	EA055: Moisture Content	----	0.1	%	8.2	8.9	8.9	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4541634)									
EP2210709-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit



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			
				Result	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit			LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4541631)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	97.0	87.2	114
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	91.6	80.9	105
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	78.0	70.0	100
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	95.9	81.0	112
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	89.2	77.2	104
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	92.6	78.7	106
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	102	79.4	110
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4541634)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.154 mg/kg	100	84.3	124

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.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number		MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4541634)							
EP2210709-001	Anonymous	EG035T: Mercury	7439-97-6	1 mg/kg	93.8	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2210761	Page	: 1 of 5
Client	: 360 ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Perth
Contact	: CHRIS DONNETTI	Telephone	: +61-8-9406 1301
Project	: 5412 - Causeway Pedestrian Bridge	Date Samples Received	: 20-Jul-2022
Site	: ----	Issue Date	: 26-Aug-2022
Sampler	: ----	No. of samples received	: 6
Order number	: 5412-002	No. of samples analysed	: 6

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

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved							
T01_0.25, T01_1.0, T02_0.5	T01_0.5, T02_0.25, T02_1.0	----	----	----	25-Aug-2022	25-Jul-2022	31
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved							
T01_0.25, T01_1.0, T02_0.5	T01_0.5, T02_0.25, T02_1.0	25-Aug-2022	08-Aug-2022	17	26-Aug-2022	08-Aug-2022	18

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Total Metals by ICP-AES	0	8	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Total Metals by ICP-AES	0	8	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

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	Sample Date	Extraction / Preparation			Analysis			
		Container / Client Sample ID(s)	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
T01_0.25, T01_1.0, T02_0.5	11-Jul-2022	T01_0.5, T02_0.25, T02_1.0	----	----	----	25-Aug-2022	25-Jul-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
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
T01_0.25, T01_1.0, T02_0.5, T01_0.5, T02_0.25, T02_1.0	11-Jul-2022	25-Aug-2022	07-Jan-2023	✔	26-Aug-2022	07-Jan-2023	✔
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
T01_0.25, T01_1.0, T02_0.5, T01_0.5, T02_0.25, T02_1.0	11-Jul-2022	25-Aug-2022	08-Aug-2022	✘	26-Aug-2022	08-Aug-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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Moisture Content	EA055	1	6	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	0	8	0.00	10.00	✘	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Mercury by FIMS	EG035T	1	9	11.11	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	9	11.11	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	9	11.11	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	0	8	0.00	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.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).



CHAIN OF CUSTODY

ALS Laboratory:
please tick →

DADELAIDE 21 Burma Road Pooraka SA 5005
Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemannah Drive Clinton QLD 4680
Ph: 07 7471 5600 E: gladstone@alsglobal.com

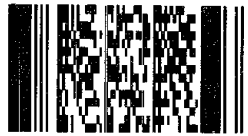
MACKAY 78 Harbour Road Mackay QLD 4740
Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 8549 8600 E: samples.melbourne@alsglobal.com
MUDGEEE 27 Sydney Road Mudgee NSW 2850
Ph: 02 6372 6735 E: mudgee.mai@alsglobal.com

NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304
Ph: 02 4868 9433 E: samples.newcastle@alsglobal.com
NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 024423 2093 E: nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090
Ph: 08 9209 7855 E: samples.perth@alsglobal.com

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-16 Desma Court Bohle QLD 4818
Ph: 07 4796 0500 E: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: 360 Environmental	TURNAROUND REQUIREMENTS: <input type="checkbox"/> Standard TAT (List due date): 08-08-2022	FOR LABORATORY USE ONLY (Circle) Custody Seal intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA Free ice / frozen ice bricks present upon receipt? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA Random Sample Temperature on Receipt: 4.3 °C Other comment:
OFFICE: 10 Bernondsey Street, West Leederville	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):	
PROJECT: 5412 - Causeway Pedestrian Bridge	ALS QUOTE NO.: EP/469/22	COC SEQUENCE NUMBER (Circle)
ORDER NUMBER: 5412-002		COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
PROJECT MANAGER: Chris Donnetti	CONTACT PH: 0415 803 884	
SAMPLER: Phunsto Wangdi	SAMPLER MOBILE: 0433 907 756	RELINQUISHED BY:
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default): Esdat +Excel	RECEIVED BY: Joel r
Email Reports to (will default to PM if no other addresses are listed): labresults@360environmental.com.au & chrisdonnetti@360environmental.com.au		DATE/TIME: 4/8 1700
Email Invoice to (will default to PM if no other addresses are listed): accounts@360environmental.com.au		RELINQUISHED BY:
		RECEIVED BY:
		DATE/TIME:
		DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)		CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).							Additional Information			
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE codes below (refer to)	TOTAL CONTAINERS	ASSGW1 - ASS GW	NT08 - Nutrients	W02 - Metals	W12 - OC/OP Pesticides	W24 - TRH/BTEX/PAH/Phenols					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH02	01-08-2022	W	1 x P (ASS-GW), 1x P (Nutrients), 1x P (Metals) and 1 x 100 ml amber (pesticides, TRH, BTEX, PAH, Phenols) and 2x 40ml vials	6	x	x	x	x	x					<p>Environmental Division Perth Work Order Reference EP2209829</p>  <p>Telephone : - 81-8-9406 1301</p>
2	BH05	01-08-2022	W	1 x P (ASS-GW), 1x P (Nutrients), 1x P (Metals) and 1 x 100 ml amber (pesticides, TRH, BTEX, PAH, Phenols) and 2x 40ml vials	6	x	x	x	x	x					
3	BH07	01-08-2022	W	1 x P (ASS-GW), 1x P (Nutrients), 1x P (Metals) and 1 x 100 ml amber (pesticides, TRH, BTEX, PAH, Phenols) and 2x 40ml vials	6	x	x	x	x	x					
4	BH14	01-08-2022	W	1 x P (ASS-GW), 1x P (Nutrients), 1x P (Metals) and 1 x 100 ml amber (pesticides, TRH, BTEX, PAH, Phenols) and 2x 40ml vials	6	x	x	x	x	x					
TOTAL					24	4	4	4	4	4					

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order : **EP2209829**
Client : **360 ENVIRONMENTAL PTY LTD**
Contact : CHRIS DONNETTI
Address : 10 Bermondsey St
 West Leederville 6007
Telephone : 9388 8360
Project : 5412 - Causeway Pedestrian Bridge
Order number : 5412-002
C-O-C number : ----
Sampler : Phunsto Wangdi
Site : ----
Quote number : EP/469/22
No. of samples received : 4
No. of samples analysed : 4

Page : 1 of 8
Laboratory : Environmental Division Perth
Contact : Natalie Duncan
Address : 26 Rigali Way Wangara Western Australia Australia 6065

Telephone : +61-8-9406 1301
Date Samples Received : 04-Aug-2022 17:00
Date Analysis Commenced : 04-Aug-2022
Issue Date : 09-Aug-2022 17:48



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
- Surrogate Control Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, Western Australia
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, Western Australia
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, Western Australia



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 Contract 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.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG020: Metals LOR for samples EP2209829-002 to -004 raised due to high TDS content.
- EP068: Poor Aldrin matrix spike recovery due to suspected matrix interferences.
- EK057G (Nitrite): LOR for sample EP2209829-002 raised due to possible sample matrix interference.
- EG035: Poor mercury spike recovery was obtained for sample EP2209829-004 due to possible matrix interference.
- EA015H (Total Dissolved Solids): LCS recovery falls outside ALS Dynamic Control Limit. However, they are within the acceptance criteria based on ALS Data Quality Objectives. No further action is required.
- ED037-P: EP2209659-6 shows poor duplicate precision for hydroxide alkalinity as CaCO₃ due to high analyte concentration present. Results could not be repeated due to insufficient sample volume.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Sample ID		BH02	BH05	BH07	BH14	----
Sampling date / time		01-Aug-2022 00:00		01-Aug-2022 00:00	01-Aug-2022 00:00	01-Aug-2022 00:00	01-Aug-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2209829-001	EP2209829-002	EP2209829-003	EP2209829-004	-----
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.04	6.68	7.85	7.58	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	2240	39600	36700	51400	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	1260	27100	24600	36900	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	383	219	487	152	----
Total Alkalinity as CaCO3	----	1	mg/L	383	219	487	152	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	9	229	30	19	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	106	2410	1560	2330	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	453	13300	12100	17100	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	70	1150	613	447	----
Magnesium	7439-95-4	1	mg/L	18	1010	1000	1280	----
Sodium	7440-23-5	1	mg/L	375	7580	7670	10200	----
Potassium	7440-09-7	1	mg/L	25	244	270	385	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.14	<0.05	<0.05	<0.05	----
Arsenic	7440-38-2	0.001	mg/L	0.003	<0.005	<0.005	<0.005	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0005	<0.0005	<0.0005	----
Chromium	7440-47-3	0.001	mg/L	0.001	<0.005	<0.005	<0.005	----
Copper	7440-50-8	0.001	mg/L	0.003	<0.005	<0.005	<0.005	----
Nickel	7440-02-0	0.001	mg/L	0.002	0.006	<0.005	<0.005	----
Lead	7439-92-1	0.001	mg/L	0.004	<0.005	<0.005	<0.005	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.025	<0.025	<0.025	----
Manganese	7439-96-5	0.001	mg/L	0.196	5.86	0.638	0.836	----
Iron	7439-89-6	0.05	mg/L	2.94	161	1.66	7.55	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH02	BH05	BH07	BH14	----
Sampling date / time				01-Aug-2022 00:00	01-Aug-2022 00:00	01-Aug-2022 00:00	01-Aug-2022 00:00	----	
Compound	CAS Number	LOR	Unit	EP2209829-001	EP2209829-002	EP2209829-003	EP2209829-004	-----	
				Result	Result	Result	Result	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.13	10.4	3.43	0.52	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.02	<0.01	<0.01	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.02	<0.01	<0.01	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.6	13.6	5.4	1.1	----	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.6	13.6	5.4	1.1	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.19	0.15	0.26	0.08	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	22.6	430	384	534	----	
∅ Total Cations	----	0.01	meq/L	21.9	476	453	581	----	
∅ Ionic Balance	----	0.01	%	1.60	5.16	8.35	4.24	----	
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
beta-BHC	319-85-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
gamma-BHC	58-89-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
delta-BHC	319-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Heptachlor	76-44-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Aldrin	309-00-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Dieldrin	60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
4,4'-DDE	72-55-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Endrin	72-20-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
4,4'-DDD	72-54-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH02	BH05	BH07	BH14	----
Sampling date / time				01-Aug-2022 00:00	01-Aug-2022 00:00	01-Aug-2022 00:00	01-Aug-2022 00:00	----	
Compound	CAS Number	LOR	Unit	EP2209829-001	EP2209829-002	EP2209829-003	EP2209829-004	-----	
				Result	Result	Result	Result	----	
EP068A: Organochlorine Pesticides (OC) - Continued									
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----	
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----	
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----	
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----	
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----	
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----	
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH02	BH05	BH07	BH14	----
Sampling date / time				01-Aug-2022 00:00	01-Aug-2022 00:00	01-Aug-2022 00:00	01-Aug-2022 00:00	----	
Compound	CAS Number	LOR	Unit	EP2209829-001	EP2209829-002	EP2209829-003	EP2209829-004	-----	
				Result	Result	Result	Result	----	
EP075(SIM)A: Phenolic Compounds - Continued									
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benzo(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----	
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----	
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----	
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH02	BH05	BH07	BH14	----
Sampling date / time				01-Aug-2022 00:00	01-Aug-2022 00:00	01-Aug-2022 00:00	01-Aug-2022 00:00	----	
Compound	CAS Number	LOR	Unit	EP2209829-001	EP2209829-002	EP2209829-003	EP2209829-004	-----	
				Result	Result	Result	Result	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	----	
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	----	
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----	
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----	
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	----	
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----	
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	----	
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	----	
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	----	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%	88.8	66.9	77.4	75.3	----	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%	102	77.3	100	85.9	----	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%	23.4	27.8	31.1	41.6	----	
2-Chlorophenol-D4	93951-73-6	1.0	%	55.9	60.2	68.4	87.1	----	
2,4,6-Tribromophenol	118-79-6	1.0	%	80.8	79.5	95.5	129	----	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%	65.6	67.0	75.6	97.9	----	
Anthracene-d10	1719-06-8	1.0	%	65.4	65.0	74.2	108	----	
4-Terphenyl-d14	1718-51-0	1.0	%	63.0	62.1	73.9	101	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	100	108	110	112	----	
Toluene-D8	2037-26-5	2	%	103	102	106	108	----	
4-Bromofluorobenzene	460-00-4	2	%	88.9	90.1	88.7	93.0	----	

QUALITY CONTROL REPORT

Work Order	: EP2209829	Page	: 1 of 12
Client	: 360 ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Perth
Contact	: CHRIS DONNETTI	Contact	: Natalie Duncan
Address	: 10 Bermondsey St West Leederville 6007	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: 9388 8360	Telephone	: +61-8-9406 1301
Project	: 5412 - Causeway Pedestrian Bridge	Date Samples Received	: 04-Aug-2022
Order number	: 5412-002	Date Analysis Commenced	: 04-Aug-2022
C-O-C number	: ----	Issue Date	: 09-Aug-2022
Sampler	: Phunsto Wangdi		
Site	: ----		
Quote number	: EP/469/22		
No. of samples received	: 4		
No. of samples analysed	: 4		



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
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, Western Australia
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, Western Australia
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, Western Australia



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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 4503939)									
EP2209829-002	BH05	EA005-P: pH Value	----	0.01	pH Unit	6.68	6.68	0.0	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4503938)									
EP2209829-002	BH05	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	39600	39200	1.0	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4501375)									
EP2209653-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	85800	87000	1.4	0% - 20%
EP2209774-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	96200	94400	1.9	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4503937)									
EP2209829-002	BH05	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	219	223	1.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	219	223	1.9	0% - 20%
EP2209659-006	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	1390	# 1850	28.6	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	13300	12300	7.2	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	14600	14200	3.2	0% - 20%
ED038A: Acidity (QC Lot: 4504036)									
EP2209596-001	Anonymous	ED038: Acidity as CaCO3	----	1	mg/L	13	12	0.0	0% - 50%
EP2209597-001	Anonymous	ED038: Acidity as CaCO3	----	1	mg/L	1	1	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4500985)									
EP2209829-002	BH05	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2410	2440	1.1	0% - 20%
EP2209829-003	BH07	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1560	1600	2.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4500984)									
EP2209829-002	BH05	ED045G: Chloride	16887-00-6	1	mg/L	13300	13000	1.9	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED045G: Chloride by Discrete Analyser (QC Lot: 4500984) - continued									
EP2209829-003	BH07	ED045G: Chloride	16887-00-6	1	mg/L	12100	12300	1.3	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4501786)									
EP2209829-001	BH02	ED093F: Calcium	7440-70-2	1	mg/L	70	70	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	18	17	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	375	374	0.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	25	24	0.0	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4501785)									
EP2209829-001	BH02	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.196	0.190	2.7	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.14	0.14	0.0	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.94	3.03	3.1	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 4501787)									
EP2209829-003	BH07	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4500954)									
EP2209829-002	BH05	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	10.4	10.6	2.1	0% - 20%
EP2209829-003	BH07	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	3.43	3.46	0.7	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4500983)									
EP2209829-002	BH05	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.02	<0.02	0.0	No Limit
EP2209829-003	BH07	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4500955)									
EP2209829-002	BH05	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP2209829-003	BH07	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4502167)									
EP2209481-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.4	0.0	No Limit
EP2209597-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4502168)									
EP2209629-010	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	<0.01	0.0	No Limit
EP2209686-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.03	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4501965)									
EP2209829-004	BH14	EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4501965) - continued									
EP2209829-004	BH14	EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin	72-20-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	<2.0	0.0	No Limit
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	<2.0	0.0	No Limit		
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4501965)									
EP2209829-004	BH14	EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	<2.0	0.0	No Limit
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	<2.0	0.0	No Limit		
EP068: Parathion	56-38-2	2	µg/L	<2.0	<2.0	0.0	No Limit		
EP075(SIM)A: Phenolic Compounds (QC Lot: 4501964)									
EP2209829-004	BH14	EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	<1.0	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP075(SIM)A: Phenolic Compounds (QC Lot: 4501964) - continued									
EP2209829-004	BH14	EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	<2.0	0.0	No Limit
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	<2.0	0.0	No Limit		
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4501964)									
EP2209829-004	BH14	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.0	No Limit
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.0	No Limit		
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4501963)									
EP2209829-004	BH14	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4503251)									
EP2209699-013	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP2209829-001	BH02	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4501963)									
EP2209829-004	BH14	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit

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 Work Order : EP2209829
 Client : 360 ENVIRONMENTAL PTY LTD
 Project : 5412 - Causeway Pedestrian Bridge



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4501963) - continued									
EP2209829-004	BH14	EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4503251)									
EP2209699-013	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP2209829-001	BH02	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 4503251)									
EP2209699-013	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP2209829-001	BH02	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit



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: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
						LCS	Low	High	
EA005P: pH by PC Titrator (QCLot: 4503939)									
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102	
				----	7 pH Unit	99.8	98.5	102	
EA010P: Conductivity by PC Titrator (QCLot: 4503938)									
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	102	92.1	105	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4501375)									
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	104	94.7	109	
				<10	1000 mg/L	# 94.1	94.7	109	
ED037P: Alkalinity by PC Titrator (QCLot: 4503937)									
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----	
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----	
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	87.8	118	
				<1	200 mg/L	97.0	87.8	118	
ED038A: Acidity (QCLot: 4504036)									
ED038: Acidity as CaCO3	----	----	mg/L	----	19.5 mg/L	97.0	77.4	128	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4500985)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.2	89.9	112	
				<1	500 mg/L	98.8	89.9	112	
ED045G: Chloride by Discrete Analyser (QCLot: 4500984)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	90.4	88.6	113	
				<1	1000 mg/L	105	88.6	113	
ED093F: Dissolved Major Cations (QCLot: 4501786)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.3	86.5	117	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	108	88.4	110	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	91.4	113	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	106	84.6	108	
EG020F: Dissolved Metals by ICP-MS (QCLot: 4501785)									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	108	90.2	111	
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	109	90.3	113	
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	104	89.7	108	
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.5	87.3	107	
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	88.9	108	
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	89.4	106	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Acceptable Limits (%)	
					Concentration	LCS	Low	High	
EG020F: Dissolved Metals by ICP-MS (QCLot: 4501785) - continued									
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.6	87.6	106	
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	87.2	108	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	106	89.5	112	
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	116	89.9	120	
EG035F: Dissolved Mercury by FIMS (QCLot: 4501787)									
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.005 mg/L	110	85.6	120	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4500954)									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	101	86.2	111	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4500983)									
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	98.1	88.7	113	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4500955)									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	90.6	90.5	110	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4502167)									
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.7	75.8	100	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4502168)									
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	96.5	70.0	110	
EP068A: Organochlorine Pesticides (OC) (QCLot: 4501965)									
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	57.0	42.3	112	
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	54.6	39.0	108	
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	62.2	45.5	116	
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	58.8	43.0	118	
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	65.9	46.2	115	
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	65.6	39.0	111	
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	85.6	39.7	114	
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	69.8	42.4	122	
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	68.0	43.6	121	
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	66.9	42.1	129	
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	69.2	42.7	123	
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	66.3	42.4	121	
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	67.4	43.8	123	
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	62.6	26.9	127	
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	71.5	44.9	128	
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	55.7	41.7	128	
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	50.2	32.2	121	
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	67.9	40.7	120	
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	63.3	31.6	123	
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	67.9	36.4	124	
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	59.9	25.4	124	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Acceptable Limits (%)	
					Concentration	LCS	Low	High	
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4501965)									
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	53.0	38.8	110	
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	63.8	34.6	115	
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	5.8	0	20.1	
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	49.5	27.8	102	
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	63.0	46.1	122	
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	66.0	46.6	118	
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	57.5	26.8	110	
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	77.4	38.8	119	
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	83.8	45.0	119	
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	82.3	44.6	118	
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	73.5	30.2	112	
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	90.0	43.2	123	
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	76.6	41.1	119	
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	63.5	34.4	125	
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	57.9	19.9	123	
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	67.2	38.0	121	
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	64.3	39.5	121	
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	59.8	39.7	119	
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	52.3	0	137	
EP075(SIM)A: Phenolic Compounds (QCLot: 4501964)									
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	10 µg/L	23.8	9.07	46.0	
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	10 µg/L	60.8	34.3	96.6	
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	10 µg/L	54.1	24.9	92.6	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	20 µg/L	46.3	21.8	83.4	
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	10 µg/L	62.9	33.9	104	
EP075(SIM): 2,4-Dimethylphenol	105-67-9	1	µg/L	<1.0	10 µg/L	59.0	33.9	102	
EP075(SIM): 2,4-Dichlorophenol	120-83-2	1	µg/L	<1.0	10 µg/L	57.7	34.3	104	
EP075(SIM): 2,6-Dichlorophenol	87-65-0	1	µg/L	<1.0	10 µg/L	61.8	38.4	102	
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	10 µg/L	69.5	29.8	106	
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	1	µg/L	<1.0	10 µg/L	70.9	31.9	109	
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	1	µg/L	<1.0	10 µg/L	68.7	34.2	110	
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	55.0	13.6	104	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4501964)									
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	58.3	41.9	99.1	
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	72.7	36.1	113	
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	62.8	35.8	102	
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	68.0	33.5	113	
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	73.1	36.5	115	
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	73.8	46.4	109	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
						LCS	Low	High	
EP075(SIM): Polynuclear Aromatic Hydrocarbons (QCLot: 4501964) - continued									
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	78.5	40.4	124	
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	84.7	40.2	123	
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	74.7	40.2	126	
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	67.6	45.6	121	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	69.3	43.2	123	
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	66.7	47.3	121	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	64.4	44.8	123	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	71.5	38.8	120	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	51.4	39.4	119	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	53.0	40.1	123	
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4501963)									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	368 µg/L	90.0	39.3	103	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	369 µg/L	106	47.2	122	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	297 µg/L	84.4	42.5	119	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4503251)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	93.3	73.6	113	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4501963)									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	370 µg/L	96.8	42.0	104	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	482 µg/L	96.0	46.2	116	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	283 µg/L	53.3	24.7	137	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4503251)									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	91.3	73.9	115	
EP080: BTEXN (QCLot: 4503251)									
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	94.0	84.1	114	
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	98.0	81.0	115	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	96.2	84.4	113	
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	98.2	84.3	114	
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	97.3	86.5	111	
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	105	77.0	118	

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.

Sub-Matrix: WATER

Matrix Spike (MS) Report



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4500985)							
EP2209829-001	BH02	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	100	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4500984)							
EP2209829-001	BH02	ED045G: Chloride	16887-00-6	1000 mg/L	85.4	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4501785)							
EP2209829-002	BH05	EG020A-F: Arsenic	7440-38-2	1 mg/L	116	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	105	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	101	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	104	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	100	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	# Not Determined	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	107	70.0	130
EG020A-F: Zinc	7440-66-6	1 mg/L	108	70.0	130		
EG035F: Dissolved Mercury by FIMS (QCLot: 4501787)							
EP2209829-004	BH14	EG035F: Mercury	7439-97-6	0.005 mg/L	# 55.5	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4500954)							
EP2209829-001	BH02	EK055G: Ammonia as N	7664-41-7	1 mg/L	103	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4500983)							
EP2209829-001	BH02	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	99.0	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4500955)							
EP2209829-001	BH02	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	87.6	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4502167)							
EP2209534-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	100.0	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4502168)							
EP2209629-011	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	98.8	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 4501965)							
EP2209829-004	BH14	EP068: gamma-BHC	58-89-9	5 µg/L	54.2	50.1	115
		EP068: Heptachlor	76-44-8	5 µg/L	64.4	47.8	121
		EP068: Aldrin	309-00-2	5 µg/L	# 10.8	48.0	122
		EP068: Dieldrin	60-57-1	5 µg/L	64.3	54.3	122
		EP068: Endrin	72-20-8	5 µg/L	65.8	52.8	125
		EP068: 4,4'-DDT	50-29-3	5 µg/L	67.4	49.0	124
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4501965)							
EP2209829-004	BH14	EP068: Diazinon	333-41-5	5 µg/L	55.4	51.5	120
		EP068: Chlorpyrifos-methyl	5598-13-0	5 µg/L	61.3	54.3	120
		EP068: Pirimphos-ethyl	23505-41-1	5 µg/L	68.7	48.8	122



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4501965) - continued							
EP2209829-004	BH14	EP068: Bromophos-ethyl	4824-78-6	5 µg/L	66.3	54.9	122
		EP068: Prothiofos	34643-46-4	5 µg/L	69.2	52.6	123
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4501963)							
EP2209829-004	BH14	EP071: C10 - C14 Fraction	----	430 µg/L	85.8	44.5	122
		EP071: C15 - C28 Fraction	----	445 µg/L	104	55.1	143
		EP071: C29 - C36 Fraction	----	299 µg/L	97.5	53.6	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4503251)							
EP2209699-014	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	85.1	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4501963)							
EP2209829-004	BH14	EP071: >C10 - C16 Fraction	----	431 µg/L	88.9	44.5	122
		EP071: >C16 - C34 Fraction	----	540 µg/L	105	55.1	143
		EP071: >C34 - C40 Fraction	----	193 µg/L	87.2	53.6	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4503251)							
EP2209699-014	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	79.8	77.0	137
EP080: BTEXN (QCLot: 4503251)							
EP2209699-014	Anonymous	EP080: Benzene	71-43-2	20 µg/L	93.4	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	94.5	73.5	126



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	50	146
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	27	153
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	67
2-Chlorophenol-D4	93951-73-6	29	120
2,4,6-Tribromophenol	118-79-6	10	131
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	34	131
Anthracene-d10	1719-06-8	43	126
4-Terphenyl-d14	1718-51-0	41	142
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2209829	Page	: 1 of 9
Client	: 360 ENVIRONMENTAL PTY LTD	Laboratory	: Environmental Division Perth
Contact	: CHRIS DONNETTI	Telephone	: +61-8-9406 1301
Project	: 5412 - Causeway Pedestrian Bridge	Date Samples Received	: 04-Aug-2022
Site	: ----	Issue Date	: 09-Aug-2022
Sampler	: Phunsto Wangdi	No. of samples received	: 4
Order number	: 5412-002	No. of samples analysed	: 4

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.
- Duplicate outliers exist - please see following pages for full details.
- Laboratory Control outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
ED037P: Alkalinity by PC Titrator	EP2209659--006	Anonymous	Hydroxide Alkalinity as CaCO3	DMO-210-001	28.6 %	0% - 20%	RPD exceeds LOR based limits
Laboratory Control Spike (LCS) Recoveries							
EA015: Total Dissolved Solids dried at 180 ± 5 °C	QC-MRG2-45013750	----	Total Dissolved Solids @180°C	----	94.1 %	94.7-109%	Recovery less than lower control limit
Matrix Spike (MS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	EP2209829--002	BH05	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG035F: Dissolved Mercury by FIMS	EP2209829--004	BH14	Mercury	7439-97-6	55.5 %	70.0-130%	Recovery less than lower data quality objective
EP068A: Organochlorine Pesticides (OC)	EP2209829--004	BH14	Aldrin	309-00-2	10.8 %	48.0-122%	Recovery less than lower data quality objective

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Container / Client Sample ID(s)	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue	
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural								
	BH02, BH07,	BH05, BH14	----	----	----	06-Aug-2022	01-Aug-2022	5
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural								
	BH02, BH07,	BH05, BH14	----	----	----	04-Aug-2022	03-Aug-2022	1

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	4	0.00	5.00	NEPM 2013 B3 & ALS QC Standard



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: **WATER**

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) BH02, BH07, BH05, BH14	01-Aug-2022	----	----	----	06-Aug-2022	01-Aug-2022	*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) BH02, BH07, BH05, BH14	01-Aug-2022	----	----	----	06-Aug-2022	29-Aug-2022	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) BH02, BH07, BH05, BH14	01-Aug-2022	----	----	----	05-Aug-2022	08-Aug-2022	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) BH02, BH07, BH05, BH14	01-Aug-2022	----	----	----	06-Aug-2022	15-Aug-2022	✓
ED038A: Acidity							
Clear Plastic Bottle - Natural (ED038) BH02, BH07, BH05, BH14	01-Aug-2022	----	----	----	06-Aug-2022	15-Aug-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) BH02, BH07, BH05, BH14	01-Aug-2022	----	----	----	04-Aug-2022	29-Aug-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) BH02, BH07, BH05, BH14	01-Aug-2022	----	----	----	04-Aug-2022	29-Aug-2022	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) BH02, BH07, BH05, BH14	01-Aug-2022	----	----	----	08-Aug-2022	29-Aug-2022	✓



Matrix: **WATER** 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
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) BH02, BH07, BH14	01-Aug-2022	----	----	----	08-Aug-2022	28-Jan-2023	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F) BH02, BH07, BH14	01-Aug-2022	----	----	----	08-Aug-2022	29-Aug-2022	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH02, BH07, BH14	01-Aug-2022	----	----	----	04-Aug-2022	29-Aug-2022	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) BH02, BH07, BH14	01-Aug-2022	----	----	----	04-Aug-2022	03-Aug-2022	*
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH02, BH07, BH14	01-Aug-2022	----	----	----	04-Aug-2022	29-Aug-2022	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH02, BH07, BH14	01-Aug-2022	08-Aug-2022	29-Aug-2022	✓	08-Aug-2022	29-Aug-2022	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH02, BH07, BH14	01-Aug-2022	08-Aug-2022	29-Aug-2022	✓	08-Aug-2022	29-Aug-2022	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068) BH02, BH07, BH14	01-Aug-2022	05-Aug-2022	08-Aug-2022	✓	05-Aug-2022	14-Sep-2022	✓
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068) BH02, BH07, BH14	01-Aug-2022	05-Aug-2022	08-Aug-2022	✓	05-Aug-2022	14-Sep-2022	✓
EP075(SIM)A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH02, BH07, BH14	01-Aug-2022	05-Aug-2022	08-Aug-2022	✓	05-Aug-2022	14-Sep-2022	✓



Matrix: **WATER** 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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH02, BH07, BH05, BH14	01-Aug-2022	05-Aug-2022	08-Aug-2022	✓	05-Aug-2022	14-Sep-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) BH02, BH07, BH05, BH14	01-Aug-2022	05-Aug-2022	08-Aug-2022	✓	05-Aug-2022	14-Sep-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH02, BH07, BH05, BH14	01-Aug-2022	05-Aug-2022	15-Aug-2022	✓	05-Aug-2022	15-Aug-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) BH02, BH07, BH05, BH14	01-Aug-2022	05-Aug-2022	08-Aug-2022	✓	05-Aug-2022	14-Sep-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH02, BH07, BH05, BH14	01-Aug-2022	05-Aug-2022	15-Aug-2022	✓	05-Aug-2022	15-Aug-2022	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) BH02, BH07, BH05, BH14	01-Aug-2022	05-Aug-2022	15-Aug-2022	✓	05-Aug-2022	15-Aug-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: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by Auto Titrator	ED037-P	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by Auto Titrator	EA005-P	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	16	12.50	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by Auto Titrator	ED037-P	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by Auto Titrator	EA005-P	2	8	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	16	12.50	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus as P By Discrete Analyser	EK067G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	16	6.25	5.26	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	4	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	6.25	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
pH by Auto Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Conductivity by Auto Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Acidity as Calcium Carbonate	ED038	WATER	In house: Referenced to APHA 2310 B Acidity is determined by manual titration with a standardised alkali to an end-point pH of 8.3. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatle Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.

Appendix D

Dewatering Management Level 2 (DER 2015b)

1 Appendix D - Dewatering Management Levels

The dewatering management described below are from the DWER (2015b) guidelines *Treatment and management of soil and water in acid sulfate soil landscapes*.

Dewatering effluent should be reinfiltrated on site with a lime dosing effluent treatment system similar to the schematic in Figure 1.

The DWER (2015b) guidelines should be referred to for details of groundwater and effluent laboratory analysis and other monitoring requirements.

1.1 Dewatering management level 1a—radial extent of groundwater cone of depression <50m

Where dewatering will be undertaken in an area underlain by ASS where the predicted radius of the cone of depression of the watertable is less than 50 metres, the management measures that should be implemented include (but are not necessarily limited to):

- staging of earthworks and dewatering program to minimise the duration and magnitude of dewatering (to limit the amount of time that ASS are exposed to the atmosphere);
- management of dewatering effluent in accordance with Table 1;
- watertable level monitoring to ensure that the actual radial extent of the groundwater cone of depression is less than 50 metres;
- if the actual radial extent of the groundwater cone of depression exceeds 50 metres and the duration of the dewatering operation exceeds seven days, the additional dewatering management measures outlined in 6.2.3 Dewatering Management Level 2 (DWER should be advised in this case);
- development of an ASSMP and submission of the ASSMP to DER for approval before commencement of site works (please allow 45 days for DER to review and provide comment on the ASSMP; site works cannot commence until the ASSMP has been approved by DER);
- submission of an initial closure report to DER; and
- remedial actions to restore groundwater quality, if needed.

1.2 Dewatering management level 1b—duration of dewatering less than seven days

Where dewatering will be undertaken in an area underlain by ASS for a total duration of less than seven days, the management measures that should be implemented include (but are not necessarily limited to):

- staging of earthworks and dewatering program to minimise the duration and magnitude of dewatering (to limit the amount of time that ASS are exposed to the atmosphere);

- management of the dewatering program to minimise the lateral and vertical extent of groundwater drawdown (to limit the volume of ASS exposed to the atmosphere (see 3.2 Minimising groundwater disturbance));
- calculation of the radius of the groundwater cone of depression;
- management of dewatering effluent in accordance with Table 1;
- watertable level monitoring to ensure that the actual radial extent of the groundwater cone of depression is not more than that predicted from calculations;
- if the actual duration of dewatering exceeds seven days and the radial extent of the groundwater cone of depression is greater than 50 metres, as the additional dewatering control measures outlined in Dewatering Management Level 2 (DWER should be advised in this instance);
- development of an ASSMP in accordance with 7 Preparation of an ASSMP and submission of the ASSMP to DWER for approval before commencement of site works (please allow 45 days for DWER to complete its review and provide comment on the ASSMP; siteworks that might disturb ASS materials should not commence until DER comment has been received);
- submission of an initial closure report to DWER; and
- remedial actions to restore groundwater quality to be undertaken if needed.

1.3 Dewatering management level 2—duration of dewatering greater than seven days with a radial extent of the cone of groundwater depression greater than 50 metres

Where dewatering will be undertaken in an area underlain by ASS for a total duration of greater than seven days or where the predicted radius of the cone of depression of the watertable exceeds 50 metres, the management measures that should be implemented include (but are not necessarily limited to):

- staging of disturbance such that the potential effects on any area disturbed at any one time are limited and easily managed;
- staging of earthworks and dewatering program to minimise the duration and magnitude of dewatering (to limit the amount of time that ASS are exposed to the atmosphere);
- management of the dewatering program to minimise the lateral and vertical extent of groundwater drawdown
- calculation and modelling of the radius of the groundwater cone of depression;
- limiting the radius of the groundwater cone of depression to less than 100 metres;
- baseline laboratory groundwater quality data collected before the commencement of dewatering operations (this may involve more than one monitoring event to ensure the data are representative and to capture seasonal variations);

- installation of groundwater monitoring bores up-gradient and down-gradient of dewatering location (bores must be appropriately positioned to enable them to be used to assess any impacts of dewatering on groundwater level and quality);
- management of dewatering effluent in accordance with Table 2;
- watertable level monitoring to ensure that watertable drawdown does not exceed 10 centimetres at a distance of 100 metres from the dewatering location;
- groundwater pH, standing water levels, EC, redox, DO, total titratable acidity and total alkalinity monitored in the field every second day during the dewatering operation and continued until it can be shown that groundwater levels have returned to normal elevations;
- groundwater samples collected for laboratory analysis at fortnightly intervals during the dewatering operation;
- laboratory groundwater quality analytical suite including: total acidity, total alkalinity, sulfate, chloride, dissolved aluminium (filtered), dissolved arsenic (filtered), dissolved chromium (filtered), dissolved cadmium (filtered), dissolved iron (filtered), dissolved manganese (filtered), dissolved nickel (filtered), dissolved zinc (filtered), dissolved selenium (filtered), ammoniacal nitrogen, TDS, total nitrogen, total phosphorus, filterable reactive phosphorus (FRP);
- development of an ASSMP and submission of the ASSMP to DER for approval before commencement of site works (please allow 45 days for DER to complete its review and provide comment on the ASSMP; ASS-disturbing siteworks should not commence until DER comment has been received);
- immediate cessation of dewatering operations if the results of groundwater and/or dewatering effluent monitoring indicate any deterioration in groundwater quality;
- remediation of groundwater if the results of the groundwater quality monitoring program indicate that any environmental impact has occurred as a result of project works;
- laboratory groundwater quality data collected after finalisation of dewatering operations;
- results of the groundwater and effluent water quality and water level monitoring program reported within an initial closure report for the project along with a discussion of any environmental impacts observed;
- groundwater samples collected from all groundwater monitoring bores for laboratory analysis at intervals of one month to two months for a period of at least six months, including at least one groundwater monitoring event taken at the time of highest seasonal groundwater levels following completion of the dewatering operation (the period of monitoring needed will increase with increasing magnitude and duration of the dewatering operation);
- results of the post-dewatering groundwater quality monitoring program reported within a post-dewatering monitoring closure report for the project along with a discussion of any environmental impacts observed (potential requirements for continued monitoring and/or

remediation will be assessed after DWER reviews this post-dewatering monitoring closure report); and

- remedial actions undertaken to restore groundwater quality, if needed.

Table 1: Dewatering Management Level 1a and 1b

	Trigger	Action	Monitoring
1b.	Total titratable acidity <40mg/L, pH>6	Continue daily field measurements of pH and total titratable acidity.	Daily —field measurement: pH, Eh, DO, EC, TTA, TAlk Fortnightly —laboratory analysis: TTA, TAlk, pH
2b.	Total titratable acidity <40mg/L, pH in range 4 to 6	Undertake neutralisation treatment (liming)	Daily —field measurement: pH, Eh, DO, EC, TTA, TAlk Weekly —laboratory analysis: TTA, TAlk, pH
3b.	Total titratable acidity in range 40mg/L to 100mg/L, pH>6	Effluent should be aerated to precipitate dissolved iron and directed to a series of settlement basins/trenches or other treatment system to allow removal of iron and other metals Undertake neutralisation treatment (liming).	Daily —field measurement: pH, Eh, DO, EC, TTA, TAlk Weekly —laboratory analysis: TTA, TAlk, pH
4b.	Total titratable acidity in range 40mg/L to 100mg/L, pH in range 4 to 6	Effluent should be aerated to precipitate dissolved iron and directed to a series of settlement basins/trenches or other treatment system to allow removal of iron and other metals Undertake neutralisation treatment (liming).	Daily —field measurement: pH, Eh, DO, EC, TTA, TAlk Weekly —laboratory analysis: TTA, TAlk, pH Fortnightly —laboratory analysis: total acidity, total alkalinity, pH, sulfate, chloride, sodium, total iron, dissolved iron (filtered), total aluminium, dissolved aluminium (filtered), total arsenic, total chromium, total cadmium, total manganese, total nickel, total zinc, total selenium, ammoniacal nitrogen, hydrogen sulfide, EC, total suspended solids (TSS), total dissolved salts (TDS), total nitrogen (TN), total

	Trigger	Action	Monitoring
			phosphorus (TP)
5b.	<p>Total titratable acidity >100mg/L</p> <p>or</p> <p>pH<4</p> <p>or</p> <p>total alkalinity <30mg/L</p>	<p>Effluent should be aerated to precipitate dissolved iron and directed to a series of settlement basins/trenches or other treatment system to allow removal of iron and other metals.</p> <p>Increase neutralisation treatment (liming) rate.</p> <p>Advise DER immediately. CSB may advise appropriate action which may include ceasing dewatering.</p>	<p>Daily—field measurement: pH, Eh, DO, EC, TTA, TALK</p> <p>Weekly—laboratory analysis: total acidity, total alkalinity, pH, sulfate, chloride, sodium, total iron, dissolved iron (filtered), total aluminium, dissolved aluminium (filtered), total arsenic, total chromium, total cadmium, total manganese, total nickel, total zinc, total selenium, ammoniacal nitrogen, hydrogen sulfide, EC, TSS, TDS, TN, TP</p> <p>May be needed to undertake investigations to determine the size of the 'acidic footprint' created and manage this impact appropriately.</p>
6b.	<p>Total titratable acidity >100mg/L and 25% higher than baseline values</p>	<p>Upgrade to 'Dewatering Management Level 2' including implementation of groundwater quality monitoring program</p>	<p>Monitoring requirements: Dependent upon value of total titratable acidity and pH as per guidance above</p>
7b.	<p>pH decrease >1 pH unit from baseline values</p>	<p>Upgrade to 'Dewatering Management Level 2' including implementation of groundwater quality monitoring program.</p>	<p>Monitoring requirements: Dependent upon value of total titratable acidity and pH as per guidance above.</p>

Table 2: Dewatering Management Level 2

	Trigger	Action	Monitoring
1a.	Total titratable acidity <40mg/L, pH>6	Continue daily field measurements of pH and total titratable acidity.	Daily —field measurement: pH, redox (Eh), electrical conductivity (EC) and Total Titratable Acidity (TTA), total alkalinity (TALK) Fortnightly —laboratory analysis: total acidity, total alkalinity, pH
2a.	Total titratable acidity <40mg/L, pH in range 4 to 6	Undertake neutralisation treatment (liming).	Daily —field measurement: pH, Eh, EC & TTA, TALK Weekly —laboratory analysis: total acidity, total alkalinity,
3a.	Total titratable acidity in range 40mg/L to 100mg/L, pH>6	Effluent should be aerated to precipitate dissolved iron and directed to a series of settlement basins/trenches or other treatment system to allow removal of iron and other metals. Undertake neutralisation treatment (liming).	Daily —field measurement: pH, Eh, EC & TTA, TALK, dissolved oxygen (DO), Weekly —laboratory analysis: total acidity, TALK, pH
4a.	Total titratable acidity in range 40mg/L to 100mg/L, pH in range 4 to 6	Effluent should be aerated to precipitate dissolved iron and directed to a series of settlement basins/trenches or other treatment system to allow removal of iron and other metals. Undertake neutralisation treatment (liming).	Daily —field measurement: pH, Eh, DO,EC, TTA, TALK Weekly —laboratory analysis: total acidity, TALK, pH Fortnightly —laboratory analysis: total acidity, total alkalinity, pH, sulfate, chloride, sodium, total iron, dissolved iron (filtered), total aluminium, dissolved aluminium (filtered), total arsenic, total chromium, total cadmium, total manganese, total nickel, total zinc, total selenium, ammoniacal nitrogen, hydrogen sulfide, EC, Total Suspended Solids (TSS), Total Dissolved Salts (TDS), Total Nitrogen (TN), Total Phosphorus (TP)

	Trigger	Action	Monitoring
5a.	<p>Total titratable acidity >100mg/L</p> <p>or</p> <p>pH<4</p> <p>or</p> <p>total alkalinity <30mg/L</p>	<p>Effluent should be aerated to precipitate dissolved iron and directed to a series of settlement basins/trenches or other treatment system to allow removal of iron and other metals.</p> <p>Increase neutralisation treatment (liming) rate.</p> <p>Advise DER immediately. Contaminated Sites Branch (CSB) may advise appropriate action which may include ceasing dewatering.</p>	<p>Twice daily—field measurement: pH, Eh, DO, EC, TTA, TALK</p> <p>Weekly—laboratory analysis: total acidity, total alkalinity, pH, sulfate, chloride, sodium, total iron, dissolved iron (filtered), total aluminium, dissolved aluminium (filtered), total arsenic, total chromium, total cadmium, total manganese, total nickel, total zinc, total selenium, ammoniacal nitrogen, hydrogen sulfide*, EC, TSS, TDS, TN, TP</p> <p>May be needed to undertake investigations to determine the size of the 'acidic footprint' created and manage this impact appropriately.</p>

1.4 Dewatering Management – Effluent Treatment System

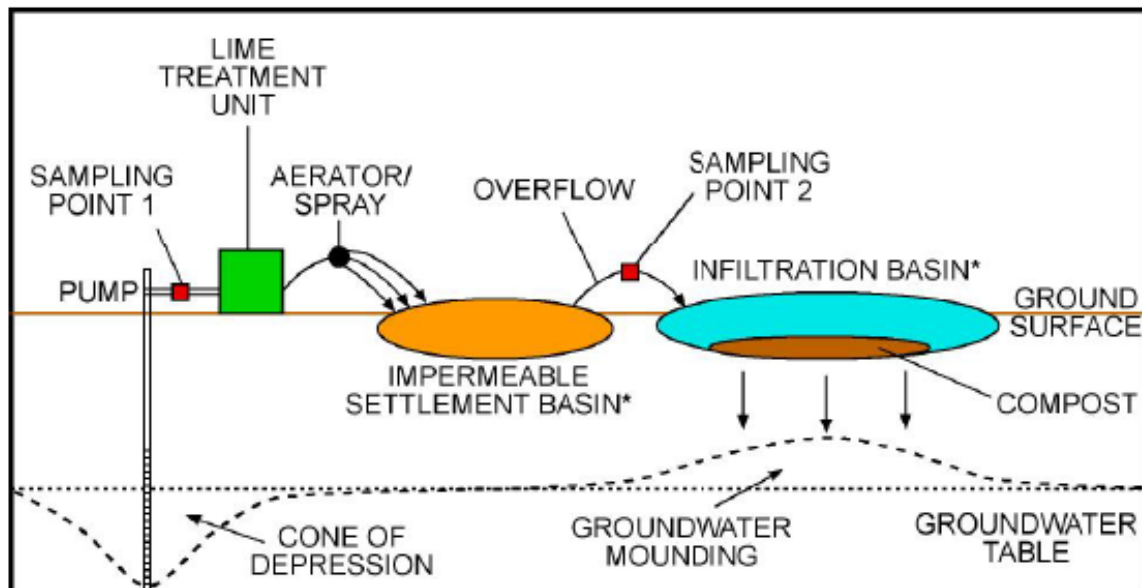


Figure 1: Schematic of an Effluent Treatment System