technical report E

contamination.



Environment Effects Statement | May 2021

western outer ring main

a project of apa

APA VTS (Operations) Pty Ltd

APA Western Outer Ring Main Environment Effects Statement

Contamination Report

May 2021

This Contamination Impact Assessment Report (Report):

1. Has been prepared by GHD Pty Ltd ("GHD") for APA VTS (Operations) Pty Ltd (APA)
2. May only be used for the purpose of informing the Environment Effects Statement and Pipeline Licence Application for the Western Outer Ring Main Project (and must not be used for any other purpose); and
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The services undertaken by GHD in connection with preparing this Report were limited to those specifically detailed in section 5 Methodology of this Report. The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report (Assumptions), as specified in section 1.3, 5.7 and throughout this Report. GHD excludes liability for errors in, or omissions from, this Report arising from or in connection with any of the assumptions being incorrect. Subject to the paragraphs in this section of the Report, the opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the time of preparation. GHD has not, and accepts no responsibility or obligation to update this Report to account for events or changes occurring subsequent to the date that the Report was signed.

Executive summary

This technical report is an attachment to the Western Outer Ring Main Project Environmental Effects Statement (EES). It provides a contamination assessment for the Project, and defines the environmental management measures necessary to meet the EES evaluation objectives.

Overview

The Western Outer Ring Main Project (the Project) is a buried 600 millimetre nominal diameter high pressure gas transmission pipeline between APA's existing Plumpton Regulating Station (approx. 38 kilometres north west of Melbourne's CBD) and Wollert Compressor Station (approx. 26 kilometres north east of Melbourne's CBD), providing a high pressure connection between the eastern and western pipeline networks of the Victorian Transmission System (VTS).

The Project includes a new buried pipeline, three above-ground mainline valves along the pipeline alignment, and an additional compressor unit and regulating station at the existing APA Wollert Compressor Station.

APA is the proponent for the Project.

On 22 December 2019, the Minister for Planning determined that the Project would require an Environment Effects Statement (EES) under the *Environment Effects Act 1978* (EE Act).

GHD was commissioned to undertake a contamination impact assessment for the purpose of the EES.

Contamination context

Construction projects have the potential to encounter contaminated soil and groundwater and other material that require specific management under Victorian Regulations. Sources of this material can be from anthropogenic activities such as industrial land uses and practices such as former or current landfilling or can be naturally occurring such as acid sulfate soils. These materials can potentially impact the scheduling, budgets and health and safety aspects of the Project but can be managed to through a range of measures as detailed in this report.

Existing conditions

The review of historical land uses identified a generally low risk for the presence of widespread contamination along the construction corridor. The majority of the alignment was historically and currently used for agricultural activities.

Nine areas were identified as having a historic or current land use that is a potential source of contamination as detailed in Section 6.4.1 and listed below:

- Within and immediately adjacent to railway reserves in Diggers Rest (Kilometre Point (KP) 8.3) and Beveridge (KP 41.1)
- A rural property in Diggers Rest that was used to store hundreds of wrecked cars (KP 9.95 – KP 10.14)
- Industrial waste illegally dumped in Diggers Rest (near KP 11.3)
- A quarry and landfill site in Bulla (south east of KP 15.3-KP 16)
- A second landfill site in Bulla (north of KP 15)

- A property in Bulla has been issued a Clean Up Notice by the Environment Protection Authority (EPA) Victoria however the source of contamination is unknown (near KP 16)
- Retarding basin in Kalkallo (KP 34- KP 35.5)
- A possible former Quarry in Beveridge (west of KP 37.5) Wollert Compressor Station (KP 50.78 to KP 51.045)

Soil sampling was completed during groundwater well installation at 11 locations and did not identify contamination in areas sampled. Analyses conducted to date have not indicated the presence of Potential Acid Sulfate Soils (PASS) in shallow soils along the alignment.

The groundwater investigation, relating to contamination, included the sampling and analysis of groundwater from 12 groundwater bores at, or within close proximity to the construction corridor, to date have not identified any significant contamination.

Analyses of surface water to date has not identified any significant contamination. It is noted that per- and polyfluoroalkyl substances (PFAS) was reported in Jacksons Creek just above the laboratory limit of reporting (LOR).

Impact assessment

The impact assessment is based on the historical and site information and the proposed construction method for the Project. The impact assessment considers all risks identified as detailed in Table 8-1, in the context of the Project and associated mitigation measures to manage environmental impacts.

This assessment has investigated the potential for contaminated soils, acid sulfate soil or rock, landfill and ground gases, and contaminated groundwater to be encountered during construction as well as the impacts from potential leaks and spills, management of waste streams, drilling fluids and hydrostatic test water which may impact human health or the environment during construction and operation and is detailed below.

Disturbance and management of existing contamination (inferred)

This assessment has investigated the potential for earthworks to interact with contaminated soil and impact on human health or the environment.

Based on the land use history within close proximity to the Project, there were limited identified potential sources of contamination that would impact shallow soils (less than 2 mbgl). Therefore it is anticipated that minor quantities of contaminated soils may be encountered during construction. Contaminated soils are most likely to be encountered within and immediately adjacent to rail reserves, the rural property in Diggers Rest (KP 9.95- KP 10.14), which is being used to store hundreds of wrecked cars, a possible former quarry in Beveridge (KP 37.5), the retarding basin (KP 34- KP 35.5) and the Wollert Compressor Station (KP 50.78 to KP 51.045). However it should be noted that soil and groundwater investigations have not been completed at sites identified as potential sources of contamination with the exception of the Kalkallo retarding basin where contamination was not identified. PFAS were also not investigated however, with the exception of the Kalkallo retarding basin, PFAS impacted soils is considered unlikely due to the lack of sources identified.

Soil and groundwater investigations at sites identified as potentially contaminating were not considered necessary for the purpose of this EES but would be required prior to construction to inform the Construction Environment Management Plan (CEMP). The impact of the Project mobilising contamination and impacting human health and the environment at these sites is considered low when mitigation measures are implemented, which includes carrying out further assessment prior to construction in order to inform the CEMP and managing these sites as per Section 10.

Assuming appropriate management of excavated spoil, the impact of existing contamination to the Project is low.

Disturbance and management of existing contamination (unidentified contamination)

Contamination may be encountered during construction that is outside of contamination sources identified in this assessment (unidentified contamination). This could be due to illegal dumping of waste and historical uncontrolled waste disposal that was unable to be identified during the desktop review.

Overall, it is considered unlikely that widespread unidentified contamination will impact the Project during construction. With appropriate procedures and contingency plans for identifying and managing unexpected contamination the impact is considered low.

Disturbance and management of uncontaminated spoil

This assessment has investigated the potential impact of uncontaminated spoil in stockpiles and open excavations on human health and the environment.

A human health impact has the potential to be realised through inhalation of dust, and an ecological impact has the potential to be realised through runoff which would have a detrimental impact to waterways due to silting.

The Project would need to stockpile uncontaminated spoil during construction works to reduce dust and runoff in accordance with EPA Victoria Publication 1834 Civil construction, building and demolition guide and EPA Publication 1895 Managing Stockpiles.

Mobilisation of contaminated groundwater

The majority of identified potential sources of contamination based on the desktop review are located where groundwater is expected to be greater than 5 metres below ground level and unlikely to intercepted during trenching works. The Project is likely to intercept groundwater at Jacksons Creek and Deep Creek which may be affected by regional groundwater impacts from landfills within the study area.

Overall the impact of mobilising contaminated groundwater is consider low due to the relatively few potential sources of contamination identified and the depth to groundwater at the majority of these locations is expected to be greater than 5 metres below ground level.

Preliminary PFAS sampling was completed in groundwater and surface water at Jacksons Creek and Deep Creek to investigate the potential for regional groundwater pollution from the Bulla Landfill and Hi-Quality Landfill.

PFAS was reported below the laboratory LOR at all three groundwater wells sampled within the regional aquifer. The groundwater assessment conducted to date was not indicative of landfill impacts.

A surface water sample from Jacksons Creek detected perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) in which the source of contamination is unclear but may be attributed to historical discharge from the Sunbury Recycled Water Treatment Plant located approximately 4.5 kilometres upstream of the Projects crossing at Jacksons Creek.

Leaks or spill

There is a possibility that spills may occur during the refuelling of vehicles, plant and machinery or the use of chemicals required as part of the construction and/or operation (maintenance). The impact of fuel or chemical spills causing contamination to soil is assessed as low based on construction and operation of the Project being managed in accordance with the mitigation measures. In addition, should leaks or spills occur, the area of impact would likely be very localised. The Project will be incorporated into the existing VTS Operational Environmental Management Plan (VTS OEMP).

Exposure to ground gases and vapour

Vapours and landfill gases associated with contaminated soil and/or contaminated groundwater that could be encountered during excavation activities, have the potential to impact human health. Exposure to soil vapours and landfill gases can have an adverse impact on human health through the generation of volatiles, odour, inhalation or flammability and explosion.

Volatile contaminants (such as those generated by a petroleum hydrocarbon plume in groundwater) are unlikely to be present in soil and/or groundwater, based on existing conditions.

The primary impact from ground gases to the Project is from the adjacent landfill and quarry in Bulla (south east of KP 14.85-KP 15.85). Landfill gas (notably methane) may accumulate in trenches or any other confined spaces during construction and potentially result in conditions where there is an explosion or asphyxiation risk to human health. Review of the most recent available operational audit completed in 2018 indicated that landfill gas at the landfill boundary was poorly understood due to limited landfill gas bores installed. Further, the risk from landfill gas would change over time and can be driven by the progressive filling and capping of the landfill. Therefore, landfill gas monitoring during trenching adjacent to the landfill (within 500 metres of the boundary of the waste) and the setting of trigger values and contingencies to respond to changes in gas concentrations is required.

A possible source of vapour-forming chemicals in the vicinity of the Project include the auto wreckers in Diggers Rest (located approximately at KP 9.95- KP 10.14). Petrol stations, dry cleaners and industrialised areas were not observed within the vicinity of the Project. Overall, this impact is considered to be low as there is unlikely to have been large volumes of fuels / chemicals stored on the construction corridor.

Management of waste streams

The following waste streams relating to the Project have been considered and include:

- Commercial and industrial waste such as those relating to pipelining wastes, timber and steel
- Construction waste such as excess spoil and rock, bitumen and drilling fluids
- Domestic waste such as putrescible and general waste, plastic, paper and cardboard packing

Based on the mitigation measures the impact to human health and the environment is considered to be low due to:

- Wastes are generally inert and generally do not pose a risk to human health
- Wastes will be present on site for a short duration and contained within specified areas reducing the likelihood of interaction with sensitive receptors
- Wastes will be recycled or disposed off-site to an appropriate facility which also limits the likelihood of interaction with sensitive receptors

The Project would not likely generate large amounts of wastes associated with ongoing operation and maintenance activities. The Project will be incorporated into the existing VTS Operational Environmental Management Plan (VTS OEMP).

Contaminated hydrostatic test water

Hydrostatic testing is a process where sections of the pipeline are filled with water and pressurised. Water is proposed to be collected from nearby dams or from water mains where suitable supply exists close to the pipeline alignment. Hydrostatic test water would be managed in accordance with State Environment Protection Policy (SEPP) (Waters). No direct discharge would occur to watercourses or drains unless approved by EPA Victoria.

The impact to human health and the environment is considered to be negligible based on mitigation measures being implemented.

Drilling fluids used for Horizontal Directional Drilling (HDD)

The use of drilling fluids (such as bentonite) during trenchless HDD operations has the potential to result in blow-out (or “fracking”), whereby the drilling fluid leaks through the bore into the surrounding soil, surface water or aquifer.

Although blow out may result in silting / increased turbidity load in surface water, the impact from blow out from a contamination perspective is expected to be low based on the following:

- Drilling fluids are designed to stabilise and seal the hole and therefore movement into the aquifer system will be very limited
- Drilling fluids are generally inert and commonly used in the groundwater bore drilling industry
- Impacts from blow out into waterways and across land would be anticipated to be short term, reversible and on a localised scale
- Implementation of mitigation measures described in Technical Report D - Land stability and ground movement which considers management and monitoring requirements during HDD drilling operations

Environmental management measures

Environmental management measures have been considered and include the need to implement spoil management measures as part of the CEMP which would consider requirements to:

- Manage existing contamination (inferred conditions and unexpected)
- Manage HDD muds
- Manage uncontaminated spoil
- Minimise impacts from disturbance of acid sulfate soil
- Minimise risks from contaminated groundwater
- Minimise risks from vapour and ground gas intrusion
- Manage chemicals, fuels and hazardous materials
- Manage waste streams
- Manage hydrostatic test water

Environmental management measures during operations have been considered for minimising contamination impact during operation from leaks and spills and would be implemented as part of the existing VTS OEMP.

Conclusion

The potential impact from contamination, including disturbance and management of both inferred or unidentified contamination and acid sulfate soils, disturbance of uncontaminated spoil, mobilisation of contaminated groundwater, exposure to ground gases or vapour, management of hydrostatic test water, management of drilling fluids, management of waste streams and accidental leaks or spills, is considered to be low or negligible once the mitigation measures are implemented.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.3 and 5.7 and the assumptions and qualifications contained throughout the Report.

Abbreviations

Abbreviation	Definition
AASS	Actual acid sulfate soils
AHD	Australian Height Datum
AMG	Australian Map Grid
AS	Australian Standard
ASC NEPM	National Environmental Protection (Assessment of Site Contamination) Measure 1999
ASS	Acid Sulfate Soils
bgl	Below ground level
BTEX	Benzene, toluene, ethylbenzene, xylene
CEMP	Construction Environment Management Plan
COC	Chain of custody
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CUN	Clean up Notice
EAO	Environmental Audit Overlay
EE Act	*Environment Effects Act 1978*
EES	Environment Effects Statement
EMM	Environment Management Measure
EPA	Environment Protection Authority
EP	Environmental Protection
GED	General environmental duty
GQRUZ	Groundwater Quality Restricted Use Zones
HDD	Horizontal directional drilling
ICCP	Impressed current cathodic protection
IW	Industrial Waste
IWMP	Industrial Waste Management Policy
IWRG	Industrial Waste Resource Guidelines
MLV	Mainline valves
MSA	Melbourne Strategic Assessment
mbgl	Meters below ground level
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council

Abbreviation	Definition
NEPM	National Environment Protection Measure
OCP	Organochlorine pesticides
OEMP	Operation Environment Management Plan
PAH	Polycyclic aromatic hydrocarbons
PAN	Pollution Abatement Notice
PASS	Potential Acid Sulfate Soils
PCB	Polychlorinated biphenyl
PCOC	Potential contaminants of concern
PFAS	Per- and polyfluoroalkyl substances
PIW	Prescribed industrial waste
PSI	Preliminary site investigation
PW	Priority waste
SEPP	State Environment Protection Policy
SPOCAS	Suspension Peroxide Oxidation Combined Acidity Sulfur
SVOC	Semi-volatile organic hydrocarbons
SWL	Standing water level
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
UPSS	Underground petroleum storage systems
VOC	Volatile organic hydrocarbons
VTS	Victorian Transmission System
WASS	Waste Acid Sulfate Soil
WORM	Western Outer Ring Main

Glossary

Term	Definition
Acid sulfate soil and rock	Natural soils or rocks that contain iron sulphides which when exposed to oxygen can release acid that may damage or otherwise adversely impact built structures and ecosystems.
Alluvial	Pertaining to, or composed of, alluvium or other deposits from streams and rivers.
APA	APA VTS (Operations) Pty Ltd, trading as APA Group, the proponent for the Project
Asbestos containing material	A group of manufactured material that contains asbestos minerals. They can be friable (loose and easily crumbled) or non-friable (bonded) asbestos.
Basalt	A dark coloured, fine grained, mafic volcanic rock
Beneficial uses	With regards to soil and groundwater, beneficial uses are the uses that soil or groundwater could be put to if they were not contaminated and require protection under EPA Victoria's SEPPs.
Contaminant	A substance, element, or compound that has an adverse effect on the quality of soil and water.
Environmental management measure	Approaches, requirements or actions to avoid, mitigate or manage potential adverse impacts
Fill Material	A designation of waste material defined by EPA Victoria. Often referred to as 'clean fill'.
Groundwater Quality Restricted Use Zone	A formal instrument imposed by EPA Victoria over an area of known groundwater contamination to prevent all or specific extractive uses of the groundwater. It may be imposed on one property or a broader area.
Landfill gas	A complex mix of different gases created by the action of microorganisms within a landfill. Usually developed from biological degradation of putrescible organic material. Generally mostly methane.
Lithology	The physical character of a rock or rock formation.
Preliminary site investigation	Usually comprising a desktop study of existing information on a site to identify potential contaminating activities and practices. It may include a site visit and some preliminary sampling.
Prescribed Industrial Waste	Any industrial waste or mixture containing industrial waste as defined by EPA Victoria's Industrial Waste Resource Guideline.
Priority waste	An industrial waste which requires additional controls due to their higher level of hazard, potential to be mismanaged or to encourage resource recovery or efficiency.
Project	The Western Outer Ring Main Project
Scoping requirements	The EES Scoping requirements for the Project were issued by the Minister for Planning in August 2020.
Spoil	Waste material brought up during the course of an excavation, tunnelling or a dredging or mining operation.

Term	Definition
Waste hierarchy	A hierarchical system of preferred waste handling approaches defined by EPA Victoria in the Environment Protection Act 1970 (Vic). The approaches from most preferred to least preferred include avoidance, re-use, recycling and energy recovery, treatment, containment and disposal.

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1. Introduction

1.1 Purpose of this report

The Western Outer Ring Main (WORM) gas pipeline project (the Project) is a proposed 600 millimetre nominal diameter high pressure gas transmission pipeline that would provide a high pressure connection between the eastern and western pipeline networks of the Victorian Transmission System (VTS).

APA is the proponent for the Project. APA is Australia's largest natural gas infrastructure business. In Victoria, the VTS is owned and maintained by APA and consists of some 2,267 kilometres of gas pipelines. The VTS serves a total consumption base of approximately two million residential consumers and approximately 60,000 industrial and commercial users throughout Victoria.

The Project has been designed to provide critical infrastructure for Victoria's gas supply, distribution, and consequent security, efficiency and affordability. The key objectives of the Project are to:

- Improve system resilience and security of gas supply
- Increase the amount of natural gas that can be stored for times of peak demand
- Improve network performance and reliability
- Address potential gas shortages as forecasted by AEMO in the March 2020 Victorian Gas Planning Report update

The Minister for Planning determined on 22 December 2019 that APA and the Western Outer Ring Main (WORM) gas pipeline project (the Project) would require an Environment Effects Statement (EES) under the *Environment Effects Act 1978* (EE Act). The EES would inform assessment of approvals required for the Project including under the *Pipelines Act 2005, Aboriginal Heritage Act 2006* and *Environment Protection and Biodiversity Conservation Act 1999*.

The purpose of this report is to assess the potential contamination impacts associated with the Project and to develop the environmental management measures necessary to meet the EES evaluation objectives.

1.2 Why understanding contamination is important

Major underground utility projects have the potential to encounter contaminated soil and groundwater, with potentially contaminated sites identified within or near the construction corridor.

Historical quarrying and landfilling activities combined with historically poor environmental management and waste disposal can potentially leave a legacy of contamination, which can pose potential threats to human health and the environment. It can also have significant economic, timing, legal and planning impacts and must be managed appropriately and in accordance with Victorian regulations and guidelines.

1.3 Limitations

This report: has been prepared by GHD for APA and *may only be used and relied on by APA for the purpose agreed between GHD and APA as set out in section 1.1 of this report.*

GHD otherwise disclaims responsibility to any person other than APA arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by APA and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

2. EES scoping requirements

2.1 EES evaluation objectives

The scoping requirements for the EES, released by the Minister for Planning, set out the specific environmental matters to be investigated and documented in the Project's EES, and informs the scope of the EES technical studies. The scoping requirements include a set of evaluation objectives. These objectives identify the desired outcomes to be achieved in managing the potential impacts of construction and operating the Project.

The following evaluation objectives are supported by scoping requirements that are relevant to the contamination assessment:

- Avoid, minimise and restore potential adverse effects on native vegetation, listed threatened and migratory species and ecological communities, and habitat for these species, as well as address offset requirements for residual environmental effects consistent with state and Commonwealth policies
- Maintain the functions and values of groundwater, surface water and floodplain environments and minimise effects on water quality and beneficial uses
- Minimise potential adverse social, economic, amenity and land use effects at local and regional scales
- Minimise generation of wastes from the Project during construction and operation, and to prevent adverse environmental or health effects from storing, handling, transporting and disposing of waste products

2.2 EES scoping requirements

The scoping requirements relevant to the contamination evaluation objectives are shown in Table 2-1, as well as the location where these items have been addressed in this report.

Table 2-1 Scoping requirements relevant to contamination

Scoping requirement	Section addressed
Key Issues	
Indirect loss or degradation of vegetation or habitat quality, that may support any listed species or other protected fauna, resulting from hydrological or hydrogeological change, erosion and sedimentation, edge effects, habitat fragmentation, loss of connectivity, or other disturbance impacts arising from construction or operation, including noise, vibration and lighting.	Section 9 Impact assessment Section 10 Environmental management measures Technical Report A – Biodiversity and habitats
The potential for adverse effects on the functions, values and beneficial uses of surface water environments, such as interception or diversion of flows or changed water quality or flow regimes during construction.	Section 9 Impact assessment Section 10 Environmental management measures Technical Report B – Surface water Technical Report C – Groundwater
The potential for adverse effects on the functions, values and beneficial uses of groundwater due to the Project on groundwater dependent ecosystems (GDEs) due to changes in groundwater levels, behaviour or quality.	Section 6 Existing conditions Section 9 Impact assessment Technical Report C – Groundwater

Scoping requirement	Section addressed
Potential for dust emissions resulting from construction works and activities, including dust from potentially contaminated soil.	Section 9 Impact assessment, Section 9.1.1 Disturbance and management of existing contamination (inferred conditions) Section 10 Environmental management measures Technical Report G – Air quality
Potential for adverse environmental or health effects from waste materials/streams generated from Project works.	Section 9 Impact assessment Section 10 Environmental management measures
Potential for unplanned spills/leakages of gas or other pollutants.	Section 9 Impact assessment Section 10 Environmental management measures
Potential for disturbance of contaminated soil, sodic soil or acid sulfate soil, and impacts associated with reuse of such soils.	Section 6 Existing conditions Section 9 Impact assessment Section 10 Environmental management measures Technical Report D – Land stability and ground movement
Existing Environment	
Describe surface and groundwater conditions and their beneficial uses that could be affected from changed water quality, or water movement, due to the Project	Section 9 Impact assessment Technical Report B – Surface water Technical Report C – Groundwater
Identify and describe nearby wetlands/swamps and floodplains that could be affected by the Project (e.g. wetlands in Merri Creek catchment).	Section 6 Existing conditions Section 9 Impact assessment Technical Report B – Surface water Technical Report C – Groundwater
Characterise the local groundwater quality and behaviour, including the protected beneficial uses and values and identifying any GDEs that might be affected by the Project.	Section 6 Existing conditions Section 9 Impact assessment Technical Report C – Groundwater
Characterise the interaction between surface water and groundwater within the Project and broader area.	Section 6 Existing conditions Section 9 Impact assessment Technical Report C – Groundwater
Identify the potential occurrence of contaminated, sodic or potential acid sulfate soils within the area where Project works may occur.	Section 6 Existing conditions Technical Report D – Land stability and ground movement
Mitigation measures	
Identify and evaluate aspects of Project works and operations, and proposed design refinement options or measures, that could avoid or minimise significant effects on water, waterway or wetland environments.	Section 9 Impact assessment Section 10 Environmental management measures Technical Report B – Surface water Technical Report C – Groundwater
Describe available options and mitigation measures for reuse, treatment or disposal of solid and liquid wastes generated by the Project	Section 7 Waste Management Section 9 Impact assessment Section 10 Environmental management measures
Describe how the waste hierarchy will be applied to control and manage waste.	Section 7 Waste Management

Scoping requirement	Section addressed
Identify suitable off-site disposal options for waste materials, and processes for waste and spoil tracking.	Section 7 Waste Management Section 9 Impact assessment Section 9.3 Cumulative impact assessment Section 10 Environmental management measures
Describe measures to minimise the risk of spills.	Section 9 Impact assessment Section 10 Environmental management measures
Describe measures for emergency and spill response.	Section 9 Impact assessment Section 10 Environmental management measures, EMM C6 - Manage chemicals, fuels and hazardous materials
Likely effects	
If the alignment traverses existing or closed landfills, evaluate landfill risks such as from ground gas emissions	Section 6 Existing conditions Section 8 Risk assessment Section 9 Impact assessment Appendix B Risk Pathway
Identify potential environmental effects resulting from the generation, storage, treatment, transport and disposal of solid and liquid wastes, including contaminated, sodic or potential acid sulfate soil, from Project construction and operation.	Section 6 Existing conditions Section 9 Impact assessment Technical Report D – Land stability and ground movement
Assess risks associated with unplanned spills/leakages of gas or other pollutants.	Section 8 Risk assessment Section 9 Impact assessment Appendix B Risk Pathway
Performance criteria	
Describe proposed measures to monitor the management of solid and liquid wastes during all Project phases.	Section 10 Environmental management measures
Describe proposed measures to reduce, monitor and audit discharges to water from the Project	Section 10 Environmental management measures Technical Report C – Groundwater Technical Report B – Surface water
Describe contingency measures for responding to unexpected impacts resulting from waste management or discharges	Section 10 Environmental management measures

2.3 Linkages to other reports

This report relies on or informs the technical assessments as indicated in Table 2-2.

Table 2-2 Linkages to other technical reports

Specialist report	Relevance to this technical study
EES Technical Report A: Biodiversity and habitats	This is relevant to define the protected beneficial uses and level of protection from contamination.
EES Technical Report B: Surface water	The Project may create runoff of contaminated soil and sediments to surface water and thereby impact water quality. The presence of contaminated soil can act as a source of contamination to groundwater through rainwater leaching. Abstraction of groundwater during construction may mobilise contaminants and require management.
EES Technical Report G: Air quality	Stockpiled soil may generate dust during construction works which might liberate contamination. The air quality report assesses dust impacts and required spoil and stockpile protection measures.
EES Technical Report C: Groundwater	Contamination in soil has the capacity to enter groundwater and become an issue where groundwater is intercepted by construction activities or is required to be extracted for dewatering. Groundwater is also a mechanism whereby contaminants can be transported to within the construction corridor. The Groundwater report assesses the hydrogeological conditions of the area and potential impacts on groundwater.
EES Technical Report K: Land use	Land uses, particularly commercial and industrial land uses, can indicate potential for contamination. Contamination caused or exposed by the Project impacting current land use. The report also refers to Environmental Audit Overlays (EAO) which is a planning tool applied by local councils and other planning authorities to identify sites that have known, identified or reasonably suspected contamination or potential contamination.
EES Technical Report D: Land stability and ground movement	The use of drilling fluids (such as bentonite) during trenchless Horizontal Directional Drilling (HDD) operations has the potential to result in blow-out (or “fracking”), whereby the drilling fluid leaks through the bore impacting the quality of the surrounding soil, surface water or aquifer. The Land stability and ground movement report assesses the risk of blow out occurring based on ground conditions.

3. Project description

3.1 Project overview

The Project provides a new link between APA's existing Plumpton Regulating Station (approx. 38 kilometres north west of Melbourne's CBD) and Wollert Compressor Station (approx. 26 kilometres north east of Melbourne's CBD). The Project includes the following key components:

- **A new pipeline**: The pipeline would be approximately 51 kilometres in length. The pipeline would be within a 15 metre wide permanent easement and be buried for its entire length to a minimum depth of cover of 750 millimetres.
- **Mainline valves**: Three mainline valves (MLV) would be located along the pipeline alignment. The area required for mainline valves would be subdivided and acquired by APA to provide ongoing access for any maintenance or inspection activities from the existing roads. The mainline valves would be spaced at intervals of approximately 15 kilometres, and located at approximately KP 6, KP 22 and KP 35.
- The **Wollert Compressor Station upgrade**: The installation of a new Solar Centaur 50 compressor, an end of line scraper station and a pressure regulating station within the existing APA facility at Wollert.

A schematic illustration of the Project context is shown in Figure 3-1

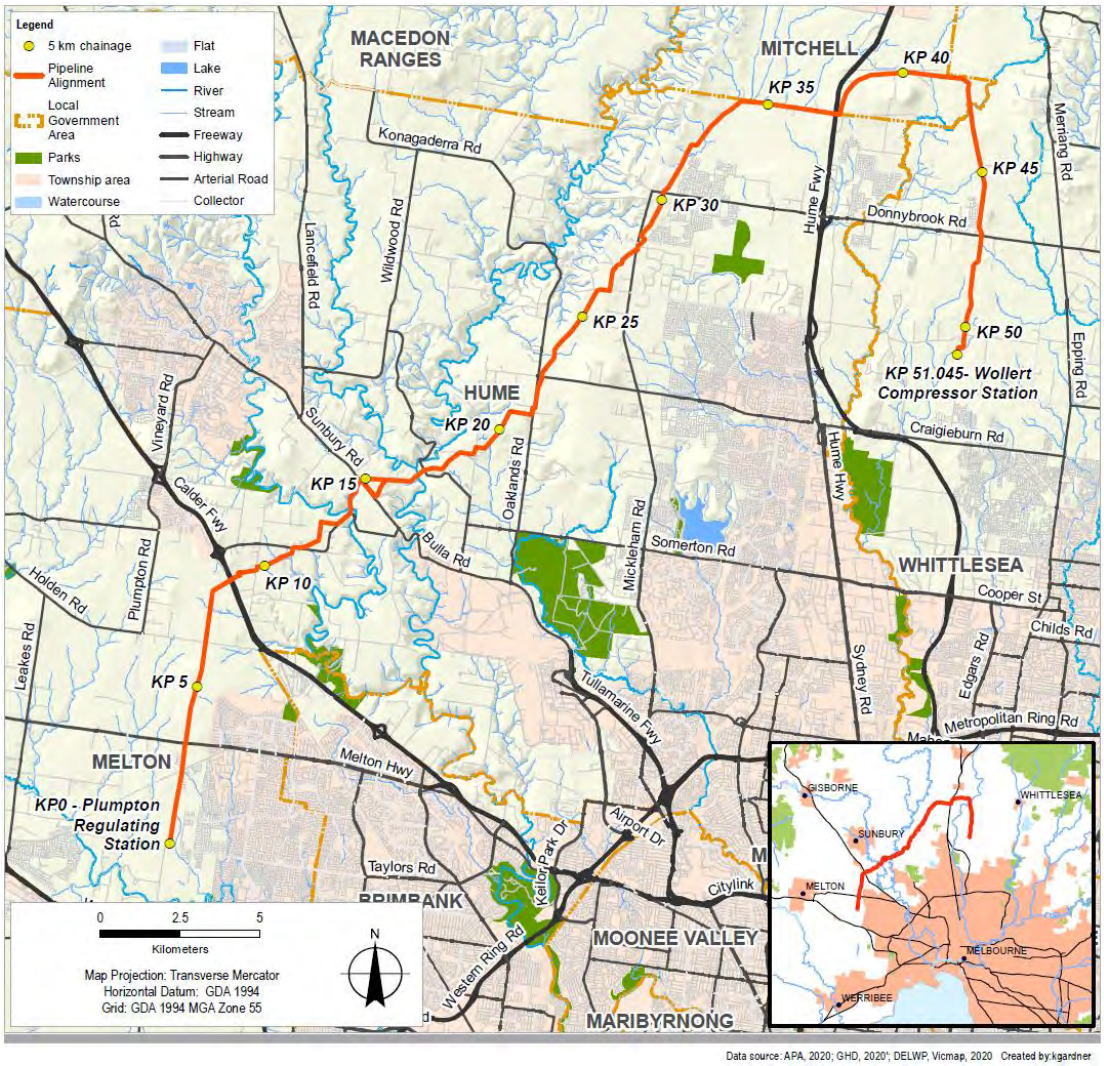


Figure 3-1 Western Outer Ring Main (WORM) overview

3.2 Construction

Subject to the staging of the works, construction for the entire Project is expected to take approximately nine months. Key construction activities for the Project include:

- Establishing offsite construction sites and construction/laydown areas
- Constructing the pipeline
- Constructing three mainline valves
- Construction of upgrades associated with the Wollert compressor station
- Rehabilitation

3.2.1 Construction sites

Two temporary construction sites would be established for construction.

One offsite compound for pipeline works. This would be nominally 200 metres x 200 metres, include laydown and storage areas and would be located on a site where the activity is permitted under the relevant Planning Scheme, most likely within an existing industrial area.

The second temporary laydown area and construction offices would be established for the Wollert Compressor Station construction works. The construction offices and site laydown area for the compressor station equipment would be located within the existing compressor site area at Wollert.

3.2.2 Pipeline construction area

The Project would require a construction area for the pipeline, which would typically comprise a 30 metre wide corridor along the pipeline alignment. Most construction activity would be located within this construction area. The activities and facilities within the construction corridor would include access tracks and additional work areas such as vehicle turn around points and additional work spaces for crossings, stockpiling of materials and storage of pipe. Additional work areas up to 50 m x 50 m or 50 m x 100 m (such as for vehicle turn-around points, areas to accommodate HDD) would be required in some locations.

3.2.3 Pipeline construction methodology

The techniques used to construct the underground pipeline would include various methods including, open trenching and alternative techniques at certain locations such as horizontal directional drilling (HDD) or horizontal boring.

Where crossing watercourses, major roads, rail line reserves or other constraints, the pipeline may be constructed using trenchless construction techniques such as HDD or shallow horizontal boring, to avoid construction disturbance within the sensitive area.

The pipeline construction sequence starts with survey works and continues with site establishment (including laydown area), clearing and grading, pipe stringing, pipe bending, welding and coating, trenching, lowering pipe into trench, hydrostatic testing, commissioning, and finally rehabilitation.

There would be dedicated access points into the construction corridor with vehicular movements along the Project alignment kept within the construction corridor.

3.2.4 Construction of other facilities

The construction sequence for the Wollert Compressor Station works starts with survey works and continues with site establishment (including laydown area), bulk earthworks, civil works (concrete slab and footings), mechanical works, electrical and instrumentation works, hydrostatic testing, commissioning, and site completion.

Various components of the compressor are assembled offsite. When delivered to site the various components are assembled together in-situ. Cranes are used to lift the compressor into place with all connecting pipework fitted.

3.3 Operation

Following the reinstatement of land as part of the pipeline construction, the land would be generally returned to its previous use. When commissioned, the pipeline would be owned and maintained by APA. The pipeline would be contained within a 15 metre wide permanent easement corridor (within the area that formed the 30 metre construction corridor). Routine corridor inspections would be undertaken in accordance with APA procedures and AS2885 to monitor the pipeline easement for any operational or maintenance issues.

Excavating or erecting permanent structures, buildings, large trees or shrubs over the underground pipeline would be prohibited in accordance with the *Pipelines Act 2005* and pursuant to easement agreements with landowners.

Maintenance and inspections of the MLVs and the Wollert compressor station would also be conducted periodically in accordance with APA procedures. The activities usually include vegetation management, valve and compressor operation and corrective maintenance.

The key operation and maintenance phase activities include:

- Easement maintenance (vegetation control, weed management, erosion and subsidence monitoring)
- Pipeline, MLVs and compressor station maintenance
- Specialist pigging operations
- Cathodic protection surveys for mechanical and electrical preventative and corrective maintenance
- Monitoring and routine inspections and surveillance

3.4 Activities and design considerations relevant to contamination

EES Chapter 4 Project description details the construction methodology for the pipeline, including trenching and also alternative techniques such as HDD or horizontal boring.

In regard to the Project's interaction with potential contamination, the following key aspects have been considered in relation to construction:

- Trenching near sites that have been identified as a potential source of landfill gas or soil vapour, which has the potential to accumulate in trenches and, in that situation, be a potential human health hazard
- Constructing through sites which have been identified as potential sources of soil and / or groundwater contamination and require assessment and management

- Excavations that intersect the water table aquifer which may require some level of dewatering, resulting in groundwater level changes which may expose potentially acid-generating sediments
- Dewatering near potential source areas which may influence migration of contamination and require assessment for disposal
- Stockpiling of spoil in a manner which minimises impacts to human health and the environment
- Hydrostatic testing and appropriate management of wastewater from this process in a manner which minimises impacts to human health and the environment
- The use of drilling fluids during any HDD works has the potential to lead to a "blow out" discharge into the surrounding soil and surface water

4. Legislation, policy and guidelines

4.1 Legislation, policy and gudelines

The EES is prepared under the EE Act and would inform assessment of approvals required for the Project. The legislation relevant to the principal approvals required for the Project is:

- Commonwealth approval under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). For the component of the Project that is located outside of the MSA, the Project requires assessment and approval under the EPBC Act, under the assessment bilateral agreement with Victoria made under section 45 of the EPBC Act.
- The Melbourne Strategic Assessment (MSA) program is the Victorian Government's approach to managing the impact of urban development in Melbourne's growth areas on significant vegetation communities, plants and animals. Areas within the approved MSA area occur between approximately KP 0 to KP 3.2, KP 28.16 to KP 28.57, and KP 32 to KP 51. Areas outside of the MSA occur approximately between KP 3.2 to KP 28.1, and KP 28.57 to KP 32.
- Pipeline Licence approval is required under the *Pipelines Act 2005* (Vic) (Pipelines Act) for the Western Outer Ring Main Project. The Pipeline Licence application is exhibited with the EES.

  Section 49 of the Pipelines Act requires that the following matters be considered before granting a licence:

  (a) the potential environmental, social, economic and safety impacts of the proposed pipeline

  (f) the assessment of the Environment Effects Minister in relation to the proposed pipeline, if an assessment has been made

  (g) any written comments received from the Planning Minister or the relevant responsible authority on the effect of the proposed pipeline on the planning of the area through which it is to pass

  (h) any written comments received from the Water Minister and from the relevant Crown Land Minister on the impact of the proposed pipeline

  Section 3 of the Pipelines Act state the objectives of the Act, including:

  (a) to facilitate the development of pipelines for the benefit of Victoria

  (e) to protect the public from environmental, health and safety risks resulting from the construction and operation of pipelines

  (f) to ensure that pipelines are constructed and operated in a way that minimises adverse environmental impacts and has regard for the need for sustainable development

  Section 4 of the Pipelines Act sets out the principles of sustainable development to be given regard in implementing the Act, including that decision-making should be guided by a careful evaluation to avoid serious or irreversible damage to the environment wherever practicable and an assessment of the risk-weighted consequences of various options.

Section 54(c) of the Pipelines Act states that conditions on a licence may include conditions concerning the protection of the environment.

- Cultural Heritage Management Plan (CHMP) under the Aboriginal Heritage Act 2006 (Vic) (AH Act). Two CHMPs are currently in progress for the Project (CHMP 16593 and CHMP 16594).

A number of legislative, policy, guidance and standard documents were found to be relevant to this contamination impact assessment at the time of reporting and are discussed further in this report. The key legislation, policy and guidelines that apply to the contamination impact assessment for the Project are summarised in Table 4-1. Further detail is provided in Section 4.2 to 4.4. It should be noted that the *Environment Protection Act 2017 and underlying regulations, environmental reference standard and associated guidance are* due to come into effect on 1 July 2021 and will result in changes to the key legislation and policy documentation detailed in Table 4-1. These changes must be taken into account by the contractor when assessing spoil assessment and management. This is further discussed in Section 4.3.2.

Table 4-1 Key documents

Legislation/policy	Relevance to this impact assessment
National Environmental Protection (Assessment of Site Contamination) Measure 1999 ('ASC NEPM'), as amended in 2013	Main guidance document for the assessment of land contamination.
Work Health and Safety Act 2011 and Work Health and Safety Regulations 2011	Provides management of asbestos.
PFAS *National Environmental Management Plan, Version 2 - January 2020*	Provides an approach for the assessment, management and disposal of per- and polyfluoroalkyl substances (PFAS) impacted spoil.
Environment Protection Act 1970 (to be superseded on 1 July 2021 by the Environment Protection Act 2017)	Any discharge to land, waterway or groundwater; and disposal of waste (including contaminated soil and acid sulfate soil) must be in accordance with the requirements of the Act.
State Environment Protection Policy (Prevention and Management of Contamination of Land)	Define environmental quality objectives and establish beneficial uses and values of land that are to be protected and would be considered for assessing contaminated land.
State Environment Protection Policy (Waters)	Define environmental quality objectives and establish beneficial uses and values of surface water and groundwater that are to be protected and would be considered for assessing the potential for contamination.
Industrial Waste Management Policy (Waste Acid Sulfate Soils) 1999	Provides guidance for the assessment, management, reuse and disposal of acid sulfate soil.
Industrial Waste Resource Guidelines (IWRG) (to be superseded by regulations and guidelines under the EP Act 2017 on 1 July 2021) • IWRG 621: Soil hazard categorisation and management (June 2009) • IWRG 655.1: Acid sulfate soil and rock (July 2009)	Provides guidance for the management, transport and disposal of waste.

Legislation/policy	Relevance to this impact assessment
• IWRG 611.2: Asbestos transport and disposal (June 2017) • IWRG 701: Sampling and analysis of waters, wastewaters, soils and wastes • IWRG 702: Soil sampling (June 2009). • EPA Victoria Industrial Waste – Classification for Drilling Mud, Victoria Government Gazette G37	
EPA Victoria Publication 1834 Civil construction, building and demolition guide	Provide guidance for the management of contaminated land and groundwater, storage and handling of chemical and management of waste.
Publication 788.3: Best practice environmental management, siting design, operation and rehabilitation of landfills	Provides landfill gas action levels that would be considered by the Project in areas adjacent to landfills.
AS 4482.1-2005: Guide to the sampling and investigation of potentially contaminated soil non-volatile and semi-volatile compounds AS 4482.2-1999: Guide to the sampling and investigation of potentially contaminated soil volatile substances	Provides sampling and investigation standards to appropriately characterise a potentially contaminated site.

4.2 Commonwealth legislation, policy and guidelines

Commonwealth legislation relevant to the Project includes:

- *National Environmental Protection (Assessment of Site Contamination) Measure 1999* ('ASC NEPM'), as amended in 2013. Developed and issued by the National Environment Protection Council (NEPC) under the *National Environment Protection Council Act 1994*.
- *Work Health and Safety Act 2011* and Work Health and Safety Regulations 2011, which provide for management of asbestos
- P*FAS National Environmental Management Plan, Version 2 - January 2020 (PFAS NEMP),* provides an approach for the assessment, management and disposal of PFAS impacted spoil

The ASC NEPM is the main guidance document for the assessment of land and groundwater contamination in Victoria. The ASC NEPM provides a national approach to the assessment of potentially contaminated sites to ensure effective environmental management practices and provide adequate protection of human health and the environment where known contamination has occurred.

In Victoria, the ASC NEPM is mainly implemented through Victorian Government policies (subordinate legislation, such as the State Environment Protection Policies) and guidelines described below. The ASC NEPM is divided into two schedules:

- Schedule A – identifies the general process for the Assessment of Site Contamination
- Schedule B – identifies general guidelines for the Assessment of Site Contamination

4.3 Victorian legislation, policy and guidelines

4.3.1 Existing legislation

Legal and regulatory obligations relating to contaminated land in Victoria are set out in the *Environment Protection Act 1970 (Vic) ('Environment Protection Act')* administered by EPA Victoria, which makes provisions with respect to the powers, duties, and functions of EPA Victoria and the protection of the environment.

The Environment Protection Act:

- Regulates the discharge or emission of waste to water (including groundwater), land or air, by a system of works approvals, licences, permits and pollution abatement notices. It also specifically controls the emission of noise and the disposal and transportation of waste.
- Enables EPA Victoria to require investigation and clean-up of identified impacts
- Provides the basis for the various State Environment Protection Policies (SEPPs). SEPPs provide more detailed requirements and guidance for the application of the Environment Protection Act to Victoria. It aims to protect the environmental values and 'beneficial uses from the effects of pollution and waste, such as:
  - Human health and wellbeing
  - Ecosystem protection
  - Visibility
  - Useful life and aesthetic appearance of buildings, structures, property and materials
  - Aesthetic enjoyment
  - Local amenity
- Incorporates a system for environmental audits to be undertaken to provide authoritative, independent and transparent advice and recommend measures to reduce identified risks to the environment from contaminating activities or conditions, and its suitability for current and future use. The environmental audits form an integral part of the land use planning and approval processes.
- Includes provision for an Industrial Waste Management Policy (IWMP) that provides Victoria's framework for the management of waste (industrial and hazardous)
- SEPPs are subordinate legislation made under the provisions of the Environment Protection Act, and set out policies to define environmental quality objectives, and establish beneficial uses and values that are to be protected in different segments of the environment. Separate SEPPs have been established for the protection of air, noise, water/groundwater and land. The following are SEPPs relevant to the management of land and water contamination:
  - State Environment Protection Policy (Prevention and Management of Contamination of Land)
  - State Environment Protection Policy (Waters)
- The Environment Protection (Industrial Waste Resource) Regulations 2009 set out the requirements for management of industrial waste and prescribed industrial waste for the purpose of the Environment Protection Act, which include the following relevant policies and guidelines to assist industry to implement the principal of wastes hierarchy as set out in section 1I of the Act:

- Industrial Waste Management Policy (Waste Acid Sulfate Soils) 1999 (IWMP WASS) 'provides a framework for management, disposal or reuse of waste acid sulfate soil'. The IWMP WASS defines acid sulfate soil as *'any soil, sediment unconsolidated* geological material or disturbed consolidated rock mass containing metal sulphides which exceeds criteria for acid sulfate soils specified in Publication 655 entitled 'Acid Sulfate Soil and Rock'.
- The Industrial Waste Resource Guidelines (IWRG) – provides a framework for transport and disposal of waste, asbestos and the threshold values for hazard categorisation and management of waste soil (including acid sulfate soil and rock) and solid industrial waste. The following IWRGs are relevant to the assessment and management of land contamination:
  - IWRG 621: Soil hazard categorisation and management (June 2009)
  - IWRG 655.1: Acid sulfate soil and rock (July 2009)
  - IWRG 611.2: Asbestos transport and disposal (June 2017)
  - IWRG 701: Sampling and analysis of waters, wastewaters, soils and wastes
  - IWRG 702: Soil sampling (June 2009)

The EPA Victoria Industrial Waste – Classification for Drilling Mud, Victoria Government Gazette G37 provides guidance on the classification and management of drilling muds introduced during investigations.

The assessment and management of contaminated land in Victoria is largely directed by EPA Victoria and guidelines issued by that authority. EPA Victoria guidelines relevant to this Project particularly include the Industrial Waste Resource Guidelines, described above, which incorporate a wide range of documents. Other EPA Victoria guidelines include:

- *Publication 788.3: Best practice environmental management, siting design, operation and rehabilitation of landfills*, (EPA Victoria, 2015)
- EPA Victoria Publication 669 *Groundwater sampling guidelines*

These documents are directly relevant for the assessment of soils, groundwater and landfills in Victoria and assessment or risk/management of risk to beneficial uses.

Worksafe guidelines applicable to the assessment of contaminated land considered for the Project include:

- Asbestos-Contaminated Soil Guidance Note (Worksafe, 2010)
- Contaminated construction sites - Construction and utilities (June 2017)

Australian Standards generally applied or considered with respect to contaminated land investigations include:

- AS 4482.1-2005: Guide to the sampling and investigation of potentially contaminated soil non-volatile and semi-volatile compounds
- AS 4482.2-1999: Guide to the sampling and investigation of potentially contaminated soil volatile substances
- AS/NZS 5667.11:1998: Water quality – Sampling – Guidance on sampling of groundwaters

4.3.2 Environment Protection Act 2017

A review of the *Environment Protection Act 1970* has resulted in the passage of the *Environment Protection Act 2017 (EP Act 2017)* is due to come into effect in July 2021. In parallel with this process the waste categorisations have also been reviewed. A summary has been provided below. However, note that the regulations, environmental reference standard and guidance underlying the EP Act 2017 have not been finalised at the time of writing and may be subject to change. It is understood that further guidance is yet to be issued.

The EP Act 2017 includes a new approach to environmental issues, focusing on preventing waste and pollution impacts rather than managing those impacts after they have occurred. The Act also includes the concept of general environmental duty (GED) which requires people to undertake reasonably practicable steps to eliminate, or otherwise reduce risks of harm to human health and the environment from pollution and waste. Unlike similar laws in other states and territories, a breach of the GED could lead to criminal or civil penalties, similar to those currently outlined in the *Occupational Health and Safety Act 2004*.

The Act also specifies a number of other duties. These are summarised as follows:

- Duty to take action to respond to harm caused by pollution incident
- Duty to notify Authority of notifiable incidents
- Duty to manage contaminated land (includes unexpected finds)
- Duty to notify of contaminated land
- Duty to investigate alternatives to waste disposal
- Duty to notify of transaction in reportable priority waste

The requirements are specified in the EP Act 2017 and the regulations and a number of guidance documents have been released that provide further clarification around when and how these duties may apply. These documents include the following:

- EPA Publication 1915 February 2021, *Contaminated land policy*
- EPA Publication 1940 February 2021, *Contaminated land: Understanding section 35 of the Environment Protection Act 2017*

The proponent and contractor should familiarise themselves with these documents and any other documents that are subsequently issued and ensure that a system is in place so that compliance and reporting requirements associated with these duties are met. Like the health and safety requirements, there is a shared responsibility between all parties and therefore roles, reporting requirements and responsibilities should be clearly defined. This would include the duty to notify where the nature of the work (excavation) and the experience, knowledge and resources of the parties involved would likely require EPA to be notified (by any one of the parties in management or control of the land) even if the contamination is existing and the occupation is only temporary.

Under the EP Act 2017, waste must be classified in accordance with regulations 61 and 62 and 66 to 69 of the Environment Protection Regulations – Second Exposure Draft (proposed final). The criteria that define the new waste categories can be summarised as follows:

- Publication 1828.1, Waste disposal categories – characteristics and thresholds June 2020
- Under the EP Act 2017, waste can be:
  - Industrial Waste (IW) – a broad category covering all waste, including clean fill

  - Priority Waste (PW) – an industrial waste which requires additional controls due to their higher level of hazard, potential to be mismanaged or to encourage resource recovery or efficiency
  - Reportable PW – a subset of PW and carries the highest level of controls. It is reserved for waste types with the highest levels of risk. Soil containing asbestos only is a reportable PW which contains asbestos as the only contaminant.
- Contaminated soil is considered a 'PW' and must be classified as either:
  - Category A
  - Category B
  - Category C
  - Category D
  - Fill Material (also commonly known as 'clean fill')
  - Soil containing asbestos only
- Category A, B and C are consistent with those detailed in the Environment Protection (Industrial Waste Resource) Regulations 2009 (IWR Regulations). Category D is proposed to allow for alternative use under certain conditions of the soil that falls between Category C and Fill Material. Threshold levels for contaminants that define the categories are provided in Publication 1828.1 *(Waste Disposal Characteristics and Thresholds)*. Category A, B, C, D and soil containing asbestos only are reportable PW under the Regulations.
- The main purpose of the Category D designation is to reduce the volume of soil being disposed to landfills (although it may still be sent to landfills) by allowing this low level contaminated soil to be safely contained at the same project site where the soil was unearthed. Containment of Category D soils would be subject to a 5-year permit and site management order, including an appropriate container. Due to the application of a site management order, Category D soil that is reused in this way is considered a Reportable PW. No information is provided in the proposed final Regulations regarding what constitutes an appropriate container (details are expected to be contained in guidance not yet issued at the time of writing); however, it may be reasonable to assume the containment location would need to ensure protection of human health and the environment. This advice would need to be refined as more information becomes available.

A number of new guidance documents are currently under development to reflect the requirements of the EP Act 2017 and these would be referenced where relevant. It is understood that these documents will provide further guidance around the conditions under which soil reuse may occur and must be considered by the contractor.

Further, the SEPPs as defined in Section 4.3.1, will ostensibly be replaced by the Environmental Reference Standards.

4.4 Local policy and guidelines

Local planning schemes provide useful information on the potential for land to have been subject to contaminating activities. This information includes land zoning and planning overlays, described below. Consideration was given to these, along with historical land uses discussed in Section 6, in the identification of potentially contaminated land.

With respect to land zoning, land zoned either commercial (C1Z and C2Z) or industrial (IN1Z and IN3Z) is important to the assessment of land contamination. Industrial and commercial processes and activities (past and present) can lead to an increased potential for contamination compared with land zoned for non-industrial purposes such as residential or recreation.

For example, fuel service stations (particularly older ones) are common sites for soil and groundwater contamination related to the storage and use of petroleum products in underground petroleum storage systems (UPSS).

The main planning overlays relevant to the Project with respect to contaminated land is the Environmental Audit Overlay (EAO). An EAO can provide an indication that land or adjacent land may have had a historic land use which may have contaminated land or groundwater. EAOs indicate that a statutory environmental audit may be required on the land to assess suitability for various land uses. If the land is potentially contaminated and a sensitive use is proposed, *Ministerial Direction No. 1 – Potentially Contaminated Land* (Direction No.1) provides that a planning authority must satisfy itself that the land is suitable through an environmental audit. The EAO is a mechanism provided in the *Victoria Planning Provisions* and planning schemes to ensure the requirement for an environmental audit under Direction No.1 is met before the commencement of the sensitive use or any buildings and works associated with that use.

The application of the overlay, in appropriate circumstances, ensures the requirement would be met (before the sensitive use commences) in the future but does not prevent the assessment and approval of a planning scheme amendment.

S. 60(1)(e) of the *Planning and Environment Act 1987* indicates the responsible authority must consider in assessing approvals "*any significant effects which the responsible authority considers the use or development may have on the environment or which the responsible authority considers the environment may have on the use or development*".

Planning overlays were reviewed during historical land assessment for this investigation and results are summarised and in EES Technical Report K: Land Use and EAO are reviewed in Section 6.1.4 herein.

It should be noted that updates to these planning documents are occurring in conjunction to the enactment of the EP Act 2017.

5. Methodology

5.1 Overview of method

This section describes the method that was used to assess the potential impacts of the Project. A risk based approach was applied to prioritise the key issues for assessment and inform measures to avoid, minimise and offset potential effects. Figure 5-1 shows an overview of the assessment method.

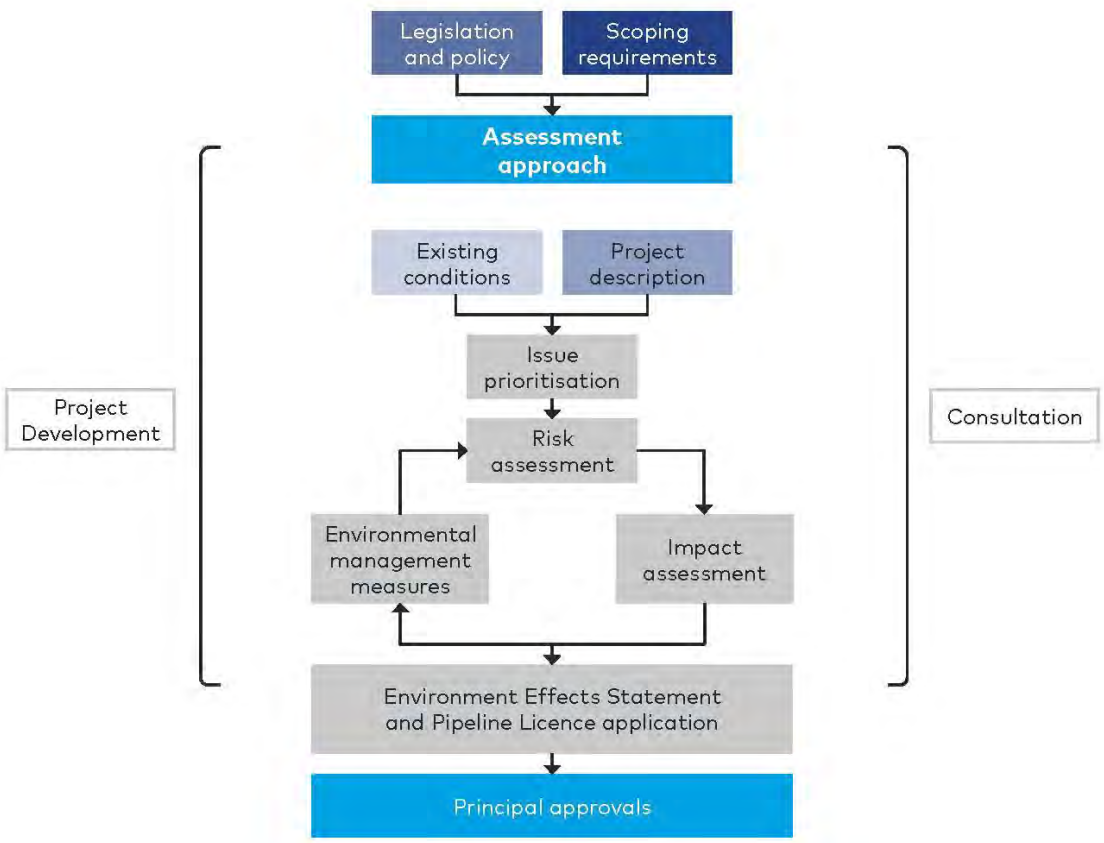


Figure 5-1 Overview of the assessment method

5.2 Study area

The study area allows for assessment of the historical and current activities that may have resulted in contamination and the presence of naturally occurring acid sulfate soils, which construction activities may impact on or be impacted by such material. The existing conditions investigation has focused on a study area that includes a 500 metre buffer of the Project pipeline to assess the nature of potential contamination source areas. The study area is shown in Appendix A, Figure A1.

Some access roads extend beyond the 500 m buffer zone. In those cases, a 50 metre investigation buffer has been applied. The smaller buffer is considered appropriate as these access roads are unlikely to include significant (or any) excavation of soils.

5.3 Existing conditions

The assessment of existing conditions was conducted in general accordance with the ASC NEPM. The ASC NEPM recommends a staged approach to site contamination assessment, with each stage informing subsequent stages. The first stage involves a preliminary site investigation (PSI) to identify the site characteristics (site location, site layout, construction, geological setting, historical land uses and activities at the site) and a site inspection. The ASC NEPM requires the PSI to be of sufficient detail to enable assessment of potential contaminants of concern (PCOCs) and the identification of areas of potential contamination. The existing conditions were assessed by reviewing publicly available information (desktop review). Soil sampling was also completed during the drilling of groundwater bores. The investigation process is detailed below.

5.3.1 Desktop review

Key elements of the desktop review included the review of publicly available data sources:

- Published geological, topographical and hydrogeological maps including GeoVic – Explore Victoria Online
- Web-based hazard assessment tool for acid sulfate soils - the Atlas of Australian Acid Sulfate Soils (CSIRO)
- Acid Sulfate Soil results reported in Constructions Sciences (2020) Pipeline ROW, Water Crossing and HDD Crossing Geotechnical Report was reviewed
- EPA Victoria's website:
  - EPA Victoria's Landfills Register (Victoria Unearthed) which lists all current and known closed landfills in Victoria
  - EPA Victoria's issued Environmental Audits. Environmental Audits (Victoria Unearthed) identify specific areas of land on which a Statutory Environmental Audit was conducted
  - EPA Victoria's Priority Sites Register (Victoria Unearthed) to identify the number of potentially contaminated sites in the study area
  - EPA Victoria Licenced Sites Register (Victoria Unearthed) to identify the number of potentially contaminated sites in the study area. Licences allow businesses to run certain licenced activities such as waste treatment and disposal.
  - Groundwater Quality Restricted Use Zones (GQRUZ) (Victoria Unearthed) located within the study area, as declared by EPA Victoria
- Historical aerial photographs to assist in detecting areas of historical earthmoving
- Current Google Maps search to assess current land uses

5.3.2 Site inspection

A site inspection was completed at two properties:

- 140 Duncans Lane, Diggers Rest (at approximately KP 9.95- KP 10.14)
- Kalkallo retarding basin (inspected between approximately KP 34.9 to KP 35.2)

These sites were selected for a site inspection as they were identified as a potential source of contamination and the Project intersects the properties. Refer to Section 6.2 for further details.

The study area was also observed from publicly accessible areas namely near the Bulla Tip and Quarry in Bulla and the former quarry identified in Beveridge.

5.3.3 Preliminary field investigation

The key element of the preliminary field investigation were as follows:

- Soil sampling was completed during groundwater well installation works. A total of 22 soil samples were collected and analysed for a broad screen of potential contaminants from a total of 11 locations within and as close as practicable to the construction corridor. Refer to Appendix A, Figure A2 for soil sampling locations.
- Acid Sulfate Soil sampling was completed at two locations (BH09 and BH12) during groundwater well installation works. Refer to Appendix A, Figure A2 for acid sulfate soil sampling locations
- Groundwater samples were collected and analysed from 12 groundwater bores within or as close as practicable to the construction corridor and analysed for a broad screen of contaminants. Refer to the EES Technical Report C – Groundwater for further details of the investigation. Refer to Appendix A, Figure A3 for groundwater sampling locations
- Preliminary PFAS investigations were completed at Jacksons Creek and Deep Creek to assess the potential for migration of PFAS in groundwater from the Bulla Landfill. This included:
  - Surface water sampling at Jacksons Creek and Deep Creek; and
  - Groundwater sampling at groundwater wells, BH15 (targeting Jacksons Creek), BH22 and BH23a (targeting Deep Creek)

Section 6.3 details the results of the preliminary field investigations.

5.4 Risk assessment

A risk assessment for the Project was carried out using an approach that is consistent with Australian/New Zealand Standard AS/NZS ISO 31000:2018 Risk Management Process.

This risk assessment was used to identify the issues for assessment and apply a structured approach to the level of assessment and analysis undertaken of potential environmental effects within each technical study based on the information gained during the desktop assessment, the site inspections (where undertaken) and the limited sampling program. Applying the risk framework facilitated an approach for the EES to identify and then investigate issues with a focus proportionate to the risk, and to consider management measures focused on reducing identified risks.

The risk assessment methodology included:

- Identify hazards, i.e. something that could go wrong and can cause harm - gather information about the site and its surrounding areas, and considering if the environment could be impacted. This would include defining the context for the risk assessment based on the existing assets, values and uses (baseline) assessments of each technical area and the proposed Project activities which interact with those existing conditions
- Assess risk - assess how the risks associated with each hazard you identified in step one could lead to harm, how severe that harm could be and the likelihood of it occurring
- Implement controls - identify standard management/mitigation measures (including those in guidelines and standards relevant at the time of reporting) and whether additional mitigation measures may be required. Implementation of multiple controls to minimise the risk of harm that a single hazard presents may be required
- Analysing the consequence and likelihood of the identified risk based on a consequence guide developed for each technical area and a likelihood guide

- Defining the risk level based on the risk matrix

The identification, analysis and evaluation of risks was conducted within each technical area and across technical areas where there was input or connection across disciplines.

The consequences of a contamination risk occurring were assigned using consequence categories from insignificant to severe based on the existing conditions and values in the study area. The consequence levels and descriptors are provided in Appendix B.

A likelihood rating for each identified risk was assigned ranging from 'almost certain' where the event is expected to occur to 'rare', where the event may occur only in exceptional circumstances. The likelihood levels and descriptors are provided in Appendix B.

The risk matrix used to define each risk level is also provided in Appendix B.

The risk ratings were revisited during the impact assessment where additional environmental management measures were applied to identify the residual impacts and risks.

5.5 Impact assessment method

The methodology for the impact assessment included:

- Identification of key issues or risks (including as described in Section 5.4)
- Summarising existing conditions with respect to potentially contaminated land (including landfills), acid sulfate soils and groundwater, including specific information on potential sources of contamination
- Identifying potential impacts of Project construction and operation, including disturbance of contaminated soil (including landfills) and acid sulfate soils and rocks, treatment and disposal options, spills or leaks, release of vapours or ground gases and hydrostatic testing
- Identification of potential receptors of contamination exposed or released to the environment through construction and operation activities. These include both human and ecological receptors.
- Identification of the migration pathways and exposure routes by which contamination exposed or released by construction or operation activities enters human and ecological receptors
- Identification of mitigation measures to manage identified risks and impacts encountered or generated during Project construction and operation
- Assessment of the potential significance of residual effects on human and ecological receptors assuming implementation of mitigation measures by taking into account the likelihood and consequence of these occurring
- Identification of measures required to monitor the management of contamination and wastes, and contingency measures during Project construction and operation

5.6 Rationale

The methodology selected for the investigation is consistent with the guidance provided in the ASC NEPM. The approach was selected to obtain information relevant to potential contamination of land and groundwater across a broad physical area primarily based on a desktop review with limited sampling completed during groundwater bore installation works.

The level of investigation was designed to be suitable for an EES, taking into account the limitations noted in Section 5.7. Where uncertainty remains based on the limitations, the contractor would need to address these in their proposed work plan.

5.7 Limitations, uncertainties and assumptions

The following limitations apply to information in this desktop assessment:

- The desktop study was based on our understanding of conditions that existed at the time of the assessment, as assessed from publicly and readily available information. Its findings and conclusions may be affected by the passage of time, by anthropogenic events (such as construction on or adjacent to the Project) and by new releases of contaminants into the environment.
- Historic land use information presented is generally limited to information obtained from available historical aerial photographs with the majority taken from 1968 to 2020. A complete set of historical aerials were not available for all years across the entire construction corridor. The earliest aerials available for review were from the 1946 but in limited locations. Assessment of historical land use was limited to available historical aerials and at selected approximate 10 yearly intervals. In particular, historical aerials prior to 1968 were limited and did not cover the entire construction corridor.
- The compiled data does not necessarily include all landfill sites. As acknowledged by EPA Victoria, there is a lack of consolidated data on the past life cycles of Victorian landfills
- Although the information obtained from Atlas of Australian Acid Sulfate Soils (ASS) map classified the study area as low and extremely low probability of acid sulfate soil occurrence, CSIRO also noted the classification to be provisional, as analytical data was not available when the plan was prepared
- Analytical results relating to ASS as reported by Construction Sciences were reviewed to assess the presence of ASS in samples analysed. This review did not verify Construction Sciences field methods or quality assurance and quality control methods.
- The Priority Sites Register (based on EPA Victoria data dated 25 May 2020) does not list all known contaminated sites in Victoria and a site would not be presumed to be free of contamination just because it does not appear on the Register
- No interviews with site owners or operators were undertaken
- Properties that appeared to be previously and currently used for residential or agricultural purposes were generally assumed to have a low potential for contamination of soil and groundwater
- Investigation locations for assessing land contamination were based on limited sampling during groundwater bore installation. Sampling locations were not based on the identified potential sources of contamination from the preliminary desktop review with the exception of the Kalkallo retarding basin.
- Information in this report is a guide only and more detailed investigations would be required as part of the detailed design and construction of proposed pipeline
- This report details the findings of a desktop study and preliminary sampling. It is recognised this represents a relatively early stage of the Project. As with all projects of this size, further information would need to be obtained to reduce the level of uncertainty and limitations, particularly in relation to contamination status of identified potential sources of contamination and the volume of contaminated waste categories. However, the level of information gathered for the assessment is considered adequate for the purpose of the report stated in Section 1.1; that is to assess (albeit not to quantify) the potential contamination and soil impacts associated with construction corridor to inform preparation of the EES.

5.8 Stakeholder engagement

Whilst stakeholder and community engagement was undertaken during the preparation of the EES, no community engagement was specifically required to inform this assessment. EES Attachment III *Community and Stakeholder Consultation Report* provides details of the consultation activities undertaken for the Project more broadly and outcomes from those activities.

6. Existing conditions

This section describes the existing conditions for the study area (defined in Section 5.2).

6.1 Desktop review of existing conditions

6.1.1 Geology, topography and hydrogeology

Geology

The geological units within the study area consist of Quaternary alluvium, Tertiary to Quaternary Newer Volcanics, Tertiary age Brighton Group and Silurian age Deep Creek Siltstone.

The geology is dominated by the Newer Volcanics basaltic flows and stony rises. Alluvium silt is present around watercourses of Jacksons Creek and Deep Creek. Outcrops of the Deep Creek Siltstone and Brighton Group are also present within the vicinity of Deep Creek. The study area also transverses the Humevale Siltstone, colluvium and alluvial terraces in Mickleham. A summary of the geological units intercepted by the study area is detailed in Table 6-1 and shown in Appendix A, Figures A4.

The Newer Volcanics are characterised by multiple lava flows ranging in thickness from approximately 7 metres to 10 metres each, although significantly thinner and thicker flows are noted. The Newer Volcanics are often characterized by the following features, from youngest to oldest:

- Scoriaceous and fractured flows (Second Phase) – also known as ‘stony rise’ basalts. These are typically much younger than the First Phase basalts, and less weathered. They are also typically emplaced directly upon a former weathering horizon (palaeosol), which can be up to few metres thick. Below this weathered horizon, there is often a highly scoriaceous and permeable interval, formed by lava de-gassing.
- Low to moderate permeability sheet flows (Upper First Phase), which are typically massive and relatively unfractured. Depending on the number of flows, there may also be a number of former weathered, interflow horizons present, also referred to as ‘palaeosols’. These often consist of plastic clays and represent the weathered tops of the underlying basalt flows but may also contain alluvial deposits.
- Highly fractured, high permeability basal flows (Lower First Phase), which typically do not outcrop but rather are emplaced in pre-existing topographic depressions (e.g. former drainage lines, lakes)

Table 6-1 Summary of geological units intercepted

Geological Unit	Description
Alluvium (Qa1)	Gravel, sand, silt: variably sorted and rounded; generally unconsolidated; includes deposits of low terraces; alluvial floodplain deposits.
Alluvial terrace (Qa2)	Gravel, sand, silt: variably sorted and rounded, generally unconsolidated; dissected to form terraces higher than Qa1, alluvial floodplain deposits
Incised colluvium (Nc1)	Silt, sand, gravel: generally, poorly sorted and poorly rounded except within channels cut into colluvium material; dissected to variable degrees

Geological Unit	Description
Newer Volcanic Group (Neo) – First Phase	Basaltic flows: olivine tholeiite, quartz tholeiite, basanite, basaltic icelandite, hawaiite, mugearite, minor scoria and ash, fluvial sediments: tholeiitic to alkaline; includes sheet flows and valley flows and intercalated gravel, sand, clay
Newer Volcanic Group (Neo) – stony rises	Tholeiitic to alkalic basalt, basanite: youngest flows with little weathering or soil development (stony rises and hummocky lava flows)
Brighton Group (Nb)	Gravel, sand, silt: variably calcareous to ferruginous sandstones and coquinas; marine to non-marine
Humevale Siltstone (Dxh)	Siltstone: brown, laminated; minor very fine- to fine grained sandstone laminae and thin beds towards the top of the formation; distal shelf and hemipelagic deposits.
Deep Creek Siltstone (Sxd)	Siltstone and sandstone: siltstone: dark grey-green, thin to thick-bedded, mostly strongly bioturbated; sandstone: regularly interbedded with siltstone; thin to very thin, commonly with ripple marks; rare conglomerate and diamictite.
Source: GeoVic Explore Victoria Online – Earth Resources , Department of Jobs, Precincts and Regions, Victoria, Australia	

Knowledge of the geology allows for a more informed interpretation of soil assessment laboratory data. Most geological formations and their weathered equivalents contain elements that can be naturally elevated above the upper limit for Fill Material as defined in EPA Publication IWRG 621. This is particularly true for metals where element such as chromium and nickel are often elevated in basalts or for arsenic and fluoride which are often elevated in deeper siltstone bedrock. While they exceed Fill Material criteria, this does not indicate contamination and can allow the soil to be classified as Fill Material.

The presence of alluvium also presents the possibility for acid sulfate soil to be present, notably below the water table or surface water. This is further discussed in Section 6.1.3.

Topography

The topography of the study area is generally flat to gently undulating, with the exception of significant low elevations at Jacksons Creek and Deep Creek where the valley sides are steep compared to the surrounding plains. The topography provides information on surface water catchments which can inform our understanding to contaminant migration via runoff to streams. It can also assist in the siting of future stockpile areas to avoid runoff of stockpiled soils into local waterways.

Hydrogeology

Contaminants in soils or landfills can leach into groundwater and migrate further afield. Knowledge of groundwater levels and flow directions is critical in assessing potential impacts to the Project.

Groundwater conditions are expected to be generally brackish in the order of 2,000 mg/L to 10,000 mg/L with low to moderate productivity.

The depth to water table varies considerably across the study area from less than 5 metres to more than 50 metres based on regional information. The water table is expected to be much shallower in areas close to watercourses and deeper at higher elevations. The depth to water table relating to identified potential sources of contamination is detailed in Section 6.3.2. Refer to the EES Technical Report C – Groundwater for specific details regarding the Projects interaction with groundwater.

Dewatering activities at the nearby quarry (Bulla Tip and Quarry) can result in a drawing down of the groundwater table, creating a localised 'cone of depression' around the centre of the dewatering. This would influence the depth of groundwater within the nearby surrounds although the magnitude of the drawdown cannot be ascertained without installation of groundwater monitoring wells. However, this is not within the control of the Project and is not considered a significant issue for the Project. Perched groundwater may also be present, particularly where dams have been infilled.

6.1.2 Groundwater use

A search of registered groundwater bores within the study area was completed and identified a total of 59 groundwater bores which were typically registered for domestic / stock watering, as summarised in Table 6-2. The search was completed to assess whether groundwater was likely being extracted for any use within the vicinity of the construction corridor which may be impacted by the Project.

There are several wells located within 20 metres of the construction corridor, refer to Appendix A, Figure A5 for locations. These wells were all drilled in the 1980s and it is unclear if they are still operational.

Table 6-2 Summary of registered groundwater bore use within the study area

Bore use	No. Bores
Domestic & Stock	30
Domestic	6
Stock	2
Investigation	5
Observation	4
Irrigation	2
Industrial	1
Unknown	9

Note, these bores do not include bores drilled as part of the Projects preliminary groundwater investigations.

The Project potential impacts on bores in close proximity could include reduction of water levels due to dewatering by the Project or releases of contaminants to the environment and impact to groundwater. These risks are considered low as:

- Any dewatering is likely to have only a localised and short-lived effect
- The risk of releases of contamination are considered low and are mitigated by environmental management measures detailed in Section 10

6.1.3 Acid sulfate soils

Acid sulfate soil is the common name given to soils affected by iron sulphide minerals, which can occur naturally in coastal environments such as estuarine systems, mangrove swamps and back-swamps and in inland environments such as river and stream channels, lakes, wetlands, billabongs, floodplains and marshes (Fitzpatrick & Shand, 2008). Acid sulfate soil can generally be classified into two broad types:

- Potential Acid Sulfate Soils (PASS) materials containing pyrite and/or monosulphides that are still waterlogged but have the potential to produce acid if oxidised
- Actual Acid Sulfate Soils (AASS) material containing sulphuric acid and pyrite, which has already been oxidised

These soils may contain sulphuric acid (AASS) or have the potential to form sulphuric acid (PASS) in amounts that have a lasting effect on the soil characteristics, cause deoxygenation or release contaminants when the iron sulphide minerals are exposed to oxygen (Fitzpatrick & Shand, 2008).

The presence of actual or potential acid sulfate conditions does not relate to contamination, but to the underlying geology. Most ASS, such as the Coode Island Silt formation in the Melbourne area, were deposited during the Holocene geological age.

The occurrence of metal sulphides in rocks, however, is not restricted to any particular rock type, depositional environment or age. Metal sulphides can be found in most rocks but they generally occur at very low concentrations, where the risk of adverse environmental impact due to acid generation is minimal. Sulphide enrichment is also associated with most coal deposits and has also been found in Silurian aged siltstones that underlie the Melbourne / Ringwood / Kilmore area (EPA Victoria, 2009b).

The presence of acid sulfate soils and acid sulfate rock can become a potential constraint to construction activities, requiring the implementation of controls to manage the spoil during excavation activities.

Information regarding the potential for acid sulfate soils to be present in the study area was obtained from the Atlas of Australian Acid Sulfate Soils as compiled by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The data obtained indicated the study area is located within an area classified as extremely low to low probability of acid sulfate soil occurrence, as shown in Appendix A, Figure A6. The confidence was rated at 4 which indicates that the classification is provisional as it is inferred from surrogate data with no on ground verification.

Acid sulfate soil in Victoria is currently regulated by the Industrial Waste Management Policy (Waste acid sulfate soil) No. S 125, 1999 (the Policy) with respect to sections 16(1A), 16(2) and 17(1A) of the Environment Protection Act (1970). Subordinate to the Policy is EPA Publication 655.1 Acid sulfate soil and rock, July 2009 which defines assessment methods and criteria and management options.

The construction corridor is largely underlain by basalt and alluvium in the creek beds. Of these, the alluvium poses the most likely risk of PASS, notably below the water table.

Field pH testing

Field pH tests are carried out as a Tier 1 approach to assessing the likely presence of PASS or AASS. The test is conducted in the laboratory and involves measuring soil pH before and after oxidation using the parameters shown in Table 6-3. Publication 655.1 indicates that even if only one positive result is obtained, the required action would be followed. An exceedance does not necessarily mean PASS or AASS is present but rather that further assessment is required.

Table 6-3 Field pH interpretation criteria (from EPA Publication 655.1)

pH_F	pH_{FOX}	ΔpH	Reaction Rate	Action required
≥5	≤5	≤2	1-2	If no other field indicators or acid sulfate soil risk indicators are present, no further action is required
>4 and <5	>3 and <5	>2	≥2	PASS may be present, further assessment is required
≤4	≤3	>2	≥2	AASS or PASS are likely to be present, further assessment is required

Two sampling events have been conducted to assess acid sulfate soil:

- Construction Sciences (2020) completed an acid sulfate soil assessment on 49 samples from 13 locations along the construction corridor as part of the geotechnical investigation
- GHD collected eight samples from two soil bores in August 2020

The location of the Construction Sciences (2020) samples are displayed on Figure 6-1 and GHD locations on Figure 6-2.

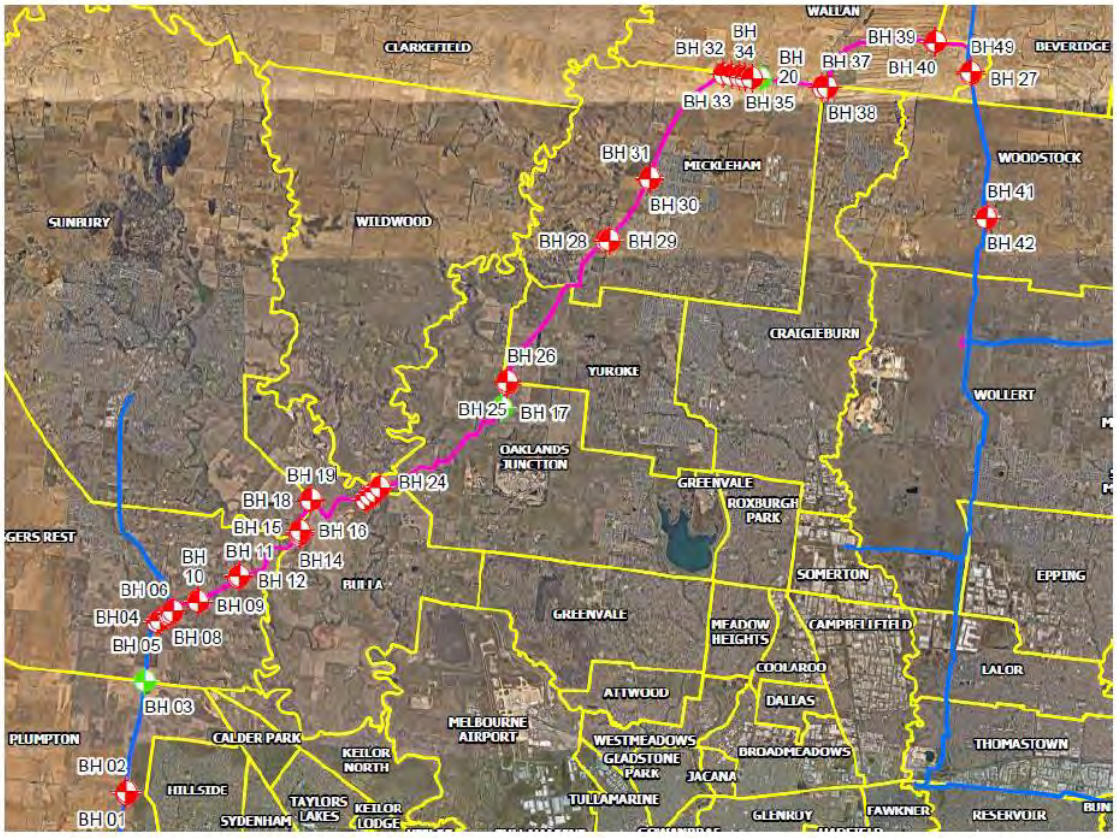


Figure 6-1 Sample locations from Construction Sciences (2020)



Figure 6-2 Acid Sulfate Soil Sample locations (circled in red)- GHD 2020

A summary of the field pH results for both events is provided in Table 6-4.

Table 6-4 Summary of pH_F and pH_{FOX} (exceedances in red)

Borehole	Depth (m)	pH Field	pH Fox	ΔpH	Reaction rate
Construction Sciences					
BH15	0 – 0.3	6.4	4.5	1.9	4
	1.5 – 2.50	7.6	7.6	0	4
	3.5 – 4.0	7.3	6.7	0.6	4
	4.0 – 4.5	7.6	7.0	0.6	4
BH16	0 – 0.80	7.0	5.0	2	3
	2.0	9.2	8.7	0.5	4
	2.0 – 3.5	9.1	8.0	1.1	4
BH17	0 – 0.5	6.0	3.5	2.5	3
	0.5 – 1.0	8.2	6.2	2	3
	1.5 – 2.0	8.1	5.7	2.4	3
BH20	0 – 1.0	7.5	5.8	1.7	4
	1.0 – 2.0	8.0	8.4	-0.4	4
	2.0 – 3.0	8.1	8.6	-0.5	4

Borehole	Depth (m)	pH Field	pH Fox	ΔpH	Reaction rate
	3.0 – 4.0	8.0	8.6	-0.6	4
	4.0 – 5.0	8.0	8.8	-0.8	4
BH22	0 – 1.0	5.2	3.2	2	4
	1.0 – 2.0	6.5	5.2	1.3	4
	2.0 – 3.0	7.4	7.5	-0.1	4
	3.0 – 4.0	7.6	7.4	0.2	4
	4.0 – 5.0	7.7	7.6	0.1	4
BH23	0 – 0.8	5.5	3.9	1.6	4
BH27	1.5 – 1.6	7.4	4.5	2.9	3
BH32	0 – 1.0	6.5	4.2	2.3	3
	1.0 – 2.0	8.1	6.3	1.8	3
	2.0 – 3.0	8.0	7.4	0.6	3
	4.0 – 5.0	8.1	8.4	-0.3	4
	5.0 – 6.0	8.0	7.1	0.9	3
	8.0 – 9.0	8.0	9.0	-1	4
BH33	1.5 – 2.0	8.3	6.4	1.9	2
	2.0 – 2.5	8.5	6.6	1.9	3
	2.5 – 3.0	8.9	7.2	1.7	3
	3.5 – 4.0	8.7	8.9	-0.2	4
	4.0 – 5.0	8.7	9.0	-0.3	4
BH34	0 – 1.0	7.5	6.0	1.5	4
	1.0 – 2.0	8.1	8.4	-0.3	4
	2.0 – 3.0	7.9	8.4	-0.5	4
	3.0 – 4.0	8.0	8.4	-0.4	4
	4.0 – 5.0	8.1	9.0	-0.9	4
BH35	0 – 1.0	6.9	8.2	-1.3	4
	1.0 – 2.0	8.5	9.1	-0.6	4
	2.0 – 3.0	8.2	8.5	-0.3	4
	3.0 – 4.0	8.4	8.8	-0.4	4
	4.0 – 5.0	7.6	6.6	1	3
BH36	0 – 1.0	8.1	8.5	-0.4	4
	1.0 – 2.0	7.8	7.8	0	4

Borehole	Depth (m)	pH Field	pH Fox	ΔpH	Reaction rate
	2.0 – 3.0	7.6	8.2	-0.6	4
	3.0 – 4.0	7.7	7.1	0.6	4
	4.0 – 5.0	7.6	6.4	1.2	3
BH49	0 – 0.65	7.3	3.7	3.6	3
GHD					
WORMBH09	0.1	7.7	5.2	2.5	3
	0.5	8.0	6.9	1.1	4
	1.0	8.2	8.2	0	4
	2.0	8.3	6.8	1.5	4
	4.0	7.9	8.4	-0.5	4
WORMBH12	0.1	7.8	7.2	0.6	4
	0.5	8.3	6.8	1.5	4
	1.0	7.8	7.7	0.1	4

Source: Reproduced Table 4-12 of Construction Sciences (2020).

The results are interpreted as follows:

- The pH Field (pH_F) results were all >5 indicating that the majority of soils sampled were neutral to alkaline and would be expected to have no acidity
- The pH_{FOX} results indicated six samples (BH17_0-0.5, BH22_0-1.0, BH23_0-0.8, BH27_1.5-1.6, BH32_0-1.0 and BH49_0-0.65) were between >3 and <5. These were generally limited to the shallow soil profile within the upper 2 metres
- The ΔpH results indicated six samples (BH17_0-0.5, BH17_1.5-2.0, BH27_1.5-1.6, BH32_0-1.0, BH49_0-0.65 and WORMBH09_0.1) at >2. All but two of these, BH17_1.5-2.0 and WORMBH09_0.1, coincided with the pH_{FOX} results of >3 and <5
- All but one sample (BH33_1.5-2.0) reported high to extreme reaction rates of greater than 2. High to extreme reaction rates can indicate a high percentage of sulphide or other molecules such as manganese. However, the reaction rate is not appropriate for the identification of acid sulfate soil as the test is subject to interferences, including manganese and organic acids, which may also trigger a fizzing reaction. The reaction rate only indicates the need for further laboratory testing which is a more definitive test of acid sulfate soil (see below).

Analytical testing

Where soils have been shown through field testing to be PASS, further laboratory analytical testing is recommended to confirm the initial assessment. The analyses involve a determination of existing and potential acidity and acid neutralising capacity. The method used includes Suspension Peroxide Oxidation Combined Acidity Sulfur (SPOCAS) or Chromium Reducible Sulfur.

The criteria for determining whether soils have potential to generate acid, and therefore require management in accordance with the Policy as acid sulfate soils, are listed in Table 6-5 for soils.

Table 6-5 Waste acid sulfate soil criteria

Soil or sediment texture	Approx. clay content (%)	Net acidity (>1000 tonnes)	
		%S	Mol H+/tonne
Sands to loamy sands	<5	0.03	18
Sandy loams to light clays	5-40	0.03	18
Medium to heavy clays and silty clays	>40	0.03	18

Further analysis was completed by Construction Sciences and GHD on samples identified as PASS based on pH_{FOX} results and results are summarised in Table 6-6.

Table 6-6 Summary of SPOCAS results

Borehole	Depth (m)	pHKCl	Net Acidity (mol H+/tonne)	Net Acidity EQV (%S)
BH15	3.5 – 4.0	7.0	<10	<0.02
BH17	0 – 0.50	5.3	14	0.02
BH20	0 – 1.0	6.3	<10	<0.02
BH22	0 – 1.0	5.5	<10	<0.02
BH23	0 – 0.80	6.4	<10	<0.02
BH27	1.5 – 1.6	5.7	<10	<0.02
BH32	0 – 1.0	6.3	<10	<0.02
	1.0 – 2.0	6.9	<10	<0.02
BH36	4.0 – 5.0	7.6	<10	<0.02
BH49	0 – 0.65	5.7	<10	<0.02
WORMBH09	0.1	6.0	17	0.03
WORMBH09	0.5	6.3	<10	<0.02
WORMBH12	0.5	7.8	<10	<0.02

The SPOCAS analysis was completed which indicated a net acidity of less than the adopted action levels of 18 mole H+/tonne and 0.03%S. One sample, WORMBH09_0.1 equalled the net acidity action level of 0.03%S.

Based on these results, the soils would not require treatment. However, the sample locations are widely spread and represents a preliminary investigation only. The Construction Sciences report also indicated that at the time of drilling the alluvial samples were dry to moist indicating that they were above the water table. It is possible that any sulphides present may have been already oxidised and therefore the shallow alluvium would not present a PASS risk.

Where alluvial material is to be disturbed during construction below the water table, such as near the three major stream crossings, this may contain PASS. The sampling conducted to date has been based on drill locations from approximately 10 metre to 240 metre from the actual creek beds so material directly within and under the creek beds have not been directly assessed. Therefore, additional sampling may be required directly within and under the creek beds to be completed by the Contractor before construction in accordance with EPA Publication 655.1, to inform spoil management planning.

6.1.4 Existing and historic land uses

Review of publicly available information from selected aerial photographs indicated that existing land uses within the study area included:

- Farming/agricultural land
- Residential
- Freeway, railway and municipal roads
- Industrial including quarrying and landfill

The existing land uses are considered to have a relatively low potential for soil and groundwater contamination with the exception of industrial areas. The risk of contamination from industrial land use typically increases with age, due to both historically poor environmental practices and accumulation of contaminants over time. Therefore, land currently zoned industrial/commercial or with an industrial/commercial history, have been identified as having an increased potential for contamination.

There are several properties that have been identified as having industrial uses relating to quarrying, landfilling and poor environmental practices such as uncontrolled dumping or storage of wastes e.g. wrecked cars. The Kalkallo retarding basin is also present within the study area. Retarding basins can act as contamination sinks as they filter pollutant loads from stormwater in-flows. At the time of reporting there were no EAOs present within the study area.

An access road running adjacent to the railway line in Beveridge is proposed as an option for use by the Project. The access road is an existing access track recently constructed by Yarra Valley Water and no construction is proposed by the Project. As such this access track has not been considered with regards to the potential for contamination.

The Wollert Compressor Station comprises of an above ground oil water separator and associated triple interceptor trap as well as minor chemical storage on site. The site currently operates under the VTS Operational Environmental Management Plan (OEMP). Whilst the risk of the Project encountering contamination at this site is considered low, its land use suggests some investigation is required.

6.1.4.1 Historical aerial photographs

Available historical aerial photographs, provided by Lotsearch, were reviewed for the entire study area at approximately 10 yearly intervals. Historical aerial photographs were limited prior to 1968 and did not cover the entire study area.

A copy of the aerial photographs are provided as Appendix C. It is noted that image resolution can vary significantly and as a result there are uncertainties in interpretation. Interpretation of aerial photographs are presented in Appendix D. A summary of the main findings are provided below.

From 1946, land uses within the study area include grazing land and associated farming infrastructure, dams, rural residential houses and to a lesser extent agricultural activities such as crops. Evidence of quarry activity was observed in 1968 to the south east of KP 14.85 –KP 15.85 (now known as the Bulla Tip and Quarry). The proposed pipeline runs adjacent to the quarry and does not appear to intersect. Over the last few years, low density residential development has commenced within the study area. A rural property located at 140 Duncans Lane, Diggers Rest (KP 9.95- KP 10.14) contained hundreds of wrecked cars. The construction corridor runs through the eastern portion of this property.

6.1.4.2 Current and former landfills and fill sites

The landfills and fill sites identified within the Project study area include:

- The Bulla Tip and Quarry, which is an operational prescribed industrial waste landfill located at 500 Sunbury Road, Bulla (located 20 metres south east from construction corridor near KP 14.85 – KP 15.85)
- The H-Quality Sunbury Quarry and Landfill, which is an operational prescribed industrial waste landfill located at 600 Sunbury Road, Bulla (located 300 metres north from construction corridor KP 15)

A small feature labelled ‘quarry’ was identified in a historical map from 1916 near KP 37.5, adjacent to the Hume Highway in Beveridge, as shown below in Figure 6-3, Figure 6-4 and Figure 6-5. This quarry is not shown in the 1938 historical map. It is identified in the earliest available historical aerial photograph from 1946 but the image resolution is poor and the site does not resemble anything like a commercial quarry. In later aerial photographs there appears to be a small farm dam in this location. Although there is no evidence for dumping in this former quarry, abandoned quarries were often used in Melbourne for dumping of municipal waste. Such features are often not licenced or registered with the EPA. They do present a potential source of contamination as well as other inert waste such as building rubble which can contain asbestos. Based on the available images the quarry does not appear to extend onto the Project alignment. However, the nature and former maximum extent of the quarry is not known.

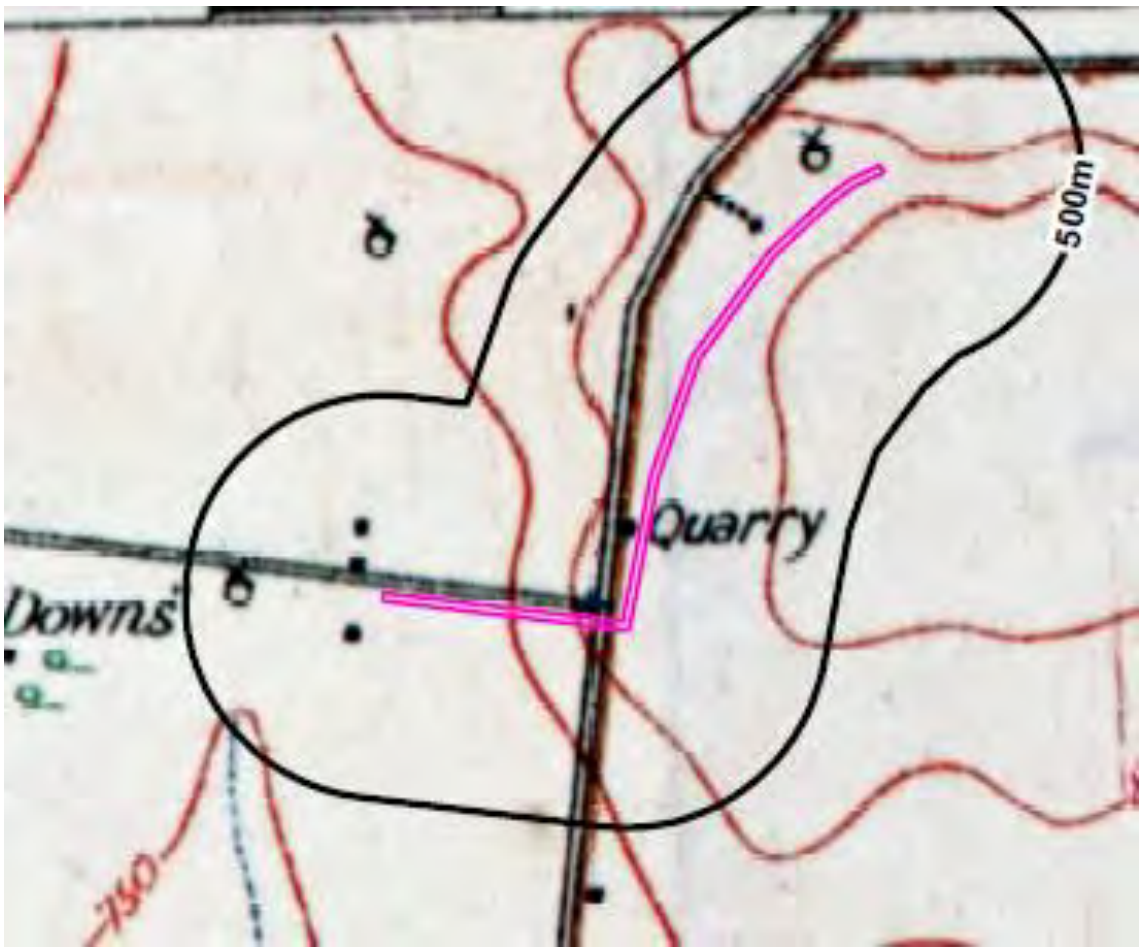


Figure 6-3 Historical map (1916)

(Source: Lotsearch Western Outer Ring Main, Melbourne, VIC (Part 19))

Project alignment between KP36 to 38.



Figure 6-4 **Former 'quarry' area** from 1974 historical aerial

(Source: Lotsearch Western Outer Ring Main, Melbourne, VIC (Part 19))

Project alignment between KP36 to 38.



Figure 6-5 Current (2020) image of the area occupied by the **former 'quarry'**

(Source: Lotsearch Western Outer Ring Main, Melbourne, VIC (Part 19))

Project alignment between KP36 to 38.

6.1.4.3 EPA priority site register

EPA Victoria's Priority Sites Register lists sites that have been issued with a formal Clean up Notice (CUN) or Pollution Abatement Notice (PAN). At these sites, EPA Victoria considers the condition of the site requires assessment/management to reduce risks to human health or the environment. EPA Victoria issues CUNs and PANs for a broad range of sites, including industrial and commercial sites as well as existing and former landfills and sites where they suspect that contamination has occurred.

A search of EPA Victoria's Priority Sites Register indicated that as of 25 May 2020 there were two sites currently listed on the register. There are also sites which have received a pollution notice which are not on the register and are detailed in Table 6-7. Refer to Appendix A, Figure A8 for sites listed on the EPA Priority Site Register and/or sites under a current pollution notice.

Table 6-7 Sites listed on the EPA Priority Sites Register

Notice ID	Address	Issue	Proximity to construction corridor
Current priority sites			
90007300	205 Bulla-Diggers Rest Road, Diggers Rest	Industrial waste has been dumped at the site. Requires assessment and/or clean up.	30m S (near KP 11.3)
90008885 / 90010148	500 Sunbury Road, Bulla	Current landfill, requires ongoing management	20m SE (KP 14.85-KP 15.85)
Current and former pollution notices not on the priority sites list			
Various	205 Bulla-Diggers Rest Road, Diggers Rest	Various Pollution Abatement Notices and Clean Up Notices, reason for notice is not disclosed.	30m S (near KP 11.3)
Various	500 Sunbury Road, Bulla	Various Pollution Abatement Notices and Clean Up Notices, reason for notice is not disclosed.	20m SE (KP 14.85-KP 15.85)
90003990	40 Batey Court, Bulla	Clean Up Notice, reason for notice is not disclosed.	20m E (near KP 16)
Various	570 Sunbury Road, Bulla	Pollution Abatement Notices, reason for notice is not disclosed.	300m N (KP 16)
90006600	600 Sunbury Road, Bulla	Pollution Abatement Notice, reason for notice is not disclosed.	300m N (KP 15)
Various	420 Wildwood Road, Wildwood	Previously on the priority sites register due to illegal dumping.	442m NW (KP 18)

6.1.4.4 EPA Statutory Environmental Audits

Statutory Environmental Audits are undertaken by an EPA Victoria-appointed independent Environmental Auditor, typically at the request of a site owner. The fact that an audit has been undertaken on a site is not an indicator of contamination, although it is likely to be an indicator of historic industrial and commercial land use with potential for contamination. A search of the Victorian EPA Interaction Portal for properties issued with a Certificate or Statement of Environmental Audit as part of a Section 53X audit ('condition of a segment of the environment') or with an audit report prepared in accordance with Section 53V of the Environment Protection Act 1970 indicates that as of 15 May 2020 there are three properties in the study area that had been issued with a Statements or Certificates of Environmental Audit or Section 53v Environmental Audits as detailed in Table 6-8. Refer to Appendix A, Figure A9 for sites which have received an EPA Statutory Environmental Audit.

Table 6-8 Statutory environmental audits in the study area

Location	CARMS No.	Audit Type	Outcome	Proximity to construction corridor
1027 – 1051 Taylors Road, Deanside	75999-1	53X Statement	The site was historically grazing land prior to 1988. The property was then used for various purposes including a dog kennel and more recently for illegal dumping and disposal of wastes from 1990 to 2015. The site was issued a clean up notice in 2015, remediation and validation works were completed in 2019. Groundwater was intercepted at 10.99 mbgl, with a TDS range of 5,200 mg/L to 11,000 mg/L. Elevated concentrations of metals and ions were reported in groundwater, however, the site was not considered a source of groundwater pollution. The site was issued a Statement of Environmental in October 2019.	75m SE (KP 0)
500 Sunbury Road, Bulla	65048-3 to 5	53V Audit Recommendations	The most recent publicly available audit (2018) was reviewed for this site (CARMS 65048-5). The site is a solid inert waste landfill with a history of poor waste management practices. Recommendations / conclusions were made in the most recent update, the most notable to this investigation being: • Landfill gas emissions were not well understood in relation to site perimeter protection, with an insufficient number perimeter bores present for monitoring. • Landfill hotspots and localised fire outbreaks were still evident. • Widespread asbestos and asbestos containing materials present across the site. • Groundwater is impacted by elevated concentrations of nitrate.	20m SE (KP 14.85 -KP 15.85)

Location	CARMS No.	Audit Type	Outcome	Proximity to construction corridor
600 Sunbury Road, Bulla	61707-10, 11, 13, 18	53V Audit Recommendations	The most recent publicly available audit (2019) was reviewed for this site (CARMS 61707-18). This landfill is licensed to accept prescribed waste in accordance with their Licence. Recommendations / conclusions were made in the most recent update, the most notable to this investigation being: • Groundwater is impacted by elevated concentrations of ammonia and metals. • Asbestos emissions were identified as high risk. • Future landfill gas emissions to offsite receptors was noted as a medium risk due to expected increase in annual waste and impact of capping. • Uncertainty of groundwater rebound following cessation of quarrying.	300m N (KP 15)

A Section 53X audit is most frequently required by the planning authorities to satisfy themselves that specified parcels of land are suitable for their proposed use (with respect to contamination). As part of a Section 53X audit, the auditor verifies that a specified parcel of land is suitable for a range of land uses (or no land uses), either with or without conditions (such as an ongoing management plan, maintaining a capping layer or not permitting contact with surface soils).

The audits were reviewed to assess their potential to impact Project construction activities. Based on the information reviewed, the proximity of the sites to the construction corridor and the proposed construction methodology adjacent to the sites, it is considered unlikely the sites reviewed would impact on construction activities with the exception of potential landfill gas within the vicinity of the Bulla Tip and Quarry (KP 14.85- KP 15.85) located in Bulla. According to Safe Work Australia, trenches are considered confined spaces if they potentially contain concentrations of airborne contaminants that may cause impairment, loss of consciousness or asphyxiation. WorkSafe Victoria indicate that trenches may be a confined space if it is:

- *"at atmospheric pressure, has a lack of oxygen, or contains atmospheric contaminants (including gases, vapours, fumes and dust or flammable contaminants) or stored substances (except liquid) that could cause engulfment."*

The section of the construction corridor that might be impacted is between KP 14 and KP 16. In this area, the construction corridor falls, in part, along the north-western boundary of the Bulla Tip and Quarry.

The two landfill sites may also impact regional groundwater which may discharge to Jacksons Creek and Deep Creek. PFAS impacted groundwater in these areas require further investigation and is detailed in Section 9.1.4.

6.1.4.5 EPA licensed sites

EPA licences are required for all scheduled premises, unless the premises are exempted in the Regulations. Licences cover the actual operation of the site, and set operating conditions, waste discharge limits and waste acceptance conditions, as appropriate.

A search of the EPA Licensed site register indicates that as of 25 May 2020, a total of one licensed facility and one EPA works approval site are located within the study area and include:

- 500 Sunbury Road, Bulla (Licence no. 11758) – prescribed industrial waste landfill located approximately, 20 meters SE of the construction corridor (KP 14.85-KP 15.85)
- 600 Sunbury Road, EPA works approvals for quarrying and composting, located approximately 300 meters N of the construction corridor (KP 15)

6.1.4.6 Groundwater quality restricted use zone (GQRUZ)

Groundwater Quality Restricted Use Zones (GQRUZ) are areas where groundwater pollution is present as a result of previous industrial uses or other activities, and the site has been assessed as part of a Section 53X audit in accordance with the Environment Protection Act 1970. These zones have been subject to clean-up, in line with the relevant environmental standards, but not all beneficial uses of groundwater have been restored. As such, restrictions remain on what the groundwater can be used for, if it is abstracted or discharged to a surface water body. If a GQRUZ was present in the study area, it would indicate the need to assess that area in more detail to assess risks to the Project. However, a search of the EPA Victoria GQRUZ map, indicates that as of 25 May 2020 there were no GQRUZs located and present within the study area.

6.2 Site inspection

A site inspection was completed on 14 July 2020 at 140 Duncans Lane, Diggers Rest and the Kalkallo retarding basin. The pipeline reference design will run directly through both properties.

The Diggers Rest property is located approximately between KP 9.95 to KP 10.14. It was selected to be inspected due to the presence of hundreds of wrecked cars. The inspection identified car bodies, car parts, tyres, scrap metal, other hard waste, gasoline bottles, a can of enamel thinner and an unlabelled jerry can. Surface staining was not observed, however the inspection was limited due to ground cover from waste and vegetation. A fire pit was also observed on site but not within the construction corridor. The old cars and liquid storage have the potential to have released lubricants, fuels and solvents to the soil creating a potential contamination and vapour risk. The general waste also has an aesthetic impact and may requiring screening of inert waste from soils excavated as part of the construction.

The Kalkallo retarding basin was selected for inspection to observe the general layout of the area. Pooling of water was evident as expected and no visual or olfactory indicators of contamination was observed.

A separate site inspection of the Bulla Tip and Quarry was completed on 16 July 2020 from publicly accessible places and viewed from the roadside. The Bulla Tip and Quarry is located approximately near KP 14.85 to KP 15.85 of the construction corridor. The Project runs along the western side of the road and is unlikely to be impacted from windblown waste and soil impacts.

The former quarry identified off the Hume Hwy in Beveridge (near KP 37.5) could not be viewed from the roadside due to vegetation. The most recent aerial image shows a small depression in ground resembling a dried dam (refer to Section 6.1.4.2, Figure 6-5).

6.3 Preliminary field investigations

Preliminary field investigations were undertaken to provide a better understanding of soil, groundwater and the presence of acid sulfate soils within the construction corridor.

The scope of the preliminary field investigation included:

- Sampling of shallow soils to assess soil quality at a total of 11 locations across the construction corridor. Soil sampling was undertaken during groundwater bore installation works
- Groundwater sampling from 12 groundwater bores to assess the presence of contaminants at locations where groundwater is likely to be intercepted during construction
- Preliminary PFAS investigations were completed at Jacksons Creek and Deep Creek, including sampling of regional groundwater (BH15, BH22 and BH23a) and surface water
- Sampling of soils to assess the presence of actual or potential acid sulfate soil at two locations (BH09 and BH12)

6.3.1 Soil contamination investigation

Soil categorisation

Currently, categorisation of soil for offsite disposal is outlined in EPA Victoria Publication 621 *Soil Hazard Categorisation and Management* (IWRG 621, June 2009). All soils are categorised as either Fill Material or prescribed industrial waste (PIW) Category A, B or C, depending upon total and leachable concentration of a broad list of potential contaminants. The disposal of each category must be managed differently, including the requirement for treatment before disposal (Category A soil only), summarised in Table 6-9.

Table 6-9 Contaminated soil management options

	Category	Potential treatment	Disposal option
Prescribed industrial waste (PIW)	Category A	On site remediation. Off site remediation. Storage pending availability of treatment.	No disposal to landfill
	Category B	On site remediation. Off site remediation. Licensed facility.	Disposal to licensed facility
	Category C	On site remediation. Off site remediation. Licensed facility.	Disposal to licensed facility
Fill Material	Fill Material	EPA Victoria does not regulate the use of fill material. However, the *Environment Protection Act 1970* places general obligations to prevent adverse impacts on the environment and human health. Where there is potential for adverse impacts from the deposit of fill material, advice would be sought from EPA Victoria.	

As detailed in Section 4.3.2, there are changes to waste disposal categories expected to come into effect on 1 July 2021 and these would be considered when categorising excess and/or contaminated spoil for offsite disposal.

Analytical Results

A total of 22 samples were analysed, generally at shallow depths of 0.1 and 0.5 metres, collected during drilling of groundwater bores in August and September 2020. Samples were submitted under chain of custody (COC) procedures to ALS Environmental Pty Ltd (primary laboratory).

Copies of NATA certified analytical results and COC documentation are provided in Appendix E. Tabulated results are provided in Appendix F.

All samples were collected with reference to the following guidelines and protocols:

- National Environment Protection (Assessment of Site Contamination) Measure, 1999 (NEPM) as amended in 2013
- Standards Australia, 2005, Australian Standard, Guide to the investigation and sampling of sites with potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds, AS 4482.1 – 2005

Soil samples were analysed for a broad analytical suite in line with EPA Victoria IWRG 621 which includes the following:

- Total Recoverable Hydrocarbons (TRH)
- Polycyclic Aromatic Hydrocarbons (PAH)
- Phenols
- Organochlorine Pesticides (OCP)
- Polychlorinated Biphenyls (PCB)
- Volatile Organic Carbons (VOC)
- Chlorinated Hydrocarbons
- Metals (Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Nickel (Ni), Lead Pb), Mercury (Hg), Silver (Ag), Tin (Sn), Molybdenum (Mo), Selenium (Se), Zinc (Zn) and Hexavalent Chromium (Cr6+)
- Cyanide CN
- Total Fluoride; and
- pH

To assess the potential management requirements, soil analytical results were screened against current EPA Victoria IWRG 621.

Borehole logs are provided within appendices of Technical Report C Groundwater. Indicators of contamination including stains, odours and anthropogenic material were not observed at locations sampled. All samples analysed reported analytical results below the upper fill material threshold limit, indicating that soils sampled would be classified as fill material for offsite disposal purposes and suitable for reuse on site from a contaminant perspective.

One borehole (BH09) was advanced on Gunns Gully Road, along the northern boundary of the Kalkallo retarding basin and within close proximity to the construction corridor at approximate KP 34.9. The two samples analysed (BH09_0.1 and BH09_0.5) reported analytical results below the upper fill material threshold limit. It is noted that PFAS was not investigated at this location. Further soil sampling within the construction corridor between approximately KP 34.2 and KP 35.4 would be required to characterise the soil quality at the Kalkallo retarding basin including analysis of PFAS.

Soil samples have not been collected at the Diggers Rest property storing wrecked vehicles (KP 9.95 to KP 10.14), within or immediately adjacent to the railway reserves likely within shallow soils only (KP 8.3 and KP 41.1) and along the construction corridor opposite a possible former quarry (KP 37.5) which were identified as potential contamination sources based on the desktop review. As such further site investigations would be required to characterise soil quality at these aforementioned locations as detailed in Section 6.4.2. Further, waste soil categorisation presented in this report would need to be reassessed once detailed soil quality information is available.

It is noted that the entry and exits pits for HDD at the two railways are anticipated to be located outside of the rail reserves. Given contamination is likely to be limited to shallow soils within the rail reserves sampling is not required unless shallow soils (less than 1 metre below surface) are to be intercepted by the Project.

Soil sampling locations are shown in Appendix A, Figure A2 and tabulated analytical results are provided in Appendix F.

6.3.2 Groundwater and surface water investigation

A groundwater monitoring network consisting of 17 bores was established by APA to provide information on groundwater levels and groundwater quality. The network generally focused on areas where groundwater depth was expected to be < 5 meters. Further details regarding the groundwater investigation is reported in the EES Technical Report C – Groundwater.

The groundwater investigation, relating to contamination, included the sampling and analysis of groundwater from 12 groundwater bores at, or within close proximity to the construction corridor, completed during March, August, September and October 2020. Refer to Appendix A, Figure A3 for groundwater sample locations.

Groundwater sampling from monitoring bores was completed in accordance with Victorian EPA publication 669 – Groundwater sampling guidelines. The groundwater monitoring bores were purged during which field water quality parameters and water level monitoring was undertaken. Sampling was completed following stabilisation of the field water quality parameters to limits as defined by Victorian EPA publication 669 – Groundwater sampling guidelines.

A preliminary surface water investigation was completed with one sample collected at each of Jacksons Creek and Deep Creek in October 2020.

A summary of the groundwater and surface water sampling completed is detailed in Table 6-10.

Table 6-10 Summary of groundwater and surface water sampling

Bore ID / Location	Number of sampling occasions	Month/s sampled
Groundwater wells		
WORMBH15	Two	March and October 2020
WORMBH22	Three	March, September and October 2020
WORMBH23	One	March 2020
WORMBH27	Two	March 2020 and October 2020
WORMBH32	Two	March and August 2020
WORMBH49	Two	March 2020 and October 2020
WORMBH01	Not sampled – insufficient water	

Bore ID / Location	Number of sampling occasions	Month/s sampled
Groundwater wells		
WORMBH03		
WORMBH05		
WORMBH06		
WORMBH07		
WORMBH09	One	September 2020
WORMBH10	Not sampled – insufficient water	
WORMBH11	One	August 2020
WORMBH12		
WORMBH14		
WORMBH16		
WORMBH23a	Two	August and October 2020
Surface water locations		
Jacksons Creek	Two	October 2020 and February 2021
Deep Creek	One	October 2020

Groundwater samples were analysed for the following:

- Salinity (measured as mg/L total dissolved solids - TDS), pH, EC, major ions
- Nutrients: Ammonia (as N), nitrate (as N), Nitrate (as N), nitrite (as N), total nitrogen, Total Kjeldahl Nitrogen
- Sulfate as SO_4
- Total phosphorous
- Metals: Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Nickel (Ni), Lead Pb), Mercury (Hg) and Zinc (Zn)

Where shallow groundwater was encountered or where deeper trenching is proposed the following additional analysis was complete (BH09, BH12, BH14, BH15, BH22, BH23a and BH32):

- E.coli
- Total Suspended Solids (TSS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD)
- Oil and grease, surfactants (MBAS)
- Organochlorinated pesticides (OCPs)
- Semi-volatile and volatile organic compounds (SVOCs and VOCs)
- Total recoverable hydrocarbons (TRHs)

- Monocyclic aromatic hydrocarbons (MAHs)
- Polycyclic aromatic hydrocarbons (PAHs) and
- Polychlorinated biphenyls (PCBs)
- Per- and polyfluoroalkyl substances (PFAS)

Surface water samples were analysed for:

- Salinity (measured as mg/L TDS), pH, EC, major ions
- Nutrients: Ammonia (as N), nitrate (as N), Nitrate (as N), nitrite (as N), total nitrogen, Total Kjeldahl Nitrogen
- PFAS

Samples were submitted under COC documentation to ALS Environmental Pty Ltd (primary laboratory).

Copies of NATA certified analytical results and COC documentation are provided in Appendix E. Tabulated results are provided in Appendix F.

Groundwater quality

To assess the potential impacts to groundwater, it is necessary to first assess the quality of the groundwater. The quality of the groundwater defines the use it could potentially be put to in its natural (uncontaminated) state. These uses are referred to in Victoria as 'beneficial uses' and include natural ecological uses (maintenance of ecosystems) and extracted uses, such as irrigation and industrial uses.

The document that defined the beneficial uses of groundwater is the State Environment Protection Policy (SEPP) *Waters*, 2018 (Water SEPP). It defines the beneficial uses of groundwater based on the quality of the groundwater as determined by its salinity (measured in total dissolved solids – TDS). Each segment has specific beneficial uses that require protection. The greater the salinity, the fewer beneficial uses that apply. As detailed in Section 4.3.2, the SEPPs are being replaced by the Environmental Reference Standards which will come onto effect 1 July 2020.

The segments defined by the Water SEPP (2018) are summarised Table 6-11.

Table 6-11 Beneficial uses of groundwater (from Water SEPP)

Beneficial Use	Segment (mg/L total dissolved solids - TDS)						
	A1	A2	B	C	D	E	F
	0-600	601–1,200	1,201-3,100	3,101–5,400	5,400-7,100	7,101-10,000	>10,000
Water dependent ecosystems and species	✓	✓	✓	✓	✓	✓	✓
Potable water supply - desirable	✓						
Potable water supply - acceptable	✓	✓					
Potable mineral water supply	✓	✓	✓	✓			
Agriculture and irrigation (irrigation)	✓	✓	✓				

Beneficial Use	Segment (mg/L total dissolved solids - TDS)						
	A1	A2	B	C	D	E	F
	0-600	601–1,200	1,201-3,100	3,101–5,400	5,400-7,100	7,101-10,000	>10,000
Agriculture and irrigation (stock watering)	✓	✓	✓	✓	✓	✓	
Industrial and commercial	✓	✓	✓	✓	✓		
Water-based recreation (primary contact recreation)	✓	✓	✓	✓	✓	✓	✓
Traditional Owner cultural values	✓	✓	✓	✓	✓	✓	✓
Cultural and spiritual values	✓	✓	✓	✓	✓	✓	✓
Buildings and structures	✓	✓	✓	✓	✓	✓	✓
Geothermal properties	✓	✓	✓	✓	✓	✓	✓

The groundwater salinity from the monitoring bores has been reported from 910 mg/L to 7,360 mg/L TDS which falls within Segment A2 to Segment D, with the majority of groundwater falling within Segment C.

The protected beneficial uses of Segment A2 to Segment D and groundwater quality indicators and objectives for the beneficial uses of groundwater are summarised in Table 6-12. As the area is not in a designated mineral water zone or a known geothermal area, the beneficial uses of Potable mineral water supply and Geothermal properties are not considered.

Table 6-12 Groundwater quality indicators and objectives

Beneficial use	Indicators	Objectives
Water dependent ecosystems and species	Groundwater must not cause receiving waters to be affected to the extent that the level of any environmental quality indicator is greater than the level of that indicator specified for surface waters in the SEPP (Waters) and Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2018 (ANZG, 2018) - Freshwater 95% species protection Groundwater quality must not adversely affect the maintenance of environmental values that depend on groundwater.	Water quality that is suitable to protect the integrity and biodiversity of water dependent ecosystems. This beneficial use encompasses: • Protection of the integrity of riparian vegetation as it contributes to the health of water dependent ecosystems and bank stability; • That groundwater quality does not adversely affect surface water ecosystems and other beneficial uses of surface environments; and • Ensures that groundwater quality does not adversely affect natural ecosystems that require access to groundwater to meet all or some of their water requirements on a permanent or intermittent basis to maintain their communities of organisms, ecological processes and ecosystem services. This includes wetlands and rivers reliant on groundwater baseflow, some terrestrial vegetation and some estuarine and near-shore marine systems, cave ecosystems and subterranean fauna; • Maintenance of fish passage
Potable water supply: acceptable	Those specified for drinking water supply in the Australian Drinking Water Guidelines (2011), updated in 2018	Salinity shall be less than 1,200 mg/L TDS. Groundwater shall not be affected to the extent that the level of any water quality indicator is greater than the level of that indicator specified for raw water for drinking water supply in the Australian Water Quality Guidelines for Fresh and Marine Waters
Agriculture and irrigation (irrigation)	Those specified for irrigation in the Australian Water Quality Guidelines (2011) for Fresh and Marine Waters	Water quality that is suitable for irrigation, such as the irrigation of domestic gardens, commercial agriculture, parks and golf courses.
Agriculture and irrigation (stock watering)	Those specified for irrigation in the Australian Water Quality Guidelines (2011) for Fresh and Marine Waters	Water quality that is suitable for stock watering.
Industrial and commercial use	Groundwater must not be affected to the extent that industrial or commercial water quality is impacted.	Water quality that is suitable for industrial and commercial use.

Beneficial use	Indicators	Objectives
Water based recreation (primary contact recreation)	Groundwater must not be affected to the extent that the level of any water quality indicator is greater than the level of that indicator specified for water based recreation (primary contact recreation) for surface waters in the SEPP (Waters)	Water quality that is suitable for primary contact recreation (e.g. swimming, diving, water skiing, caving and spas), secondary contact recreation (e.g. boating and fishing) and for aesthetic enjoyment.
Traditional Owners' and Aboriginal Victorians' cultural values	No specific water quality objectives have been set. This report adopts those required to protect aquatic ecosystems.	Water quality that is suitable for traditional owner cultural needs and that will ensure that traditional owner cultural practices can continue. For example, traditional aquaculture, fishing, harvesting, cultivation of freshwater and marine foods, fish, grasses, medicines and filtration of holistic water holes/camps.
Cultural and spiritual values	No specific water quality objectives have been set. This report adopts those required to protect aquatic ecosystems.	Water quality that is suitable for cultural and spiritual needs and that will ensure that cultural, spiritual and ceremonial practices can continue. These include the cultural values held by communities (e.g. water based festivals and celebrations).
Buildings and Structures	Introduced contaminants must not cause groundwater to become corrosive to structures or building materials; Specific indicators include: pH, sulphate, chloride, redox potential, salinity or any chemical substance or waste that may have a detrimental impact on the structural integrity of buildings or other structures.	Groundwater quality where introduced contaminants do not cause groundwater quality to become corrosive to buildings, structures, property and materials.

In assessing the beneficial uses of groundwater, consideration is also given to whether a particular beneficial use is being realised currently or has the potential to be realised in the future. An assessment of this is provided in Table 6-13.

Table 6-13 Assessment of relevance of beneficial uses

Beneficial Use	Current use	Future use
Water dependant ecosystems and species	Existing – Groundwater from the study area would discharge towards major drainage lines	Likely
Potable water supply (acceptable)	Existing - Domestic bores have been identified in the vicinity of the construction corridor. These may provide water for consumptive purposes although the availability of a high quality municipal water supply would suggest this use is unlikely.	Possible but unlikely

Beneficial Use	Current use	Future use
Agriculture and irrigation (Irrigation)	Existing - Irrigation bores have been identified near the construction corridor.	Likely
Agriculture and irrigation (stock watering)	Existing - Stock bores have been identified near the construction corridor.	Likely
Water based recreation	Possible - While it cannot be confirmed, given the current paucity of residential development in the area it is unlikely that groundwater is currently developed for recreational purposes, e.g. swimming pool top-up water.	Possible but unlikely
Industrial and commercial use	Existing - Commercial and industrial bores have been identified near the construction corridor. However, the extraction of groundwater for such purposes often requires treatment and the availability of a high-quality municipal water supply would suggest his use is unlikely.	Unlikely
Protection of Buildings and Structures	Possible - Groundwater in some locations along the construction corridor is shallow and potentially within a range that could interact with buried services, cellars and basements of buildings. At this stage, there are few buildings located near the construction corridor.	Possible
Traditional Owners' and Aboriginal Victorians' cultural values	Existing – where groundwater discharges to creeks.	Likely
Cultural and spiritual values		

In summary:

- Extractive uses of groundwater within the study area are existing.
- Discharge of groundwater to the receiving water bodies is a natural endpoint for the groundwater and therefore:
  - Water-dependent ecosystems and species are existing and would remain existing in the future
  - Water-based recreation is possible however not confirmed if currently being realised.
  - Traditional owners' and Aboriginal Victorian cultural values and cultural and spiritual values potentially exist currently and are a possible ongoing use
- Groundwater is shallow in some locations across the study area that buildings and structures may intercept. However, these areas correspond with low lying land potentially prone to flooding and therefore this use is unlikely.

Analytical results

The groundwater and surface water samples were collected to provide information on water quality and the potential presence of contamination. The results are not meant to direct any clean up of groundwater and surface water but to inform potential management requirements should groundwater and surface water be extracted for any purpose such as dewatering excavations. Groundwater and surface water analytical results were compared to the guidelines listed in Table 6-12.

Groundwater

Concentrations of ammonia (as N), total nitrogen and total phosphorus, were reported above the adopted criteria to assess water dependent ecosystems. Such chemicals can have a natural origin but may also be related to agricultural practices. These may preclude groundwater disposal to the environment, such as disposal to waterway (if required). Additional assessment would need to be undertaken prior to any such disposal.

In addition, the salinity of the majority of the groundwater exceeds the criteria adopted to assess for irrigation and as such the groundwater is likely to be too saline for long term irrigation use.

Analytes that are more indicative of anthropogenic contamination included E.coli, MBAS, OCPs, SVOCs, VOCs, TRHs, MAHs, PAHs and PCBs. All of these were reported below the laboratory limit of reporting (LOR) for samples analysed. The preliminary PFAS sampling and results are discussed below.

All samples reported metals in excess of the ecological criteria. However, these are considered to represent background groundwater conditions as the distribution was consistent and widespread and not related to any obvious contamination source.

The anticipated depth to groundwater for each source zone is detailed in Table 6-14.

Table 6-14 Depth to groundwater at potential source sites

Potential sources of contamination	Location	Approximate depth to groundwater within the vicinity of the potential source
Railway crossings / rail reserves Note: Railway reserves are not considered a source of groundwater contamination	Sunbury Railway Line crossing in Diggers Rest (KP 8.3)	Assumed to be at 2 mbgl. No groundwater bores present targeting area.
	Railway crossing in Beveridge (KP 41.1)	4 mbgl
Rural property used to store hundreds of wrecked cars	140 Duncans Lane, Diggers Rest KP 9.95 to KP 10.14)	Regional groundwater between 5 to 10 mbgl. No groundwater bores present targeting area.
Industrial waste illegally dumped	205 Bulla-Diggers Rest Road, Diggers Rest, approximately 30 m south of construction corridor (KP 11.3)	Regional groundwater between 20 to 50 mbgl. No groundwater bores present targeting area.

Potential sources of contamination	Location	Approximate depth to groundwater within the vicinity of the potential source
Quarry and landfill site	Bulla Tip and Quarry – 500 Sunbury Road, Bulla approximately 20 m south to south east of the construction corridor near KP 1.85 to KP 15.85).	Regional groundwater between 20 to 50 mbgl. No groundwater bores present targeting area. The pipeline alignment does cross two creeks in this area and groundwater is likely to be significantly shallower at those locations. However, these are located approximately 700 to 850 m from the landfill and impact to groundwater from the landfill at this distance is considered unlikely.
Landfill site	600 Sunbury Road, Bulla, approximately 300 m north of the construction corridor at KP 15). Emu Creek runs along the eastern boundary of the landfill.	Regional groundwater varies significantly from 5 to 50 mbgl.
Unknown, but is known to have received CUN	40 Batey Court, Bulla, approximately 25 m east to the east of the construction corridor near KP 16	Regional groundwater between 20 to 50 mbgl. No groundwater bores present targeting area.
Retarding basin	Kalkallo between KP 34 and KP 35.5	Between 7.3 to 8.1 mbgl
Former Quarry	300 Hume Hwy, Beveridge approximately 30 m west of KP 37.5	Regional groundwater between 10 to 50 mbgl. No groundwater bores present targeting area.
Wollert Compressor Station	Between KP 50.78 to KP 51.045	Approximately 7.5 mbgl

Groundwater has not been investigated at potentially contaminated sites with the exception of the Kalkallo retarding basin where two groundwater bores (BH09 and BH32) targeted this potential source and the and the Wollert Compressor Station where one groundwater bore (BH16) targeted this potential source. Based on the depth to groundwater reported in these groundwater bores it is unlikely that groundwater will be intercepted by the Project at these potential source site. Further investigation of groundwater at the Kalkallo retarding basin and the Wollert Compressor Station is not required.

A groundwater bore (BH12) is located within 40 metres of the railway reserve in Beveridge. The railway reserve is highly unlikely to be a source of groundwater pollution and has not been considered further in relation to groundwater.

The two landfills identified within the study area (as detailed in Table 6-14) may impact regional groundwater. It is anticipated that the Project will intercept groundwater at Jacksons Creek and Deep Creek in which groundwater may discharge. However, sampling conducted by APA has not identified PFAS above the laboratory LOR in the regional groundwater near Jacksons Creek. Further discussion of the preliminary PFAS sampling and analytical results are below.

Investigation of groundwater at other potential source areas, including the Diggers Rest property, directly adjacent to the Bulla Landfill and near the former quarry in Beveridge are not considered warranted due to the unlikelihood of groundwater being intercepted by the Project. In the unlikely event that groundwater is intercepted by the Project at these sites, the groundwater may need to be disposed of appropriately. This would involve sampling and analysis for contaminants of concern listed in Table 6-15 and any groundwater extracted should be managed in accordance with the Environmental Management Measure (EMM) C4 – Minimise Impacts of Groundwater Disposal as detailed in the EES Technical Report C – Groundwater.

Surface water

Concentrations of phosphorus and total nitrogen were reported above the adopted criteria to assess water dependant ecosystems (SEPP Waters Environmental Quality Indicators). Phosphorus was also reported above the adopted criteria to assess long term irrigation. This may impact the management options for any surface water extracted as part of the Project works.

PFAS

Preliminary PFAS sampling was completed in groundwater and surface water at Jacksons Creek and Deep Creek to investigate the potential for regional groundwater pollution from the Bulla Landfill and Hi-Quality Landfill. The key findings of the preliminary sampling are:

- PFAS was analysed in groundwater at BH15 (Jacksons Creek) and BH22 and BH23a (Deep Creek) and was reported below LOR (<0.002 ug/L) in all three wells sampled
- Jacksons Creek
  - Surface water sample was initially collected near the Project crossing in October 2020. Further sampling was completed in February 2021 to confirm results and included sampling upstream, downstream and at the Project crossing
  - All surface water sample reported concentrations of perfluorooctanoic acid (PFOA) and Perfluorooctane sulfonate (PFOS), with PFOS reported close to the laboratory LOR and above the adopted criteria to assess water dependant ecosystems (PFAS NEMP 99% species protection ecological investigation level)
  - It is noted that groundwater well (BH15), installed to assess conditions near Jacksons Creek, is screened within the siltstone at 17.3 to 20.3 metres and is unlikely to be representative of the shallower groundwater conditions to be encountered during dewatering. Further investigation of shallow groundwater and sediments to be disposed offsite at Jacksons Creek is recommended in order to inform disposal and management options as well as seeking relevant EPA approvals, if required.
  - The source of PFAS contamination within Jacksons Creek is unclear but may be attributed to historical discharge from the Sunbury Recycled Water Treatment Plant located approximately 4.5 kilometres upstream of the Projects crossing at Jacksons Creek
- Deep Creek
  - Surface water sample reported PFAS below the laboratory LOR
  - It is understood that HDD under Deep Creek will occur at least 16 metres below the surface within the siltstone unit. Groundwater well BH22 was screened at 27.2-30.2 metres and BH23a was screened at 22-25 metres. Although the groundwater wells are screened deeper than the anticipated depth of HDD, given the analytical results it is highly unlikely that PFAS would be present within drilling fluids at this depth. Further investigation of PFAS at Deep Creek is not considered warranted.

6.3.3 Acid sulfate soils and rock

The results of GHD's additional PASS sampling is discussed in Section 6.1.3. The results did not indicate the presence of PASS in the samples analysed.

6.4 Summary of existing conditions

6.4.1 Potential sources of contamination

A summary of the potential sources of contamination, their locations in relation to the Project, how the potential contamination could be interacted with (impact pathway) and the associated potential contaminants of concern is presented in Table 6-15 shown in Appendix A, Figure A10.

Table 6-15 Summary of potential sources of contamination

Potential sources of contamination	Location	Distance/direction from construction corridor	Potential impact pathway	Potential contaminants of concern	Anticipated construction method
Railway crossings / rail reserves	Sunbury Railway Line crossing in Diggers Rest (KP 8.3) Railway crossing in Beveridge (KP 41.1)	Pipeline runs beneath railway lines.	Excavation of shallow soil (unlikely to be realised based on construction method)	Metals, TRHs, BTEX, PAHs, OCPs, asbestos	HDD Entry and exit pits outside of the rail corridor. Depth of cover at 2.0 m.
Rural property used to store hundreds of wrecked cars	140 Duncans Lane, Diggers Rest (KP 9.95- KP 10.14)	Pipeline runs directly through the eastern portion of the property.	Excavation of soil Soil vapour migration Abstraction of groundwater (unlikely to be realised based on construction method)	Metals, TRHs, BTEX, PAHs and solvents.	Open trench construction Standard trench depth of 2.0 m.
Industrial waste illegally dumped	205 Bulla-Diggers Rest Road, Diggers Rest (KP 11.3)	Approximately 30m to the south of the construction corridor.	Abstraction of groundwater (unlikely to be realised based on construction method)	Metals, TRHs, BTEX, PAHs	Not applicable, construction corridor not within or adjacent to the potential source site.
Quarry and landfill site	Bulla Tip and Quarry – 500 Sunbury Road, Bulla (KP 14.85-KP 15.85)	Approximately 20m to the east of the Project construction corridor.	Gas migration Abstraction of groundwater (unlikely to be realised based on construction method)	Landfill gas (methane, carbon dioxide, hydrogen sulphide and carbon monoxide), heavy metals, nutrients (ammonia, nitrate, phosphorous), TRHs, BTEX, PAHs, chlorinated hydrocarbons, per- and polyfluorinated alkyl substances (PFAS).	Construction works adjacent to potential source of contamination Open trench construction Standard trench depth of 2.0 m.

Potential sources of contamination	Location	Distance/direction from construction corridor	Potential impact pathway	Potential contaminants of concern	Anticipated construction method
Landfill site	600 Sunbury Road, Bulla (KP 15)	Approximately 300m north of the construction corridor	Abstraction of groundwater (unlikely to be realised based on construction method)	TRHs, BTEX, PAHs, chlorinated hydrocarbons, PFAS.	Not applicable, construction corridor not within or adjacent to the potential source site.
Unknown, but is known to have received CUN	40 Batey Court, Bulla (KP 16)	Approximately 25m to the east of the construction corridor.	Gas migration Abstraction of groundwater (unlikely to be realised based on construction method)	Unknown	Construction works adjacent to potential source of contamination Open trench construction Standard trench depth of 2.0 m
Retarding basin	Kalkallo (KP 34-KP 35.5)	Construction corridor runs along the northern boundary	Excavation of soil Abstraction of groundwater (unlikely to be realised based on construction method)	Contaminants dependent on surrounding land uses – potentially Metals, TRHs, BTEX, PAHs, OCPs, asbestos, E.Coli and nutrients, PFAS	Open trench construction Standard trench depth of 2.0 m
Former Quarry	300 Hume Hwy, Beveridge (KP 37.5)	30m to the west of the construction corridor	Excavation of soil Abstraction of groundwater (unlikely to be realised based on construction method)	Metals, TRHs, BTEX, PAHs, aesthetics, asbestos	Construction works adjacent to potential source of contamination Open trench construction Standard trench depth of 2.0 m
Wollert Compressor Station	Wollert (KP 50.78 to KP 51.045)	Forms part of the construction corridor	Excavation of soil Abstraction of groundwater (unlikely to be realised based on construction method)	Metals, TRHs, BTEX, PAHs, solvents, OCPs	Open trench construction Standard trench depth of 2.0 m Various ground disturbance related to the upgrade of the Wollert Compressor Station.

Potential sources of contamination	Location	Distance/direction from construction corridor	Potential impact pathway	Potential contaminants of concern	Anticipated construction method
Source unknown, possibly due to historical discharge from the Sunbury Recycled Water Treatment Plant [1]	Jacksons Creek (KP 13.6)	Jackson Creek	Abstraction of shallow groundwater, surface water and sediments	Nutrients and PFAS	Jackson Creek – Open trench construction, depth of cover 2.0 m
Potential Acid sulfate soils (PASS)	Jacksons Creek (KP 13.6) Merri Creek (approx. KP 42.8).	Jacksons Creek Merri Creek	Exposing sediments to oxygen from dewatering	PASS	Dewatering, likely exposing alluvium. Jackson Creek – Open trench construction, standard trench depth of 2.0 m Merri Creek – Open trench construction, standard trench depth of 2.0 m

Note:

1. This potential source is located outside of the defined study boundary. The potential source was added in this instance due to further investigation of PFAS impacts within Jacksons Creek.

6.4.2 Summary of field investigations

The preliminary field investigations conducted by GHD have indicated:

- Analyses of soil samples did not identify any significant contamination
- Analyses conducted to date have not indicated the presence of PASS in shallow soils along the alignment
- Analyses of groundwater samples to date have not identified any significant contamination
- Analyses of surface water to date have not identified any significant contamination. It is noted that elevated PFAS was reported in Jacksons Creek just above the laboratory LOR.

Sampling to date has been limited and related to the locations where groundwater bores were installed, and geotechnical bores installed by Construction Sciences. Further assessment as detailed below is required to be completed prior to construction in order to inform the CEMP. Additional environmental mitigation measures may be required depending on the outcome of further assessment.

Soil

Areas identified as potential contaminant sources where spoil is to be excavated, includes:

- The auto wreckers at Diggers Rest
- The former quarry at Beveridge to confirm or otherwise, the presence of any landfilling
- Areas of unforeseen contamination unearthed during construction
- Kalkallo retarding basin to assess for the presence of PFAS
- Shallow sediments at Jacksons Creek
- Wollert Compressor Station

All potentially contaminated soils requiring offsite disposal will first have to be classified in accordance with IWRG702 and IWRG621 or as per the relevant waste regulations in effect at the time of disposal.

It is noted HDD fluids are generally classified in accordance with the EPA Industrial Waste Classification for drilling mud however this does not apply when drilling through contamination and IWRG 621 and 702 should be considered.

Acid sulfate soils

PASS and AASS were not identified in the samples assessed but further sampling and analysis may be required if excavating soils beneath the water table in alluvium such as at creek crossings at Jacksons Creek (KP 13.6), and Merri Creek (approx. KP 42.8). Further assessment if acid sulfate soils at the Kalkallo retarding basin is not required as the Project is unlikely to intercept groundwater at this location.

Groundwater

Analysis of groundwater to date has not identified significant contamination. Groundwater has not been investigated at the majority of potential source areas identified however groundwater is unlikely to be intercepted at these locations. Groundwater intercepted at Jacksons Creek and Deep Creek crossing has the potential to be impacted by regional groundwater pollution from landfills within the study area, including PFAS. The preliminary groundwater PFAS investigation completed at these aforementioned creeks reported PFAS below the laboratory LOR. However as previously discussed, the groundwater wells sampled were screened in the regional aquifer well below the depth of the creek and are not likely to be representative of water extracted during shallow dewatering. Shallower water will be subject to interactions with the surface water in Jacksons Creek in which PFAS was detected – albeit at low concentrations near the laboratory LOR. Further testing of groundwater is to be conducted to confirm (or otherwise) the result from Jacksons Creek. The results of that testing will inform the management of any water extracted for dewatering purposes. PFAS in groundwater may also be entrained in spoil which would impact on its management. However, further PFAS assessment at Deep Creek is not considered warranted as discussed in Section 6.3.2.

Surface water

Analyses of surface water to date has not identified any significant contamination. PFAS was reported in Jacksons Creek just above the laboratory LOR. Further sampling and analyses completed in February 2021, indicated detectable levels of PFAS in the samples. Investigation of shallow groundwater and sediments is recommended.

Landfill gas

No analysis of landfill gas (notably methane) has been undertaken. Landfill gas originating from the Bulla Landfill has the capacity to migrate and impact enclosed spaces and trenches within 500 metres of the landfill near KP15 and KP16. However, installation of landfill gas monitoring bores to assess this risk has not been recommended. This is because several variables such as changing atmospheric pressure and the heterogeneous nature of fractured basalt will influence landfill gas migration in this area and concentrations of landfill gas will fluctuate depending on such variables. Consequently, the immediate risk from landfill gas can change over time and a measurement taken at one time may not represent conditions in the trench when excavated. Given this, it is considered more efficient to conduct real-time monitoring during construction and establishing trigger levels and contingency measures to mitigate this risk, as recommended in Section 10.

Soil vapour

Inspection of the Diggers Rest property identified a large number of dumped vehicles and disused chemical storage containers including solvents and generally poor condition of the site. The site has the potential to leak hydrocarbons, oils and volatile organic compounds (VOCs) which can create a vapour risk in enclosed spaces and trenches. Such material can also pose an odour risk for any excavations and stockpiles. It is recommended therefore that soils sampling be conducted on this site to assess the presence of such chemicals so as to inform the construction contractor on potential soil vapour mitigation (if required).

7. Waste management

This section details the waste management options for the Project. The section is largely concerned with the spoil generated by the Project but also considers any construction waste generated by the Project.

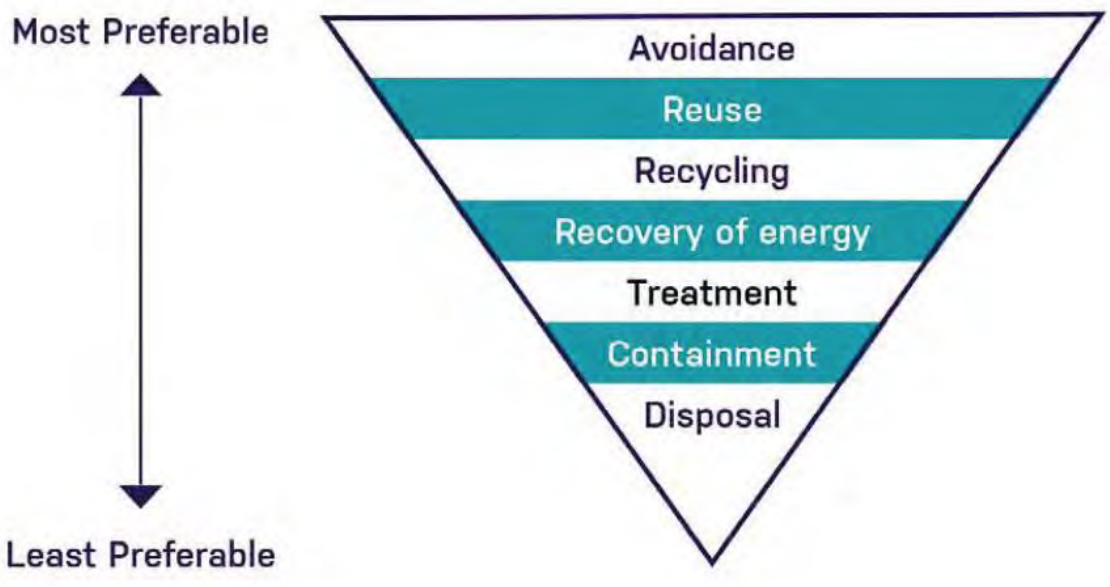
7.1 Definition of spoil

Spoil is defined as any material brought up during the course of an excavation or drilling. Spoil can be contaminated or not contaminated. It can also be a potential acid sulfate soil (PASS) or not. All spoil must be managed appropriately and in accordance with EPA legislation and guidelines. Aspects of management are common to all types such as the need for adequate stockpiling. Specific management requirements are mandated for contaminated spoil and PASS and these are distinguished through the report.

Details regarding expected spoil volumes were not provided as it is currently unclear as to how much spoil would require offsite management. It is understood approximately 2 m^3 of soil would be excavated per metre of trench length. Given the trench is expected to be approximately 51 km in length, the volume of spoil generated is in the order of 102,000 m^3 (in situ). However, it is anticipated that the spoil can be reused on site e.g. to backfill trenches and reinstating natural landforms (where practicable).

7.2 Spoil management hierarchy

Spoil management would consider the waste management hierarchy for the Project as defined in the *Environment Protection Act 1970 (Vic)* ('Environment Protection Act'), which prioritises management of waste in the following order of preference as shown below:



7.3 Avoidance

Avoidance can be considered in terms of avoiding spoil generation and avoiding contaminated spoil generation. It is expected the majority of the spoil generated will be a relatively short-lived issue as it will be reused to backfill excavations (refer to Section 7.4). However, it is possible that an excess of spoil will remain if the excavation cannot be compacted to the pre-excavation levels.

For this excess spoil, scope exists for some avoidance or at least minimisation through:

- The avoidance of known or potential contamination which may be achieved through the avoidance of contaminated areas where practicable e.g. consideration of realignment of the pipeline to avoid areas identified in Section 6 as having a higher likelihood of contaminated soil. This would include the Diggers Rest property (KP 9.95- KP10.14), Kalkallo retarding basin (KP 34-KP 35.5) and the former quarry at Beveridge (KP 37.5) and
- Minimisation of overall spoil generation through reduction of depths of excavations where practicable or refining construction methods to reduce the volume of spoil produced / disturbed

It is expected that the Contractor will consider all possibilities in the design stages.

7.4 Reuse

Based on the desktop assessment, the majority of the Project is within current and historical agricultural land use areas with the exception of sites identified within Section 6.4. Agricultural land uses within the Project corridor are considered to have a low potential for contamination. Herbicides and pesticides, if present, would be expected to be present in low concentrations, with low bioavailability and expected to be a negligible risk to human health and the environment. On a risk-based approach and in accordance with the requirements in Table 2 of the General Practice Note, Potentially Contaminated Land, June 2005[1], it is recommended that soils, not from within sites identified as potentially contaminated, have unrestricted reuse both on and off site. However, if unexpected contamination is identified such as odours, staining or anthropogenic materials such as building rubble or asbestos containing materials, the spoil would be assessed and managed as per EMM C1 and EMM C2.

Uncontaminated spoil, as detailed above, does not require sampling to confirm reuse or disposal. However, landfill operators / disposal sites may request assessment which should be confirmed once the disposal site is identified, noting that this assessment requirement may be limited to a site history investigation only.

Spoil within areas identified as potentially contaminated may be reused at the site of origin where it meets human health and ecological criteria for the current land use and is a preferred option. Spoil is assessed as either Prescribed Industrial Waste (PIW) or Fill Material in accordance with IWRG 621.

Given the alignment is largely through agricultural land with few obvious sources of contamination, it is anticipated that the majority of spoil from trenching will be suitable for reuse at the site of origin from a contaminant perspective.

[1] While this document is written for planners to assess the appropriate level of assessment of contamination for a planning scheme amendment or planning permit application, the principals of this document are applicable in this circumstance.

It is also important to note the new EP Act and waste classification requirements are expected to come into effect on 1 July 2021 as detailed in Section 4.3.2. EPA Publication 1828.1 *Waste Disposal Categories – characteristics and thresholds* specifies the waste classification criteria that would apply from that time. Additional contaminated land management guidance (yet to be released at the time of writing) may also be applicable.

Any soil reuse on VicTrack land requires approval by VicTrack and be conducted in accordance with Soil Reuse – Guidelines for the reuse of potentially contaminated or contaminated soil on VicTrack Land.

7.4.1 Prescribed industrial waste (PIW)

Spoil designated as Prescribed Industrial Waste (PIW) (Categories A, B and C) contain levels of contamination that mean it cannot be subject to unrestricted reuse as they pose an unacceptable risk to human health or the environment. PIW are regulated by EPA Victoria and options for the reuse of these materials includes:

- Category A: Cannot be reused on site unless an EPA approved management plan is in place to manage potential impacts to human health and the environment
- Category B: Cannot be reused on site unless an EPA approved management plan is in place to manage potential impacts to human health and the environment
- Category C: Potential reuse onsite subject to treatment and reclassification as Fill Material and approved by EPA Victoria where required (i.e. PFAS impacts). ASC NEPM criteria applicable to the relevant land use to be considered. Alternatively an EPA approved management plan is in place to manage potential impacts to human health and the environment

Reuse of spoil classified as PIW, is not possible offsite without treatment and reclassification as Fill Material approved by EPA Victoria.

7.4.2 PFAS-impacted spoil

Classification of spoil containing PFAS is based on the EPA Publication 1669.3 Interim position on PFAS, which provides total concentration criteria for PFAS for reuse. An application to the EPA for classification of PFAS-impacted spoil as suitable for reuse would be required.

7.4.3 Fill Material

Fill Material is classified as a waste material, but with many viable uses. Fill Material should be suitable for reuse on site as trench back-filling.

Fill Material may be used offsite, however consideration must be given to the receiving environment. The Environment Protection Act 1970 places general obligations to prevent adverse impacts on the environment and human health. Where there is potential for adverse impacts from the deposit of fill material, for example where it is naturally acidic, advice should be sought from EPA.

7.5 Recycling and energy recovery

As most of the spoil will be returned to the excavation, recycling and energy recovery opportunities from the Project are unlikely to be a viable spoil management option.

7.6 Treatment

The need for treatment is based on the risk the spoil poses and the end use requirements of the spoil. For example, in the unlikely event that contaminated spoil is needed for backfilling and other sources of clean fill are not available, then treatment of PIW material to Fill Material may be a desirable approach. It may also be considered more sustainable to treat soil rather than send it to a landfill. Selection of treatment over disposal may also be subject to a cost benefit analysis.

7.6.1 PIW

The purpose of treatment of contaminated spoil (PIW) is to:

- Reduce the overall risk it poses to the environment and human health
- To allow for management options other than offsite disposal and
- Category A material would require pre-treatment to reduce its hazard risk to a lower category (C or Fill Material) before landfill disposal or fully remediated

Treatment may be required if high levels of contamination are indicated. Treatment of such material can be conducted onsite or offsite, although offsite treatment at an EPA-licensed facility would be the preferred approach.

There are various methods for treating PIW depending on the contaminants which are targeted to be removed. EPA Victoria Publication 1589 Contaminated soil – treatment & disposal (Draft Position) 2015 requires the spoil producer to conduct an assessment to determine if treatment is a viable option before PIW can be disposed of at a landfill.

Options for treatment of contaminated spoil include:

- Chemical immobilisation and solidification for the treatment of inorganic and organic contaminants
- Bioremediation for the treatment of organic contaminants, including petroleum hydrocarbons
- Soil washing for the treatment of heavy metals, petroleum hydrocarbons, some VOCs, PCBs, PAHs, acids, pesticides, herbicides, PFAS and cyanides
- Thermal desorption for the treatment of VOCs, SVOCs, PCBs, dioxins and furans
- Thermal destruction for PFAS-impacted soils

Treatment of spoil is not anticipated to be required based on the desktop study but the contamination status of soils in areas identified as potentially contaminating sources (refer to Section 6.4.1) would be further investigated to confirm this assumption.

7.6.2 PFAS

PFAS-impacted soil can be treated using destruction methods (e.g. incineration, thermal desorption, chemical oxidation) or immobilisation (i.e. addition of agents designed to sorb PFAS and make it less leachable). The costs of destruction or immobilisation of PFAS-impacted spoil are high and there are limited options available in Victoria. Treatment would likely need to be conducted offsite. Therefore, treatment of PFAS would need to consider the logistics and costs based on the volumes involved and the relative cost of other management methods discussed herein.

7.6.3 Fill Material

Treatment will generally not be required for non-contaminated spoil designated as Fill Material.

7.7 Containment

Containment of contaminated spoil involves storage in a permanent or temporary feature to remove exposure and leaching risks. Containment options for PIW are generally not considered to be a viable option for the Project.

Where removal of PIW is not required for construction purposes and can remain in situ, it may be viable to assess management options to minimise contaminant migration such as leaching. Containment options can be considered for selected soils where cut and fill operations are proposed, and the contaminant levels and leachable fractions of the spoil are managed so that exposure and release is prevented. An environmental management plan should be produced to manage such soils.

7.8 Disposal

7.8.1 PIW

Disposal of spoil is the least preferred management option in relation to EPA Victoria's waste hierarchy. However, it may be required for any PIW identified due to Project, site and program constraints. Disposal off site may involve pre-treatment at licenced facilities.

Category A material cannot be sent to landfill without treatment to reduce its hazard classification to a lower level (i.e. Category B or C or Fill Material).

Category B and C material can be disposed directly to a licenced landfill.

Any PIW leaving the site would be classified in accordance with IWRG 621 (or EPA Publication 1828.1 after July 2021) and can only be transported by a licensed operator under a Victorian EPA-approved licence. It is also important to note the changes to the EP Act and waste classification expected to come into effect on 1 July 2021 as detailed in Section 4.3.2.

7.8.2 PFAS

Landfill disposal of PFAS-impacted spoil requires an application to the EPA for acceptance of a classification of PFAS spoil. This would need to include the results of analytical testing including leach testing.

7.8.3 Fill Material

Landfill disposal of Fill Material is an available option. However, such use would not be considered a sustainable approach given other reuse options available.

7.9 Other construction waste

Construction work will generate waste in the form of inert solid waste and putrescible waste. These might include leftover materials (pipework, adhesives, wooden pallets, packing materials, etc), excavated infrastructure and putrescible wastes. These wastes are not PIW and are classified as industrial waste in accordance with the IWR Regulations. There is potential for these wastes to be released into the environment impacting aesthetics as well as the environment, if not appropriately managed. Therefore, these wastes need to be managed appropriately in accordance with the EP Act. The Contractor should manage these in accordance with the waste management hierarchy as described in section 7.2. Unused products, materials and empty containers shall be returned to suppliers wherever practicable or through industry disposal programs with priority given to reuse and recycling before disposal to landfill. The Contractor should also consider reduction of waste generation in their planning phase through allocation of the right amount of materials that they need to complete for the Project.

7.9.1 PIW

Construction works will likely generate other PIW streams, which will typically include:

- Waste oils unfit for their original intended use (eg. lubricating and hydraulic waste oils)
- Waste oils and water mixtures or emulsions, and hydrocarbon and water mixtures or emulsions
- Other oils, hydrocarbons or emulsions
- Used oil filters (this waste must be reused or recycled and is prohibited from disposal to landfill)
- Absorbents contaminated with PIW residues (e.g. rags contaminated with oils, hydrocarbons and organic solvents)
- PIW residues in rigid steel or plastic containers
- PIW residues in bags or containers

The Contractor will need to manage these wastes in accordance with the IWR Regulations. The waste streams will need to be transported to a facility that is licensed to accept them. The wastes should be managed in accordance with the waste management hierarchy, with the recovery of oils to be prioritised at dedicated licensed facilities. Used oil filters must be reused or recycled and are prohibited from disposal to landfill.

The IWR Regulations also require waste transport certificates (WTCs) to be completed to track the movement of PIW from ‘cradle to grave’. It is the responsibility of the waste producer, transporter and receiver to complete a WTC for each consignment of PIW within seven days, unless an exemption applies.

7.10 Groundwater

Management of groundwater from dewatering activities is discussed in the EES Technical Report C – Groundwater. The Groundwater report concluded that groundwater salinity in many bores exceeds the ANZECC (2000) criteria for long term irrigation and in places the salinity may preclude groundwater disposal to land, if required, during construction dewatering.

Disposal to sewer would require agreement with the relevant water authority and may not be permitted if large amounts of saline water require sewer disposal.

8. Risk assessment

A risk assessment of Project activities was performed in accordance with the methodology described in Section 5.4.

The initial risk ratings considered an initial set of mitigation measures (where relevant), which are based on compliance with legislation and standard requirements in effect at the time of reporting that are typically incorporated into the delivery of infrastructure projects of similar type, scale and complexity. Risk ratings were applied to each of the identified risk pathways assuming that these mitigation measures were in place. Refer to Section 4.3.2, for further details of key legislative changes coming into effect on 1 July 2021.

The assessment of the potential impacts associated with the identified risks during the construction and operation of the Project is presented in the following section of this report.

The risk register showing the risk pathways and findings of the risk assessment for contamination is attached in Appendix B.

Nine construction risks and two operation risk were identified and assessed. Individual risk items are discussed further in Section 9.

A summary of the risk assessment results is presented in Table 8-1.

Table 8-1 Risk results

Risk ID	Risk description	Construction/ operation	Pipeline/ MLV/ compressor	Initial risk rating	Final risk rating
C1	**Disturbance and management of existing contamination (inferred conditions)** Construction activities disturb contaminated soil, acid sulfate soil and/or contaminated materials impacting human health and the environment which require management, transport and disposal.	Construction	All	Low	Low
C2	**Disturbance and management of existing contamination (unidentified contamination)** Construction activities disturb unknown contaminated soil, acid sulfate soil and/or contaminated materials impacting human health and the environment which require management, transport and disposal.	Construction	All	Low	Low

Risk ID	Risk description	Construction/ operation	Pipeline/ MLV/ compressor	Initial risk rating	Final risk rating
C3	**Disturbance and management of uncontaminated spoil** Construction works will disturb a large volume of uncontaminated spoil as part of trenching which could impact human health and the environmental from dust generation and runoff to waterways.	Construction	All	Low	Low
C4	**Mobilisation of contaminated groundwater** Construction works cause mobilisation of existing contaminated groundwater impacting beneficial uses.	Construction	Pipeline	Low	Low
C5	**Leaks or spills** Leaks or spills during construction from plant/machinery operations, fuel and chemical storage leads to affecting soil quality, surface water quality and/or groundwater quality.	Construction	All	Low	Low
C6	**Leaks or spills** Ongoing operation of the facility and MLV leads to leaks (due to maintenance works) or spills affecting soil quality, surface water quality and/or groundwater quality.	Operation	All	Low	Low
C7	**Exposure to ground gases and vapour** Construction activities releasing vapours and / or ground gases from contaminated soil and / or contaminated groundwater, impacting human health or beneficial uses. This includes possible volatile contamination from the auto wreckers site in Diggers Rest and landfill gas migrating from adjacent landfill in Bulla.	Construction	All	Medium	Low

Risk ID	Risk description	Construction/ operation	Pipeline/ MLV/ compressor	Initial risk rating	Final risk rating
C8	**Management of waste streams** Mismanagement of waste streams generated during Project construction affects human health, aesthetics and the environment	Construction	All	Low	Low
C9	**Management of waste streams** Mismanagement of waste streams generated during Project operation affects human health, aesthetics and the environment	Operation	All	Low	Low
C10	**Contaminated hydrostatic test water** Handling, storage or disposal of water from hydrostatic testing affects human health and the environment from exposure to contaminants	Construction	Pipeline	Negligible	Negligible
C11	**Drilling fluids used for HDD** Drilling fluids used for HDD sections impacting groundwater and surface water quality and land.	Construction	Pipeline	Low	Low

9. Impact assessment

The impact assessment in this section is based on the historical and site information collected and presented above, including field investigations detailed in Section 6.3, and the proposed construction method for the Project. The impact assessment considers all risks identified as detailed in Table 8-1, in the context of the Project and associated mitigation measures to manage human health and environmental impacts.

This assessment has investigated the potential for contaminated soils, acid sulfate soil or rock, landfill gases and contaminated groundwater and surface water to be encountered during construction and cause an impact to human health or the environment during construction and operation.

The impact assessment also considers legislative, policy and guidance documentation that was in effect at the time of reporting. Refer to Section 4.3.2, for further details of key legislative changes coming into effect on 1 July 2021.

9.1 Construction impacts

9.1.1 Disturbance and management of existing contamination (inferred conditions)

Based on desktop review of existing conditions, it is expected that minor quantities of excavated soil may be contaminated as a result of existing and historical land uses. Potential sources of contamination and the associated contaminants of concern are summarised in Section 6.4.1.

The analytical results from the preliminary soil sampling did not identify contamination in soil samples however the majority of potential source sites were not sampled as previously discussed in Section 6.

This assessment has investigated the potential for earthworks to interact with contaminated soil and impact on human health or the environment.

A human health impact has the potential to be realised under the following scenarios:

- Direct contact with contaminated soil (adsorption through skin)
- Ingestion of contaminated soil
- Inhalation of dust or vapours

An ecological impact has the potential to be realised under the following scenarios:

- Runoff from exposed contaminated soil in stockpiles and excavations into water courses and drains. This would result in an increased contaminant load to the creeks and potentially increased silting of the water.
- Access to exposed contaminated soil to fauna

Based on the land use history within close proximity to the Project there were limited identified potential sources of contamination that would impact shallow soils (less than 2 mbgl) and therefore it is anticipated that minor quantities of contaminated soils may be encountered during construction. Contaminated soils are most likely to be encountered within and immediately adjacent to rail reserves (within shallow soils), the rural property in Diggers Rest (KP 9.95-KP 10.14), which is being used to store hundreds of wrecked cars, a possible former quarry in Beveridge (KP 37.5),the retarding basin in Kalkallo (KP 34- KP35.5) and the Wollert Compressor Station (KP 50.78 to KP 51.045).

Avoidance of potentially contaminated sites based on the Project corridor is not possible. Environmental mitigation measures to minimise the impacts have been recommended and would include:

- Contaminated soil to be managed in according with the SEPP (Prevention and Management of Contaminated Land) and the EPA IWRG 621 and 702
- Areas of potential contaminated soils would be identified in the CEMP and assessed prior to construction
- Where possible, contaminated soils would be avoided or left in situ to the extent possible
- Construction works during wet weather would be managed such that contaminated soils and surface water impacts can be managed
- Where it is necessary to excavate contaminated soils, they would be stockpiled separately, with containment measures appropriate to the type of contamination present
- Handling and transport of contaminated spoil for off-site treatment/disposal would be in accordance with EPA IWRG 621 and 702 and waste management standards set out in the CEMP
- All spoil handling and transport is conducted in accordance with the EPA IWRGs
- All stockpiles of potentially contaminated spoil are appropriately secured, lined and bunded to prevent leaching
- All stockpiles of potentially contaminated spoil are appropriately covered and bunded to limit rainwater ingress, dust generation and contact by fauna
- Stockpiling of contaminated soil is kept to a minimum and removed to landfill or other use at the earliest opportunity
- Transport companies must be licensed by EPA Victoria to carry contaminated soil
- Any material imported for use as backfill would be categorised as Fill Material in accordance with IWRG 621 and must be accompanied by relevant documentation confirming its compliance to the ‘Fill Material’ criteria
- Opportunities for reuse be investigated by the contractor and spoil that is unable to be reused be removed from site via designated haulage routes
- The waste management hierarchy to be considered

The acid sulfate soil desktop review indicates that acid sulfate soils are unlikely to be present within the Project and as such it is not anticipated that an EPA approved acid sulfate soil management plan would be required however further assessment is required where dewatering of alluvium may occur, specifically at Jacksons Creek and Merri Creek.

Soil investigations at sites identified as potentially contaminating were not considered necessary for the purpose of this EES. It is unlikely that the Project would mobilise contamination impacting human health and the environment at these sites when mitigation measures are implemented. Therefore, the impact is considered low due to:

- The extent of contaminated soils is anticipated to be localised at very few sites across the Project corridor as identified above
- Stockpile management measures will minimise exposure to contamination via limiting dust generation and stormwater runoff
- Disturbance and handling of potentially contaminated spoil would be short term

- In the unlikely event that contamination was mobilised the extent of impact would be expected to be very localised and impact reversible through containment and clean up measures
- Appropriate personal protective equipment and standard hygiene protocols will minimise potential impact to human health

9.1.2 Disturbance and management of existing contamination (unidentified contamination)

Disturbance of contamination in Project locations not identified as a potential source of contamination may be encountered during construction. This could be due to illegal dumping of waste and historical uncontrolled waste disposal that was unable to be identified during the desktop review. Disturbance of this material could lead to releases of contamination and potential adverse impacts to the human health and the environment consistent with those detailed in Section 9.1.1.

Avoidance of unidentified contaminated sites is not possible. Environmental mitigation measures to minimise the impacts have been recommended. The CEMP would include a procedure and contingency plans for identifying and managing any unexpected contamination. Assessment and management of any unexpected contamination must be conducted in accordance with relevant legislation, regulations and guidelines. Contaminated soil management procedures provided for Risk ID C1 would be included.

Former or current land uses, such as the retarding basin may act as sources for PFAS contamination to soil and groundwater on the construction corridor although the presence of PFAS has not been confirmed. Should further investigations identify PFAS in spoils, it should be managed in accordance with the PFAS NEMP and in consultation with the EPA.

It is unlikely that the Project would mobilise unexpected contamination and impacting human health and the environment when mitigation measures are implemented. Therefore, the impact is considered low due to:

- The likelihood of the Project encountering widespread contamination is considered unlikely based on the desktop review of current and historical land uses and the extent of contamination would be anticipated to be within discreet and localised locations, if any
- Environmental mitigation measures to cease ground disturbance and assess contamination minimises exposure by limiting contact with soils and allows the opportunity to plan the management measures specific to the contamination identified
- The disturbance to unexpected contamination would be of short duration prior to removal or containment based on EMM C2 which recommend the Project to cease ground disturbance in the immediate vicinity, assess contamination and identify appropriate management actions

9.1.3 Disturbance and management of uncontaminated spoil

This assessment has investigated the potential impact of uncontaminated spoil in stockpiles and open excavations on human health and the environment.

A human health impact has the potential to be realised through inhalation of dust and an ecological impact has the potential to be realised through runoff which would have a detrimental impact to waterways due to silting.

Avoiding spoil generation is not considered possible therefore environmental mitigation measures have been recommended to minimise impacts. The Project would need to stockpile uncontaminated spoil during construction works to reduce dust and runoff in accordance with EPA Victoria Publication 1834 – Civil construction, building and demolition guide and EPA Publication 1895 Managing Stockpiles.

It is unlikely that the Project would generate dust and runoff at a rate that would impact human health and the environment when mitigation measures are implemented. Therefore, the impact is considered low due to:

- Stockpiling measures would minimise dust generation and thus reduce exposure and extent of impact
- If generation of dust was to occur the exposure would be expected to be of short duration prior to mitigation measures being implemented
- Containment measures to restrict stormwater runoff from stockpiles as well as appropriate siting of stockpiles would avoid runoff from entering sensitive receptors such as Creeks
- Mobilisation of sediments during trenching through Creeks is anticipated to be of short duration and localised extent in which impacts will reduce with time

Further to the above and as discussed in Section 7.4, based on the low potential for contamination in soils outside of areas identified as potentially contaminating, it is recommended that such soils have unrestricted reuse both on and off site. However, if unexpected contamination is identified such as odours, staining or anthropogenic materials such as building rubble or asbestos containing materials, the spoil would require further assessment and be managed as per EMM C1 and EMM C2.

Uncontaminated spoil, as detailed above, does not require sampling to confirm reuse or for disposal. However, landfill operators / disposal sites may request assessment which should be confirmed once the disposal site is identified.

9.1.4 Mobilisation of contaminated groundwater

This assessment has investigated the potential for earthworks to interact with contaminated groundwater and impact on human health or the environment.

A human health impact has the potential to be realised under the following scenarios:

- Direct contact with contaminated groundwater (adsorption through skin)
- Ingestion of contaminated groundwater
- Mobilisation of existing plumes by dewatering or other activities that result in changes to groundwater levels causing migration of existing groundwater into previously uncontaminated areas, including where extraction bores are present

An ecological impact has the potential to be realised under the following scenario:

- Discharge of groundwater to surface water or over land
- Mobilisation of existing plumes by dewatering or other activities that result in changes to groundwater levels causing migration of existing groundwater into previously uncontaminated areas, causing discharge to waterways

The majority of identified potential sources of contamination based on the desktop review are located where groundwater is expected to be greater than 5 mbgl and unlikely to intercepted during trenching works. The Project is likely to intercept groundwater at Jacksons Creek and Deep Creek which may be affected by regional groundwater impacts from landfills within the study area. Preliminary PFAS sampling was completed in groundwater and surface water at Jacksons Creek and Deep Creek to investigate the potential for regional groundwater pollution from the Bulla Landfill and Hi-Quality Landfill. PFAS was reported below the laboratory LOR at all three wells sampled within the regional aquifer and the limited groundwater assessment was not indicative of landfill impacts. Surface water samples from Jacksons Creek reported elevated concentrations of PFOA and PFOS in which the source of contamination is unclear but may be attributed to historical discharge from the Sunbury Recycled Water Treatment Plant located approximately 4.5 kilometres upstream of the Projects crossing at Jacksons Creek. Further investigation of shallow groundwater and sediments to be disposed offsite at Jacksons Creek is recommended in order to inform disposal and management options as well as seeking relevant EPA approvals, if required. Refer to Section 6.3.2 for further details.

Groundwater or localised perched water was expected to be much shallower within the Kalkallo retarding basin. However, based on depth to groundwater as reported in BH10 and BH32, groundwater is expected to be at least seven meters below ground level and unlikely to be intercepted during construction.

Groundwater has not been investigated at other potential source sites however the depth to groundwater is expected to be deeper and not intercepted by the Project as detailed in Table 6-14.

Avoidance of potentially contaminated groundwater is not considered possible, therefore mitigation measures to minimise impacts have been recommended. Should contaminated groundwater be intercepted within the construction corridor, it could result in an adverse impact to humans and the environment. Contaminated groundwater would be managed as follows:

- Contaminated groundwater would be managed in accordance with SEPP (Waters) and disposal as per EPA Guidelines and approvals process
- Groundwater from areas that have been identified as contaminated would not be discharged to the environment (land, waterways). Options for management of this water would need to be in accordance with EPA regulations and guidelines and in consideration of the EPA's waste hierarchy.
- Contaminated groundwater would either be treated onsite, depending on contaminant encountered (this may require approval from the EPA Victoria) or disposed offsite to an EPA Victoria licensed facility. Alternatively, a construction approach may be adopted where contaminated groundwater is left in-situ (i.e. not abstracted for dewatering of excavations purposes or disturbed).

Overall, the potential to intercept groundwater contamination across the construction corridor where potential sources of contamination have been identified is considered remote due to the depth to groundwater at the majority of these locations. The exception being potential PFAS contamination at Jacksons Creek within shallow groundwater which requires further investigation to confirm PFAS presence. In addition, should further investigations identify PFAS, it should be managed in accordance with the PFAS NEMP and in consultation with the EPA.

Groundwater investigations at sites identified as potentially contaminating were not considered necessary for the purpose of this EES with the exception of Jacksons Creek and Deep Creek. It is unlikely that the Project would mobilise potential groundwater contamination impacting human health and the environment when mitigation measures are implemented.

Therefore, the impact is considered low due to:

- Groundwater is not likely to be intercepted by the trenching works at identified potential sources of contamination
- Groundwater from areas that have been identified as contaminated would not be discharged to the environment (land, waterways), unless groundwater conditions are investigated and subject to EPA approval
- Dewatering is of short duration, localised extent and at locations where source areas have not been identified thus the Project is unlikely to mobilise existing contamination to areas previously not impacted
- Appropriate personal protective equipment and standard hygiene protocols will minimise potential impact to human health

Refer to EES Technical Report C – Groundwater for further details regarding groundwater quality at areas likely to be intercepted by the Project but not within identified potential contamination source zones.

9.1.5 Leaks or spills

There is a possibility that spills may occur during the refuelling of vehicles, plant and machinery or the use of chemicals required as part of the construction which may impact soil quality and human health.

Environmental mitigation measures to minimise impact would include those listed in EMM C6 with key measures listed below:

- Minimise chemical and fuel storage on site and store hazardous materials and dangerous goods in accordance with the relevant guidelines and requirements
- Comply with the Victorian WorkCover Authority and Australian Standard AS1940 Storage Handling of Flammable and Combustible Liquids and EPA Victoria publications 1834 Civil construction, building and demolition guide and 1698 Liquid Storage and Handling Guidelines
- Spill kits will be available at all locations where machinery/plant are operating, refuelling points and fuel and chemical storage locations
- The type and volume of liquid material (fuel, oil, lubricant) stored on-site for construction activities is to be limited to only that which is required
- Liquid material would not be stored within 50 metres of waterways

Based on the above mitigation measures the impact has been assessed as low due to:

- Any such spills would be expected to be relatively small volumes at discreet locations (limited extent) rather than widespread contamination
- A spill event would be expected to be of short duration and promptly remediated to reduce extent of impact
- Small volumes are anticipated to be stored on site thereby reducing the potential magnitude of any spill

9.1.6 Exposure to ground gases and vapour

Vapours and landfill gases associated with contaminated soil and/or contaminated groundwater that could be encountered during excavation activities, have the potential to impact human health. Exposure to soil vapours and landfill gases can have an adverse impact on human health through the generation of volatiles, odour, inhalation or flammability and explosion.

Volatile contaminants (such as those generated by a petroleum hydrocarbon plume in groundwater) are unlikely to be present in soil and/or groundwater, based on existing conditions. Depending on the contaminant concentration and depth, the contaminants associated with existing contamination may not be present at the surface. Excavation of surface soils during construction has the potential to expose volatile contamination at depth, creating a pathway for gases and vapours to migrate from a subsurface source of vapour-forming chemicals (volatile organic compounds such as petroleum hydrocarbons in soil and/or groundwater) into buildings or other enclosed spaces via cracks in the foundation and/or openings for utility lines.

Possible sources of vapour-forming chemicals in the vicinity of the Project include the auto wreckers in Diggers Rest (located approximately at KP9.95-KP 10.14). Petrol stations, dry cleaners and industrialised areas were not observed within the vicinity of the Project.

The primary source of ground gases is the adjacent landfill and quarry in Bulla (located between KP 15.3 and KP 16). The potential impact to the Project is that landfill gas (notably methane) can accumulate in enclosed spaces such as trenches during construction and potentially result in explosive conditions.

The initial impact from ground gas and landfill gas was considered medium due to the potential consequence if gases were present without prior assessment which would include a range of different scenarios which are difficult to measure given the uncertainty of ground conditions.

The risk associated with the non-preferred alignment is considered higher, as the non-preferred alignment is directly adjacent to the landfill boundary where as only a small section of the preferred alignment is within 500 metres of the waste boundary.

In addition to the standard environmental mitigation measures as described in EMM C5, additional mitigation measures were recommended with key measures described below::

- Landfill gas
  - Continuous monitoring of landfill gas conditions when any person is in the trench or during hot works or works that could potentially produce a spark within the trench when within 500 metres of the waste boundary
  - Setting of trigger values and appropriate and proportionate contingencies for the management of work depending on concentrations of landfill gas detected. Triggers should consider explosion and asphyxiation potential impacts.
  - Contingencies to address any breaches of trigger values including temporary cessation of work until a reappraisal of risks is conducted, implementation of additional safety measures and or vapour extraction systems in response to the risk assessment
  - The aforementioned monitoring should be completed at the locations listed in Table 9-1.

Table 9-1 Landfill gas monitoring areas

Pipeline alignment	Tabl
Preferred alignment [1]	15.3 to 16
Non-preferred alignment [1]	KPs do not exist for the non-preferred alignment.
Note: 1 Monitoring should be completed when within 500 metres of the waste boundary	

- Auto wreckers in Diggers Rest
  - Shallow soil vapour assessment at the auto wreckers in Diggers Rest dependent upon soil investigation
  - Risk assessment to determine risk to construction workers during trenching

Based on the above additional mitigation measures the residual impact was assessed as low because:

- Real time continuous monitoring during construction, within 500 metres of the waste boundary in the landfill, allows the contractor to be aware of the current gas conditions within the trench and hence be aware of the potential impact to human health
- Setting of trigger values and appropriate contingencies allows the contractor to respond appropriately to gas conditions within the trench thereby significantly reducing the likelihood and consequence of health impacts from gas accumulation

Given gas conditions would be known during trenching and appropriate trigger values and contingencies would be in place, the likelihood of an adverse consequence was reduced from 'unlikely' to 'remote'. Remote indicates that the event could occur but is not anticipated unless abnormal circumstances prevail such as inaction when trigger values are exceeded.

9.1.7 Management of waste streams

The following waste streams relating to the Project have been considered and include:

- Commercial and industrial waste such as those relating to pipelining wastes, timber and steel
- Construction waste such as excess spoil and rock, bitumen and drilling fluids
- Domestic waste such as putrescible and general waste, plastic, paper and cardboard packing

The waste streams described above are generally inert with limited potential to impact human health other than aesthetics. The primary impact relates to impacts to the environment where wastes may enter sensitive receptors such as creeks, flow into drains and be accessible to fauna such as birds.

Avoidance of waste is generally not considered possible, therefore mitigation measures to minimise impacts have been recommended and would include those listed in EMM C7, specifically:

- Construction wastes to be managed in accordance with the IWR Regulations
- Undertake an assessment of potential wastes to be generated for the construction phase of the Project that identifies waste elimination, reduction measures and opportunities for the re-use and recycle of construction waste
- Appropriately designated/designed facilities to handle the identified waste streams including necessary segregation and storage requirements

- Dedicated and labelled on site disposal locations, which segregates wastes into streams for offsite disposal or recycling
- Waste facilities shall be located away from natural drainage systems and low-lying areas
- PIW (such as waste oils, oily water mixtures, oily rags and oil filters, etc) are segregated, labelled and securely stored and transported to a facility licensed to accept these wastes
- Appropriate waste classification and disposal to be used, including a licensed waste contractor and completion of waste transport certificates for PIW
- Toolbox includes specific awareness on chemical management/refuelling and differences between waste types to facilitate correct segregation, storage and disposal
- Putrescible wastes shall be sufficiently enclosed for odour control
- No PIW shall be comingled with other waste streams

Based on the mitigation measures described above the impact to human health and the environment is considered to be low due to:

- Wastes are generally inert and generally do not pose a risk to human health
- Wastes will be present on site for a short duration and contained within specified areas (limited extent) reducing the likelihood of interaction with sensitive receptors
- Wastes will be recycled or disposed off-site to an appropriate facility which also limits the likelihood of interaction with sensitive receptors

Potentially hazardous wastes including contaminated spoil, waste oils and filters, oily rags, grease, fuels and hydrostatic testing have been considered within Risk IDs C1, C2, C5 and C10.

9.1.8 Contaminated hydrostatic test water

Hydrostatic testing is a process where sections of the pipeline are filled with water and pressurised. Water is proposed to be collected from nearby dams or from water mains where suitable supply exists close to the construction corridor. Chemicals may need to be added to the water. Such water supplies would potentially be impacted by contaminants and may create an issue for water disposal.

A human health impact has the potential to be realised under the following scenarios:

- Direct contact with hydrostatic testing water (adsorption through skin)
- Ingestion of hydrostatic testing water

An ecological impact has the potential to be realised under the following scenario:

- Disposal or accidental spillage into waterways or drains
- Potential erosion and silting of waterways if approved by EPA to discharge to waterways

Environmental mitigation measures to avoid impact would include those listed in EMM C8 with key measures listed below:

- Water to be used for hydrostatic testing would be sampled to determine water quality prior to use
- Hydrostatic test water would be managed in accordance with SEPP (Waters)
- Prior to hydrostatic testing, the pipeline would be pre-cleaned to remove weld debris, dust and surface scale

Environmental mitigation measures to minimise impact would include those listed in EMM C8 with key measures listed below:

- Water would be reused where practicable to minimise the number of discharge locations and conserve water Hydrostatic test water discharge would only be undertaken where water designated for release into the environment is of a quality that is within relevant statutory water quality guidelines. Relevant landholder(s) would be consulted prior to any discharge of hydrostatic test water to land.
- Any discharge of hydrostatic test water would not result in soil erosion or sedimentation of land or water. Sediment control devices to remove suspended solids such as geotextile fabric filters would be used.
- No direct discharge would occur to watercourses or drains unless approved by EPA Victoria

Based on the above mitigation measures the impact has been assessed as negligible due to:

- Water quality of hydrostatic testing would be known prior to discharge, if approved, thereby reducing the likelihood of contaminants entering waterways
- Completion of hydrostatic testing is of short duration, limited to the pipeline at a localised scale thereby limiting the extent of impact

9.1.9 Drilling fluids used for HDD

The use of drilling fluids (such as bentonite) during trenchless HDD operations can result in blow-out (or “fracking”), whereby the drilling fluid leaks through the bore into the surrounding soil, surface water or aquifer.

Blow-out is typically associated with the over-pressurisation of bore support fluid in cohesionless granular materials. Based on Technical Report D - Land stability and ground movement, this is considered to be a rare circumstance for the trenchless crossings expected for construction of the pipeline and the impact to the creek has been assessed as minor.

This assessment has investigated the potential impact of blow out from a contamination perspective. Refer to Technical Report D - Land stability and ground movement for recommended environmental management measures to minimise the likelihood of blow out occurring.

Drilling fluids are unlikely to impact human health as the drilling fluids are generally inert and standard personal protective equipment for handling such materials would limit exposure.

Impact to the environment has the potential to be realised under the following scenarios:

- Blow out across land which may runoff into sensitive receptors such as waterways and flow into drains
- Blow out into surface water, silting the waterway
- Blow out into the aquifer beyond the drilling location

Key recommended environmental mitigation measure to minimise impacts would include:

- Spill kits or similar would be available to contain spills on land, preventing runoff into surface water and drains
- Identification of contingency measures when HDD activities are in the vicinity of waterway zones
- Drilling fluids will be disposed in accordance with Environment Protection (Industrial Waste Resource) Regulations 2009 and EPA Victoria Industrial Waste – Classification for Drilling Mud, Victoria Government Gazette G37

- If HDD occurs through a potentially contaminated site, sampling for contaminants of concern at a frequency consistent with IWRG 621 and 702 would be considered to provide a waste classification to inform offsite disposal

The impact from contamination if blow out does occur is expected to be low based on the following:

- Drilling fluids are designed to stabilise and seal the hole and therefore the extent of movement into the aquifer system will be very limited
- Drilling fluids are generally inert and commonly used in the groundwater bore drilling industry
- Impacts from blow out into waterways and across land would be anticipated to be short term, reversible and on a localised scale. Implementation of mitigation measures described in Technical Report D - Land stability and ground movement which considers management and monitoring requirements during HDD drilling operation.

9.2 Operation impacts

9.2.1 Leaks or spills

There is a possibility that leaks, or spills may occur during the refuelling of vehicles, plant and machinery or the use of chemicals required as part of the maintenance works during operation which may impact soil quality and human health.

Environmental mitigation measures to minimise impact would include those listed in EMM C10 with key measures listed below:

- All operations and maintenance are to be conducted in accordance with EPA Industrial Waste Resource Guidelines
- Any chemical/fuel spill waste to be captured and disposed off-site as regulated waste using EPA licensed waste contractor
- Spill kits are maintained onsite at all times and training provided for use of spill kit
- Toolbox includes specific awareness on chemical management /refuelling and differences between waste types to facilitate correct segregation, storage and disposal
- Any fuels or chemicals stored on site must be stored in an AS1940 compliant bund or double skinned tanks to prevent any spills impacting soil or water
- Chemical and waste storage and refuelling areas shall be designated away from watercourses to minimise the risk of contamination during handling and use

The Project will be incorporated into the existing VTS OEMP.

The impact of fuel or chemical spills causing contamination to soil is assessed as low when considering the management measures based on the following:

- Any such spills would be expected to be relatively small volumes at discreet locations rather than widespread contamination
- A spill event would be expected to be of short duration and promptly remediated to reduce extent of impact
- Small volumes are anticipated to be stored on site thereby reducing the potential magnitude of any spill

9.2.2 Management of waste streams

The Project would not likely generate large amounts of wastes associated with ongoing operation and maintenance activities. Spills relating to fuel and chemical use are considered above.

Environmental mitigation measures to minimise impact to human health and the environment would include those listed in EMM C10 with key measures listed below:

- All operations and maintenance are to be conducted in accordance with EPA Industrial Waste Resource Guidelines
- General and regulated waste collection bins provided
- Oily rags and filters are segregated, labelled and securely stored and disposed as regulated waste
- Appropriate waste classification and disposal to be used, including a waste contractor and waste tracking receipt
- All staff and contractors are inducted into the VTS OEMP which includes risk and controls associated with: waste management, chemical management and refueling, weed and pest management and incident response
- Toolbox includes specific awareness on chemical management/refuelling and differences between waste types to facilitate correct segregation, storage and disposal
- Spilt material will be collected into regulated waste bins and taken offsite by licenced third party to an approved facility. Regulated waste disposal records will be provided
- Designated covered bins will be provided for general waste to minimise litter generation

Appropriate waste classification Based on the mitigation measures described above and as included in EMM C10, the impact to human health and the environment is considered to be low due to:

- Wastes will be present on site for a short duration and contained within specified areas reducing the extent of potential impact and the likelihood of interaction with sensitive receptors
- Wastes will be disposed off-site to an appropriate facility which also limits the likelihood of interaction with sensitive receptors

9.3 Cumulative impact assessment - contamination

As the current spoil volume estimates anticipated to be disposed off site have not yet been prepared for the Project, it was not possible to undertake a cumulative impact assessment. However, given the scale and construction methodology for the Project, much of the spoil removed to facilitate construction would most likely be reused as a part of the reinstatement phase. Therefore, subject to a market assessment of landfill capacity, there would be limited spoil required to go directly to landfill and this is unlikely to create a material impact to landfill capacity or to landfill capacity available to other projects, such as the Sunbury Road Upgrade, the Bald-Hill - Yan Yean Pipeline and the Western Victoria Transmission Network project and potentially the North East link and Westgate Tunnel.

Although offsite disposal of spoil to landfill is the least desirable option for spoil management, Victoria has several options and significant capacity available for spoil disposal and for treatment of highly contaminated soil should the need arise. These are summarised in Table 9-2 and Table 9-3, respectively.

Table 9-2 Landfills listed on EPA licence schedule

Landfill Name	Location	Owner / operator	EPA Licence	Licenced PIW waste types	Likely closure date
Cleanaway – MRL Ravenhall	1154-1198 Christies Road, Ravenhall	Cleanaway	12160	Contaminated soil (Category C) Waste acid sulfate soils	Potential to operate beyond 2046
SUEZ Lyndhurst	890 Taylors Road, Dandenong South	SUEZ	74643	Contaminated soil (Category C) Various prescribed waste – Cat B and C Potential acid sulfate soils	Potential to operate beyond 2046
Hanson-Wollert Landfill	45 Bridge Inn Road, Wollert	Hanson Construction Materials	12309	Contaminated soil (Category C) Asbestos	Potential to operate beyond 2046
Hi Quality Bulla	600 Sunbury Road, bulla	Hi Quality Quarry Products	45279	Contaminated soil (Category C) Waste acid sulfate soils Potential acid sulfate soils Asbestos	Potential to operate beyond 2046
Maddingley Brown Coal	11 Tilleys Road, Maddingley	Maddingley Brown Coal Pty Ltd	45288	Waste acid sulfate soils Contaminated soil (Category C)	2033 - 2034

Table 9-3 Soil treatment facilities in Melbourne

Owner / operator	Location	EPA Licence	Licenced PIW waste types	Approx. annual throughput
RENEX Group	109-131 Ordish Rd, Dandenong South VIC 3175	127069	Category A, B and C contaminated soil Various other PIW	70,000 to 10,000 tonnes
EnviroPacific Services Pty Ltd – SOLVE facility	541-583 Kororoit Creek Rd, Altona VIC 3018	186685	Category A, B and C contaminated soil	100,000 tonnes

Owner / operator	Location	EPA Licence	Licenced PIW waste types	Approx. annual throughput
Veolia Environmental Services (Australia_ Pty Ltd	15- 19 McDonald Rd Brooklyn VIC 3012	74276	Various PIW	8,000 to 12,000 tonnes
SUEZ and Veolia	890 Taylors Road, Dandenong South	Pending	Category A, B and C contaminated soil Subject to waste types listed on EPA licence	60,000 tonnes

10. Environmental management measures

The recommended environmental management measures (EMMs) relevant to contamination assessment are listed in Table 10-1.

The EMMs have been developed with consideration of the EPA waste management hierarchy as discussed in Section 7 and have endeavoured to default to the most preferable options before consideration of less preferable management options.

Avoidance was considered as a first preference. Based on the current pipeline alignment, avoidance of spoil generation is not considered possible. However, there is scope for avoiding potentially contaminated soils through realignment away from areas identified as potentially contaminated although considered unnecessary based on risk.

Reuse of spoil as backfilling is considered the most viable option for the majority of the spoil, although there may be an excess of spoil remaining after this process. This remaining spoil will need to be assessed and managed under a CEMP and in accordance with the EPA's waste regulations and guidelines in effect at the time of construction. It is considered unlikely that gross contamination is present on site such that options involving soil treatment should not be required.

The EMMs prescribe the management and mitigation measures to manage spoil at all stages of the Project from assessment to excavation to completion and operation. The EMMs consider the legislation and regulations relevant at the time of reporting. Refer to Section 4.3.2, for further details of key legislative changes coming into effect on 1 July 2021, which will require consideration and adherence by the contractor during construction.

Table 10-1 Recommended Environmental management measures

	Environmental Management Measure	Stage
C1	**Implement spoil management measures** Prepare and implement spoil management measures in accordance with relevant regulations, standards and guidelines including EPA Publication 1834 Civil construction, building and demolition guide. The spoil management measures must be developed in consultation with the EPA Victoria and include processes and measures to manage all spoil types i.e. all excavated material. The main spoil types would include mostly uncontaminated soils and potentially small volumes of prescribed industrial waste (PIW) in the vicinity of the potential sources noted in Technical report E Contamination. The spoil management measures must define roles and responsibilities and include requirements and methods for: <u>General</u> • Complying with applicable regulatory requirements including EPA Publication 1834 Civil construction, building and demolition guide and SEPP (Prevention and Management of Contaminated Land) • Investigations in accordance with the Australian Standard AS 4482.1:2005 Guide to the investigation and sampling of sites with potentially contaminated soil, the ASC NEPM and the EPA Victoria Industrial Waste Resource Guidelines (IWRGs) • Leaving contaminated soils in-situ to the extent possible • Assessment of any material imported to the site for use as backfill in accordance with IWRG 621 and 702. Imported material must meet the 'Fill Material' criteria as defined in Table 2 of IWRG621. <u>Assessment</u>	Construction

	Environmental Management Measure	Stage
	• Completing further soil investigations to assess soil quality for the analysis detailed in Technical report E Contamination prior to construction in order to inform the CEMP: – At the Diggers Rest (KP 9.95 - KP10.14), which is being used to store hundreds of wrecked cars – A possible former quarry in Beveridge (KP 37.5) along the construction corridor to ascertain if the former quarry extents encroaches onto the Project – The retarding basin (KP 34-35.5) prior to any excavation in these areas – Wollert Compressor Station (KP 50.78 to KP 51.045) – Shallow sediments in Jacksons Creek • Following these further investigations, updating the CEMP to include areas of potential contaminated soils • Identifying where any contaminated or hazardous material is exposed during construction and how it would be made safe for the site owner and the environment. Beneficial uses of land and ASC NEPM guidance on criteria protective of those beneficial uses must be considered for the land uses in these areas. <u>Unexpected contamination</u> • Identifying, containing and managing unexpected contamination in accordance with applicable regulatory requirements including EPA IWRG 621 and 702 <u>Handling, stockpiling and transport</u> • Conducting all spoil handling and transport for offsite disposal in accordance with the EPA IWRGs • Managing construction works during wet weather, which can lead to runoff of contaminated and uncontaminated soil from stockpiles and excavations into nearby waterways, in accordance with SW1 and SW4 • Regularly monitoring weather conditions and planning works accordingly to avoid or minimise impact to sensitive receptors from works during adverse weather (i.e. runoff from rainfall) • Implementing personal protective equipment and standard hygiene practices when handling contaminated spoil • Separating stockpiles of trench spoil into contaminated and uncontaminated soil. As both of these waste types can adversely impact the environment (e.g. through runoff to waterways), all stockpiles must be managed in accordance with EPA Victoria Publication 1834 Civil construction, building and demolition guide and EPA Publication 1895 Managing Stockpiles, 2020. • Where it is necessary to excavate contaminated soils, stockpiling these separately, with containment and treatment measures appropriate to the type of contamination present. This must include. – All stockpiles of potentially contaminated spoil must be appropriately secured, lined and bunded to prevent leaching – All stockpiles of potentially contaminated spoil must be appropriately covered and bunded to limit rainwater ingress, dust generation and contact by fauna – Stockpiling of contaminated soil must be kept to a minimum and removed to landfill or other use at the earliest opportunity • Handling and transport of contaminated spoil for off-site treatment/disposal in accordance with Environment Protection	

	Environmental Management Measure	Stage
	(Industrial Waste Resource) Regulations 2009. Transport companies must be licensed by EPA Victoria to carry contaminated soil. • Managing PFAS-impacted soil (if any) in accordance with the PFAS NEMP and EPA guidance • Monitoring, recording and tracking spoil and other waste handling including but not limited to stockpile management, trucking and destination tracking, and sampling results <u>Reuse or Disposal</u> • Assessing potentially contaminated spoil, which is to be disposed of offsite, in accordance with IWRG 621 and 702 • Considering the waste management hierarchy including opportunities for reuse, with spoil that is unable to be reused to be removed from site via designated haulage routes • Disposing drilling muds in accordance with Environment Protection (Industrial Waste Resource) Regulations 2009 and EPA Victoria Industrial Waste – Classification for Drilling Mud, Victoria Government Gazette G37	
C2	**Managing any unknown contamination** The spoil management measures referenced in EMM C1 must include requirements and methods to address and manage any contamination that was not expected during construction. Such material may be identified by visual or olfactory observations, the presence of asbestos and other anthropogenic material. The spoil management measures must include contingency plans and appropriate responses in accordance with EPA guidelines. These must include, as a minimum: • Cease ground disturbance at the unknown contamination location and within the immediate vicinity • Assess site contamination and identify appropriate management action	Construction
C3	**Minimise impacts from disturbance of acid sulfate soil** PASS may be present in saturated alluvium beneath and within close proximity to the creeks. Carry out further assessment where dewatering of alluvium may occur, specifically at Jacksons Creek and Merri Creek. The spoil management measures referenced in EMM C1 must include requirements and methods to minimise impacts from disturbance of acid sulfate soil, including but not limited to: • Characterising acid sulfate soil and rock prior to excavation in accordance with EPA Publication 655.1 Acid sulfate soil and rock • Developing appropriate stockpile areas including lining, covering and runoff collection to prevent release of acid to the environment • Identifying suitable sites for re-use, management or disposal of acid sulfate soil • Preventing oxidation that could lead to acid formation if practicable, through cover and/or scheduling practices, for example by minimising the length of time that acid sulfate soil is left in stockpiles as far as reasonably practicable and/or addition of neutralising compounds • Completing further acid sulfate soil assessment prior to construction in order to inform the CEMP at: – Jacksons Creek – Merri Creek • Requirements and methods must be in accordance with the Industrial Waste Management Policy (Waste Acid Sulfate Soils), EPA Victoria	Construction

	Environmental Management Measure	Stage
	Publication 655.1 Acid Sulfate Soil and Rock, and the Department of Sustainability and Environment's Victorian Best Practice Guidelines for Assessing and Managing Coastal Acid Sulfate Soil	
C4	**Minimise risks from contaminated groundwater** Develop and implement groundwater management measures in accordance with EMM G3:	Construction
C5	**Minimise risks from vapour and ground gas intrusion** Relevant sections of the Project must consider vapours and gases associated with any construction that interfaces with landfill sites (within 500 metres of the boundary of the waste) or contaminated areas. These include the sections of the alignment adjacent to the Bulla Landfill (approx. KP 15 to KP 16) and near the Diggers Rest property (approx. KP 9.95- KP 10.14). The spoil management measures referenced in EMM C1 must include requirements for assessment, monitoring and management of intrusive vapour, including potentially flammable or explosive conditions, in enclosed spaces within 500 metres of the Bulla Landfill (approx. KP 15-KP 16) and Diggers Rest (approx.. KP 9.95- KP 10.14) property and trenches in those areas. The spoil management measures must address vapour risks associated with excavation of impacted soils, extraction of impacted groundwater, open excavations and stockpiles and gases. Specifically associated with the Bulla Landfill (KP 15-KP 16), this must include, where relevant: • Securing of the excavation and stockpile area from the public and livestock including signage warning of open excavations • Continuous monitoring of landfill gas conditions when any person is in the trench or during hot works or works that could potentially produce a spark within the trench • Setting of trigger values that require action within areas being trenched and including any temporary structures within the vicinity of the landfill. These must be developed in accordance with EPA Victoria Publication 788 Best Practice Management; Siting, design, operation and rehabilitation of landfills (landfill BPEM) and relevant occupational health and safety regulations and compliance codes. • Contingencies to address any breaches of trigger values including temporary cessation of work until a reappraisal of risks is conducted, additional monitoring at a higher frequency, implementation of additional safety measures and or vapour extraction systems in response to the risk assessment Specifically relevant to the Diggers Rest property (approx. KP 9.95- KP 10.14), this must include, prior to construction to inform the CEMP: • Investigation of soils within the construction corridor to assess for the presence contamination including metals, TRHs, BTEX, PAHs and solvents • If volatile contamination is identified a risk assessment to determine the risk from vapours to construction workers during trenching may be required	Construction

	Environmental Management Measure	Stage
C6	**Manage chemicals, fuels and hazardous materials** The spoil management measures must include requirements for management of chemicals, fuels and hazardous materials including to: • Minimise chemical and fuel storage on site and store hazardous materials and dangerous goods in accordance with the relevant guidelines and requirements • Comply with the Victorian WorkCover Authority and Australian Standard AS1940 Storage Handling of Flammable and Combustible Liquids and EPA Victoria publications 1834 Civil construction, building and demolition guide and Publication 1698: Liquid storage and handling guidelines – EPA Victoria. • Develop and implement management measures for dangerous substances, including: – Creating and maintaining a dangerous goods register – Disposing of any hazardous materials, including asbestos, in accordance with Industrial Waste Management Policies, regulation and relevant guidelines – Implementing requirements for the installation of bunds and precautions to reduce the risk of spills • Develop and implement contingency and emergency response procedures to handle fuel and chemical spills, including availability of on-site hydrocarbon spill kits • Make spill kits available at all locations where machinery/plant are operating, refuelling points and fuel and chemical storage locations • Limit the type and volume of liquid material (fuel, oil, lubricant) stored on-site for construction activities to only that which is required • Liquid material must not be stored within 50 metres of waterways	Construction
C7	**Management of waste streams** Implement the following measures to manage non hazardous waste: • Manage wastes in accordance with the IWR Regulations • Undertake an assessment of potential wastes to be generated for the construction phase of the Project that identifies waste elimination, reduction measures and opportunities for the re-use and recycle of construction waste • Use appropriately designated/designed facilities to handle the identified waste streams including necessary segregation and storage requirements. This must include dedicated and labelled on site disposal locations, which segregates wastes into streams for offsite disposal or recycling • Locate waste facilities away from natural drainage systems and low-lying areas • PIW (such as waste oils, oily water mixtures, oily rags and oil filters, etc) must be segregated, labelled and securely stored and transported to a facility licensed to accept these wastes • Classify and dispose waste in accordance with the IWR Regulations including by using a licensed waste contractor and completing waste transport certificates for PIW • Carry out a toolbox meeting including specific awareness on chemical management/refuelling and differences between waste types to facilitate correct segregation, storage and disposal • Sufficiently enclose putrescible wastes for odour control (e.g. use of suitable bins) • No PIW shall be comingled with other waste streams	Construction

	Environmental Management Measure	Stage
	• Document and implement a detailed process for monitoring, recording and tracking waste handling	
C8	**Management of hydrostatic test water** Implement measures for management of hydrostatic testing water including: • Manage hydrostatic test water in accordance with SEPP (Waters) • Sample water to be used for hydrostatic testing to determine water quality prior to use • Prior to hydrostatic testing, pre-clean the pipeline to remove weld debris, dust and surface scale • Reuse water where practicable to minimise the number of discharge locations and conserve water • Only discharge hydrostatic test water discharge where water designated for release into the environment is of a quality that is within relevant statutory water quality guidelines. Relevant landholder(s) must be consulted prior to any discharge of hydrostatic test water to land. • Any discharge of hydrostatic test water must not result in soil erosion or sedimentation of land or water. Sediment control devices to remove suspended solids such as geotextile fabric filters must be used. • Direct discharge must not occur to watercourses or drains	Construction
C9	**Management of drilling fluids** Implement measures for management of drilling fluids including: • Making spill kits or similar available to contain spills on land, preventing runoff into surface water and drains • Identifying and implementing contingency measures when HDD activities are in the vicinity of waterway zones • Disposing drilling fluids in accordance with Environment Protection (Industrial Waste Resource) Regulations 2009 and EPA Victoria Industrial Waste – Classification for Drilling Mud, Victoria Government Gazette G37 • If HDD occurs through a potentially contaminated site the IWRG 621 and 702 must be followed for offsite disposal • Selecting appropriate inert drilling fluids	Construction
C10	**Minimise contamination risks during operation** Operate the Project in accordance with the existing VTS OEMP. Key design and operation measures must include: • Conducting all operations and maintenance (including wastes) in accordance with EPA Industrial Waste Resource Guidelines • No permanent storage of fuel or other chemicals along the pipeline corridor • Compressor on a concrete area and surrounded by crushed rock hard stand and under cover with a shelter roof • Above ground oily water separator with triple interceptor and underground overflow pit with level sensors serviced annually • Provision of general and regulated waste collection bins • Use of quick break detergents suitable for oily water separator • Annual stack test monitoring and servicing of compressors • Ensuring PIW (such as waste oils, oily water mixtures, oily rags and oil filters, etc) are segregated, labelled and securely stored and transported to a facility licensed to accept these wastes	Operation

	Environmental Management Measure	Stage
	• Appropriately classifying and disposing waste including using a regulated waste contractor and completion of waste transport certificates for PIW • Maintain spill kits onsite at all times and providing training for use of spill kit • Inducting all staff and contractors into APA HSE policies and procedures including risks and controls associated with: waste management, chemical management and refuelling, weed and pest management and incident response • Carrying out toolbox meetings including specific awareness on chemical management /refuelling and differences between waste types to facilitate correct segregation, storage and disposal • Pre- start checks of plant, equipment and vehicles will be conducted to check for oil leaks • Storing any fuels or chemicals on site in an AS1940 compliant bund or double skinned tanks to prevent any spills impacting soil or water • Regular inspections on spill controls/bunding; • Designating chemical and waste storage and refuelling areas away from watercourses to minimise the risk of contamination during handling and use • Refuelling to be carried out on hardstand or over a drip tray to capture spills and minor leaks • Collecting spilt material into regulated waste bins to be taken offsite by an EPA licenced third party to an approved facility. Regulated waste disposal records must be provided. • Providing designated covered bins for general waste to minimise litter generation • Providing a detailed process for monitoring, recording and tracking waste handling	

10.1 Recommended performance criteria and management

The recommended mitigation measures to meet the performance criteria scoping requirements have been included within Table 10-2.

Table 10-2 Performance criteria and management

Scoping requirement	Performance criteria
Describe proposed measures to monitor the management of solid and liquid wastes during all Project phases.	The CEMP must include a detailed process for monitoring, recording and tracking spoil and other waste handling including stockpile management, trucking and destination tracking, sampling results etc.
Describe proposed measures to reduce, monitor and audit discharges to water from the Project	Management of contaminated groundwater in accordance with SEPP (Waters) and disposal as per EPA Guidelines and approvals process. Direct the management of contaminated groundwater. This would either be treated onsite, depending on contaminant encountered or disposed offsite to an EPA Victoria licensed facility. Alternatively, a construction approach may be adopted where contaminated groundwater is left in-situ (i.e. not abstracted or disturbed). No direct discharge of hydrostatic water would occur to watercourses or drains

Scoping requirement	Performance criteria
	Identification of contingency measures when HDD activities are in the vicinity of waterway zones Spill kits or similar would be available to contain drilling fluid spills on land, preventing runoff into surface water and drains.
Describe contingency measures for responding to unexpected impacts resulting from waste management or discharges	The CEMP must include a procedure for identifying, containing and managing unexpected contamination in accordance with applicable regulatory requirements including EPA IWRG 621 and 702. The spoil management measures would need to include contingency plans and appropriate responses in accordance with EPA guidelines. These might include, as a minimum: a. Cease ground disturbance at the unknown contamination location and within the immediate vicinity. b. Assess site contamination and identify appropriate management action. Contingency and emergency response procedures to handle fuel and chemical spills, including availability of on-site hydrocarbon spill kits

11. Summary and Conclusion

The purpose of this report is to provide a contamination impact assessment to inform the preparation of the EES required for the Project.

A summary of the key assets, values or uses potentially affected by the Project, and the associated impact assessment are summarised below.

11.1 Existing conditions

11.1.1 Soil

The desktop assessment and limited soil sampling undertaken along the construction corridor indicated that the historical and current land uses were primarily agricultural with portions of the study area being used for industrial purposes such as quarrying and landfilling.

The areas of concern identified within the Project study area are summarised in Section 6.4.1. The most notable are:

- Auto wreckers located at 140 Duncans Lane Diggers Rest (KP 9.95- KP 10.14)
- Kalkallo retarding basin (KP 34- KP 35.5)
- Possible former quarry in Beveridge (KP 37.5) Wollert Compressor Station (KP 50.78 to KP 51.045)

The preliminary soil sampling associated with groundwater bore installation was not specifically targeted at contamination sources and did not identify contamination at locations sampled. The limited results indicated that shallow soils are likely suitable for reuse at the site of origin in areas not identified as potential sources of contamination.

Further testing is required in:

- Areas identified as potential contaminant sources, where spoil is to be excavated, such as the Diggers Rest property and the Wollert Compressor Station
- The former quarry at Beveridge to confirm or otherwise, the presence of any landfilling
- Areas of unforeseen contamination unearthed during construction
- Kalkallo retarding basin to assess for the presence of PFAS
- Rail reserves if shallow soil are to be intercepted. Noting that based on current construction details, the entry and exit pits are located outside of the rail reserves and thus sampling at this point is not required.
- Shallow sediments at Jacksons Creek to determine the presence of PFAS

11.1.2 Acid sulfate soils

PASS and AASS were not identified in the samples assessed but further sampling and analysis may be required if excavating soils beneath the water table in alluvium such as at creek crossings at Jacksons Creek, (approx. KP 13.6), and Merri Creek (approx. KP42.8) in accordance with EPA Publication 655.1.

11.1.3 Groundwater

Analysis of groundwater to date has not identified significant contamination. Groundwater has not been investigated at the majority of potential source areas identified however groundwater is unlikely to be intercepted at these locations.

Groundwater intercepted at Jacksons Creek and Deep Creek crossing has the potential to be impacted by regional groundwater pollution from landfills within the study area, including PFAS. The preliminary PFAS investigation completed at these aforementioned creeks reported PFAS below the laboratory LOR. However as previously discussed, the screened depth of groundwater wells were insufficient to assess groundwater likely to be extracted during dewatering at Jacksons Creek.

Further investigation is required at Jacksons Creek, to assess for the presence of PFAS to inform the management of any water extracted for dewatering purposes. PFAS in groundwater may also be entrained in spoil which would impact on its management. However, further PFAS assessment at Deep Creek is not considered warranted as discussed in Section 6.3.2.

Disposal of groundwater to the land as irrigation may be precluded in some sections of the alignment by the salinity. Refer to the EES Technical Report C – Groundwater for a more detailed discussion on groundwater management.

11.1.4 Surface water

Analyses of surface water to date has not identified any significant contamination other than low levels of PFAS in Jacksons Creek where PFAS was reported just above the laboratory LOR. Further sampling and analyses completed in February 2021 at Jacksons Creek confirmed the presence of PFAS in samples. As such, investigation of shallow groundwater and sediments is recommended. Landfill gas

No analysis of landfill gas (notably methane) has been undertaken. Landfill gas originating from the Bulla Landfill has the capacity to migrate and impact enclosed spaces and trenches within 500 metres of the landfill (boundary of the waste), potentially impacting the alignment near KP15.3 and KP16 and the non-preferred alignment. An intrusive investigation of landfill gas is not recommended as discussed in Section 6.4.2. Rather than a landfill gas investigation, contingency measures for monitoring during construction have been recommended in Section 10. Soil vapour

Inspection of the Diggers Rest property identified a large number of dumped vehicles and storage of solvents and generally poor condition of the site. The site has the potential to leak hydrocarbons, oils and volatile organic compounds (VOCs) which can create a vapour risk in enclosed spaces and trenches. Such material can also pose an odour risk for any excavations and stockpiles. It is recommended therefore that soil sampling be conducted on this site to assess the presence of such chemicals so as to inform the construction contractor on potential soil vapour mitigation (if required).

11.2 Risk assessment

A risk assessment of Project activities was performed in accordance with the methodology described in Section 5.4. Risks were assessed for the construction and operation of the Project. A total of 11 risk items were identified and assessed as either negligible risk or low risk. These included disturbance and management of both inferred or unidentified contamination and acid sulfate soils, disturbance of uncontaminated spoil, mobilisation of contaminated groundwater, exposure to ground gases and vapour, management of hydrostatic test water, accidental leaks or spills and drilling fluids used during HDD. Accountability and management controls will be set out in statutory management plans including the CEMP and VTS OEMP under the Pipelines Act.

11.3 Impact assessment

The impact assessment is based on the historical and site information and the proposed construction method for the Project. The impact assessment considers all risks identified as detailed in Table 8-1, in the context of the Project and associated mitigation measures to manage human health and environmental impact.

Soil and groundwater investigations at sites identified as potentially contaminating were not considered necessary for the purpose of this EES. The impact of the Project mobilising contamination and impacting human health and the environment at these sites is considered low when mitigation measures are implemented which includes the contractor assessing and managing these sites as per Section 10.

11.3.1 Construction impacts

Disturbance and management of existing contamination (inferred conditions)

Based on desktop review of existing conditions, it is expected that minor quantities of excavated soil may be contaminated as a result of existing and historical land uses.

The impact from the Project mobilising contamination and impacting human health and the environment at potentially contaminated sites is considered low when mitigation measures are implemented due to:

- The extent of contaminated soils is anticipated to be localised at very few sites across the Project corridor
- Stockpile management measures will minimise exposure to contamination via limiting dust generation and stormwater runoff
- Disturbance and handling of potentially contaminated spoil would be short term
- In the unlikely event that contamination was mobilised the extent of impact would be expected to be very localised and impact reversible through containment and clean up measures
- Appropriate personal protective equipment and standard hygiene protocols will minimise potential impact to human health

Disturbance and management of existing contamination (unidentified contamination)

Disturbance of contamination in Project locations not identified as a potential source of contamination may be encountered during construction. This could be due to illegal dumping of waste and historical uncontrolled waste disposal that was unable to be identified during the desktop review.

The impact of the Project mobilising unexpected contamination and impacting human health and the environment is considered low when mitigation measures are implemented due to:

- The likelihood of the Project encountering widespread contamination is considered unlikely based on the desktop review of current and historical land uses and would be anticipated to be within discreet and localised locations, if any
- Environmental mitigation measures to cease ground disturbance and assess contamination minimises exposure by limiting contact with soils and allows the opportunity to plan the management measures specific to the contamination identified

- The disturbance to unexpected contamination would be of short duration prior to removal or containment based on EMM C2 which recommend the Project to cease ground disturbance in the immediate vicinity, assess contamination and identify appropriate management actions

Disturbance and management of uncontaminated spoil

This assessment has investigated the potential impact of uncontaminated spoil in stockpiles and open excavations on human health and the environment.

The impact of the Project generating dust and runoff impacting human health and the environment is considered low when mitigation measures are implemented due to:

- Stockpiling measures would minimise dust generation and thus reduce exposure
- If generation of dust was to occur the exposure would be expected to be of short duration prior to mitigation measures being implemented
- Containment measures to restrict stormwater runoff from stockpiles as well as appropriate siting of stockpiles would avoid runoff from entering sensitive receptors such as Creeks
- Mobilisation of sediments during trenching through Creeks is anticipated to be of short duration and localised extent in which impacts will reduce with time

Mobilisation of contaminated groundwater

This assessment has investigated the potential for earthworks to interact with contaminated groundwater and impact on human health or the environment.

The impact of the Project mobilising contamination and impacting human health and the environment at these sites is considered low when mitigation measures are implemented due to:

- Dewatering is of short duration, localised extent and at locations where source areas have not been identified thus the Project is unlikely to mobilise existing contamination to areas previously not impacted
- Further investigation of groundwater conditions allows the Project to dispose of contaminated groundwater, if identified, rather than storing on site thereby reducing the likelihood of exposure to the environment and human health
- Appropriate personal protective equipment and standard hygiene protocols will minimise potential impact to human health

Leaks or spills

There is a possibility that spills may occur during the refuelling of vehicles, plant and machinery or the use of chemicals required as part of the construction which may impact soil quality and human health.

Based on the mitigation measures the impact has been assessed as low due to:

- Any such spills would be expected to be relatively small volumes at discreet locations rather than widespread contamination
- A spill event would be expected to be of short duration and promptly remediated to reduce extent of impact
- Small volumes are anticipated to be stored on site thereby reducing the potential magnitude of any spill

Exposure to ground gases and vapour

Vapours and landfill gases associated with contaminated soil and/or contaminated groundwater that could be encountered during excavation activities, have the potential to impact human health. Exposure to soil vapours and landfill gases can have an adverse impact on human health through the generation of volatiles, odour, inhalation or flammability and explosion.

Based on the additional mitigation measures associated with landfill gas (Bulla Tip and Quarry) and ground vapour (auto wreckers in Diggers Rest) the residual risk was assessed as low because:

- Real time continuous monitoring during construction, within 500 metres of the waste boundary in the landfill, allows the contractor to be aware of the current gas conditions within the trench and hence be aware of the potential impact to human health
- Setting of trigger values and appropriate contingencies allows the contractor to respond appropriately to gas conditions within the trench thereby significantly reducing the likelihood and consequence of health impacts from gas accumulation

Given ground conditions and the risk profile would be known, the likelihood of an adverse consequence was reduced from ‘unlikely’ to ‘remote’. Remote indicates that the event could occur but is not anticipated unless abnormal circumstances prevail such as inaction when trigger values are exceeded.

Management of waste streams

The following waste streams relating to the Project have been considered and include:

- Commercial and industrial waste such as those relating to pipelining wastes, timber and steel
- Construction waste such as excess spoil and rock, bitumen and drilling fluids
- Domestic waste such as putrescible and general waste, plastic, paper and cardboard packing

Based on the mitigation measures the impact to human health and the environment is considered to be low due to:

- Wastes are generally inert and generally do not pose a risk to human health
- Wastes will be present on site for a short duration and contained within specified areas reducing the likelihood of interaction with sensitive receptors
- Wastes will be recycled or disposed off-site to an appropriate facility which also limits the likelihood of interaction with sensitive receptors

Contaminated hydrostatic test water

Hydrostatic testing is a process where sections of the pipeline are filled with water and pressurised. Water is proposed to be collected from nearby dams or from water mains where suitable supply exists close to the construction corridor. Chemicals may need to be added to the water. Such water supplies would potentially be impacted by contaminants and may create an issue for water disposal.

Based on the mitigation measures the impact has been assessed as negligible due to:

- Water quality of hydrostatic testing would be known prior to discharge, if approved, thereby reducing the likelihood of contaminants entering waterways Completion of hydrostatic testing is of short duration, limited to the pipeline at a localised scale thereby limiting the extent of impact

Drilling fluids used for HDD

The use of drilling fluids (such as bentonite) during trenchless HDD operations can result in blow-out (or “fracking”), whereby the drilling fluid leaks through the bore into the surrounding soil, surface water or aquifer.

The impact from contamination if blow out does occur is expected to be low based on the following:

- Drilling fluids are designed to stabilise and seal the hole and therefore movement into the aquifer system will be very limited
- Drilling fluids are generally inert and commonly used in the groundwater bore drilling industry
- Impacts from blow out into waterways and across land would be anticipated to be short term, reversible and on a localised scale
- Implementation of mitigation measures described in Technical Report D - Land stability and ground movement which considers management and monitoring requirements during HDD drilling operation

11.3.2 Operation impacts

Leaks or spills

There is a possibility that leaks, or spills may occur during the refuelling of vehicles, plant and machinery or the use of chemicals required as part of the maintenance works during operation which may impact soil quality and human health.

The impact of fuel or chemical spills causing contamination to soil is assessed as low when considering the management measures based on the following:

- Any such spills would be expected to be relatively small volumes at discreet locations rather than widespread contamination
- A spill event would be expected to be of short duration and promptly remediated to reduce extent of impact
- Small volumes are anticipated to be stored on site thereby reducing the potential magnitude of any spill

Management of waste streams

The Project would not likely generate large amounts of wastes associated with ongoing operation and maintenance activities.

Based on the mitigation measures the impact to human health and the environment is considered to be low due to:

- Wastes will be present on site for a short duration and contained within specified areas reducing the likelihood of interaction with sensitive receptors
- Wastes will be disposed off-site to an appropriate facility which also limits the likelihood of interaction with sensitive receptors

11.3.3 Cumulative impact assessment

As the current spoil volume estimates anticipated to be disposed off site have not yet been prepared for the Project, it was not possible to undertake a cumulative impact assessment. However, given the scale and construction methodology for the Project, much of the spoil removed to facilitate construction would most likely be reused as a part of the reinstatement phase. Therefore, subject to a market assessment of landfill capacity, there would be limited spoil required to go directly to landfill and this is unlikely to create a material impact to landfill capacity or to landfill capacity available to other projects.

11.3.4 Summary

The potential impact from contamination, including disturbance and management of both inferred or unidentified contamination and acid sulfate soils, disturbance of uncontaminated spoil, mobilisation of contaminated groundwater, management of hydrostatic test water, drilling fluids, accidental leaks or spills and management of waste streams, is considered to be low or negligible once the mitigation measures are implemented.

12. References

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National Environmental Protection Council (NEPC), National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended in 2013.

Work Health and Safety Act 2011 and Work Health and Safety Regulations 2011

Appendices

Appendix A – Figures

Figure A1 Study Area

Figure A2 Soil sampling locations

Figure A3 Groundwater sampling plan

Figure A4 Geology

Figure A5 Registered groundwater bores

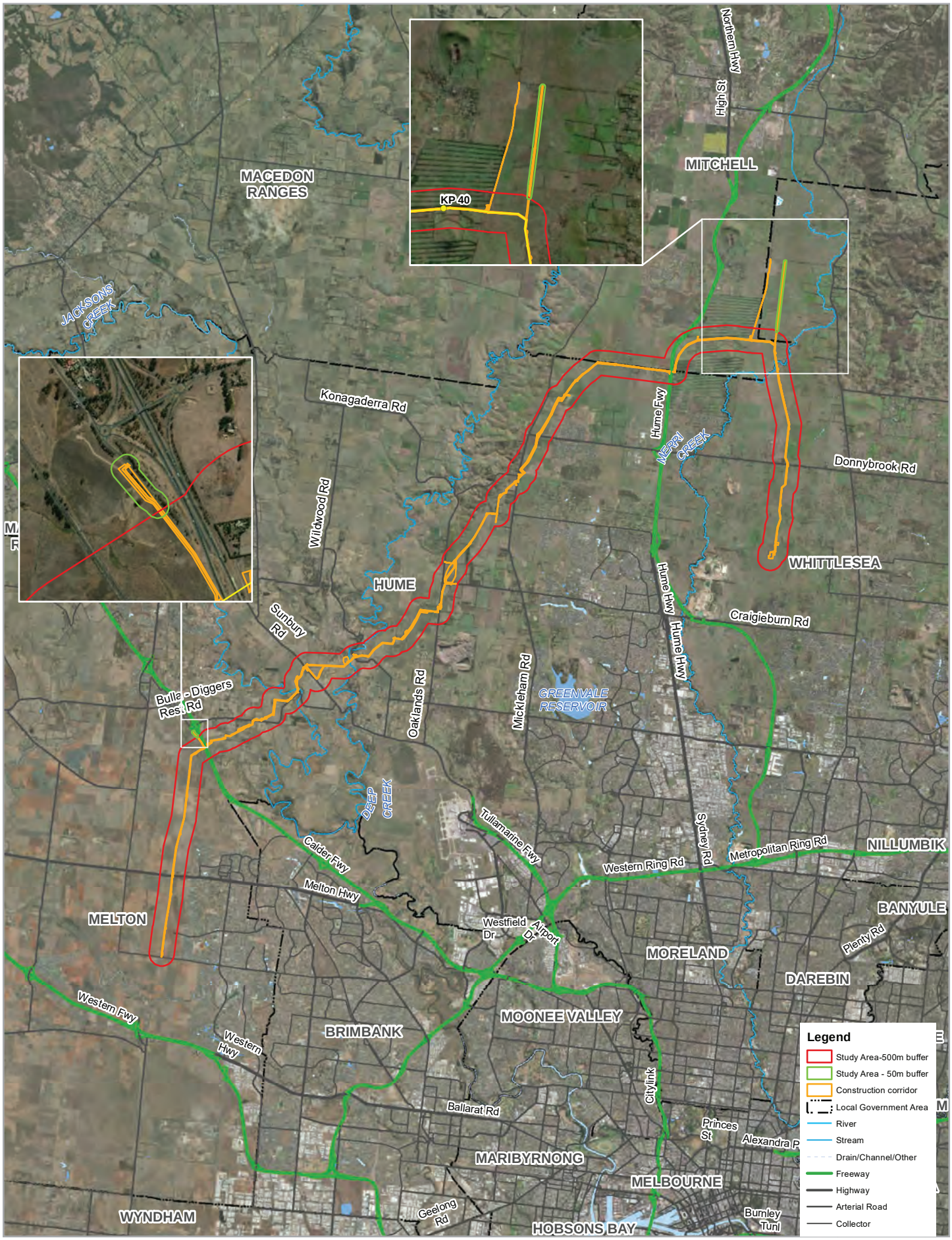
Figure A6 Acid sulfate soils

Figure A7 Construction Sciences (2020) acid sulfate sampling

Figure A8 EPA Priority Site Register and Pollution Notice

Figure A9 Statutory Environmental Audits

Figure A10 Potentially contaminated sites



Paper Size ISO A4

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

N

GHD

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

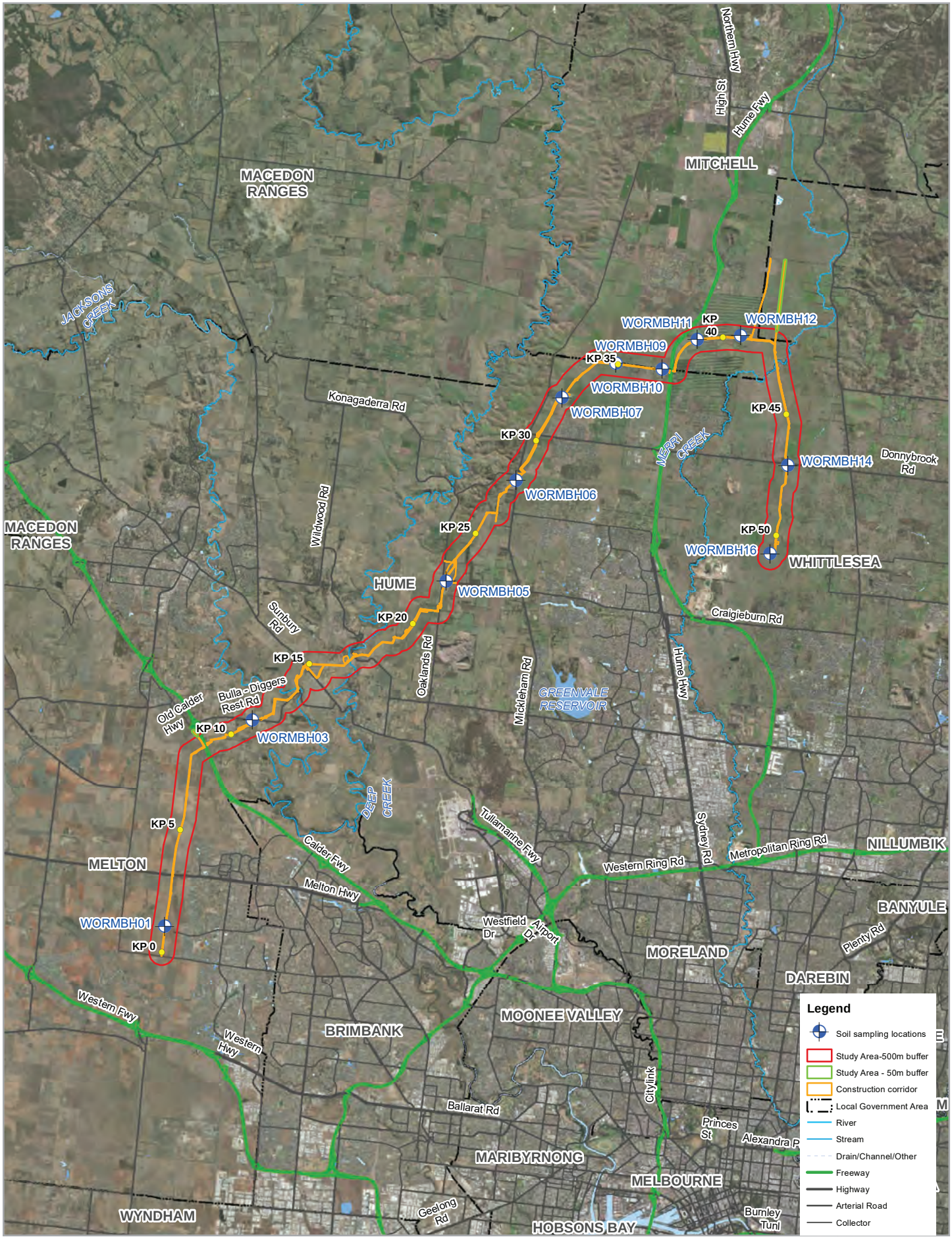
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Study Area

Figure A1

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 1.5 3 4.5 6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

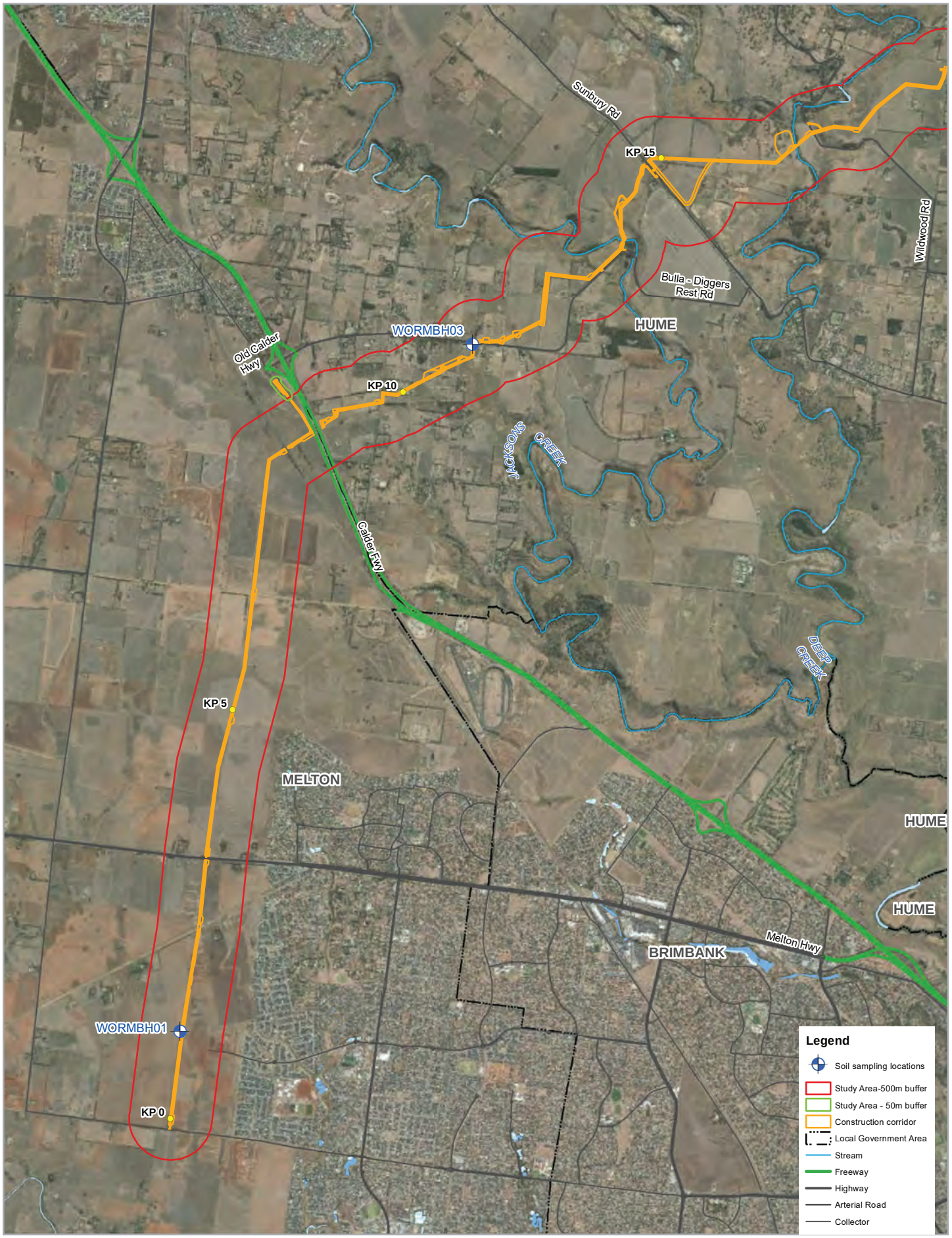
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Soil Sampling Locations

Figure A2

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.4 0.8 1.2 1.6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

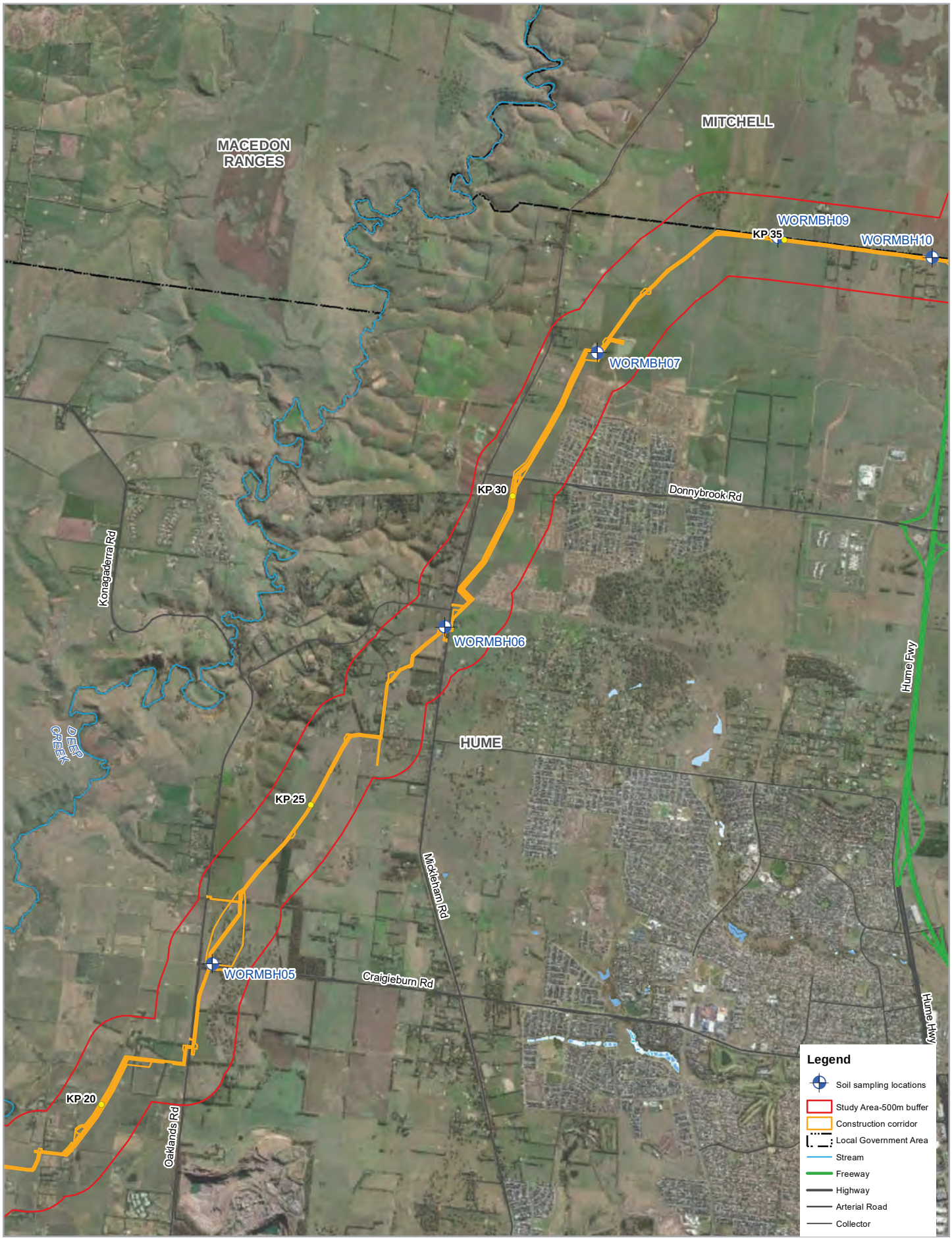
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Soil Sampling Locations

Figure A2-1

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.4 0.8 1.2 1.6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

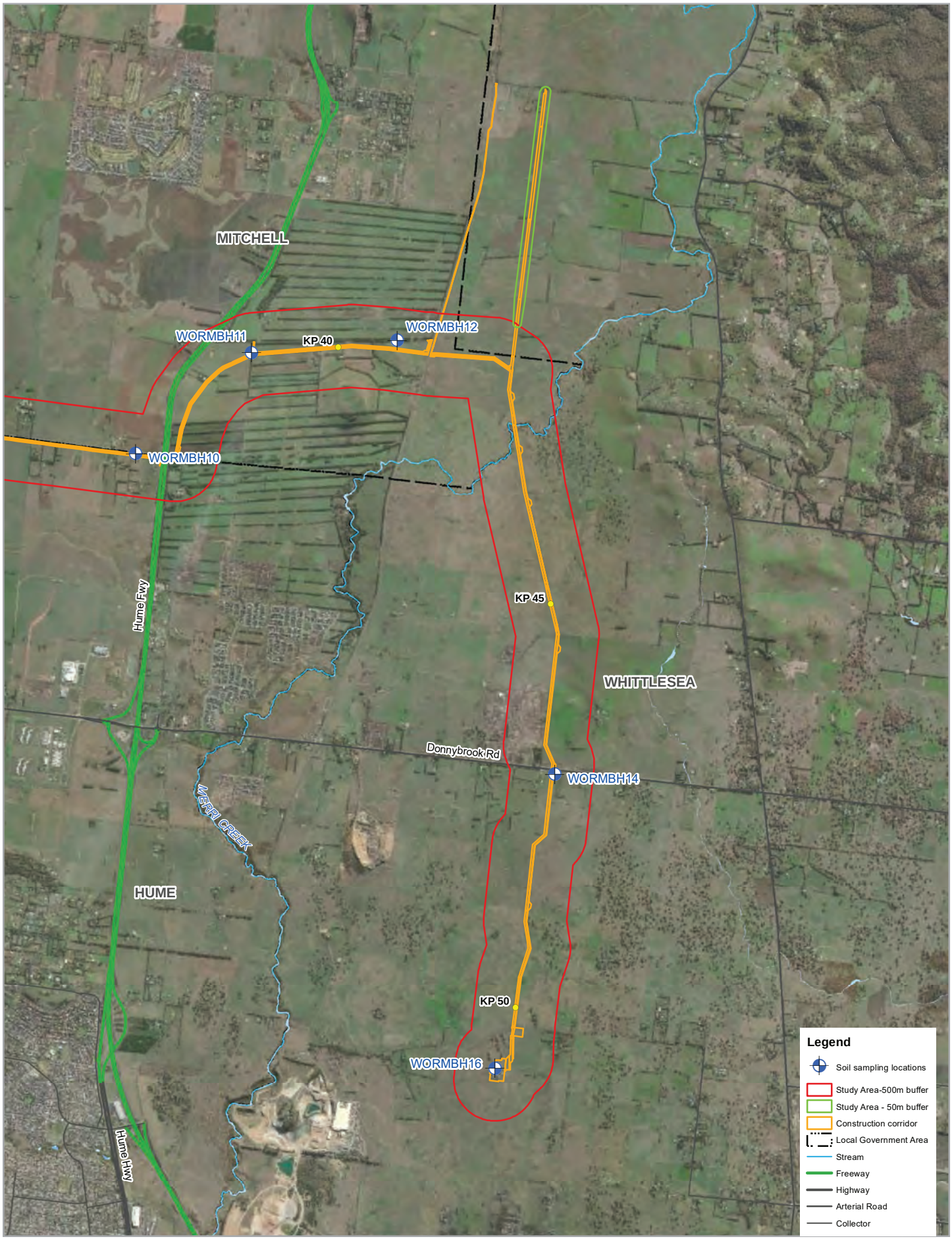
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Soil Sampling Locations

Figure A2-2

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.4 0.8 1.2 1.6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

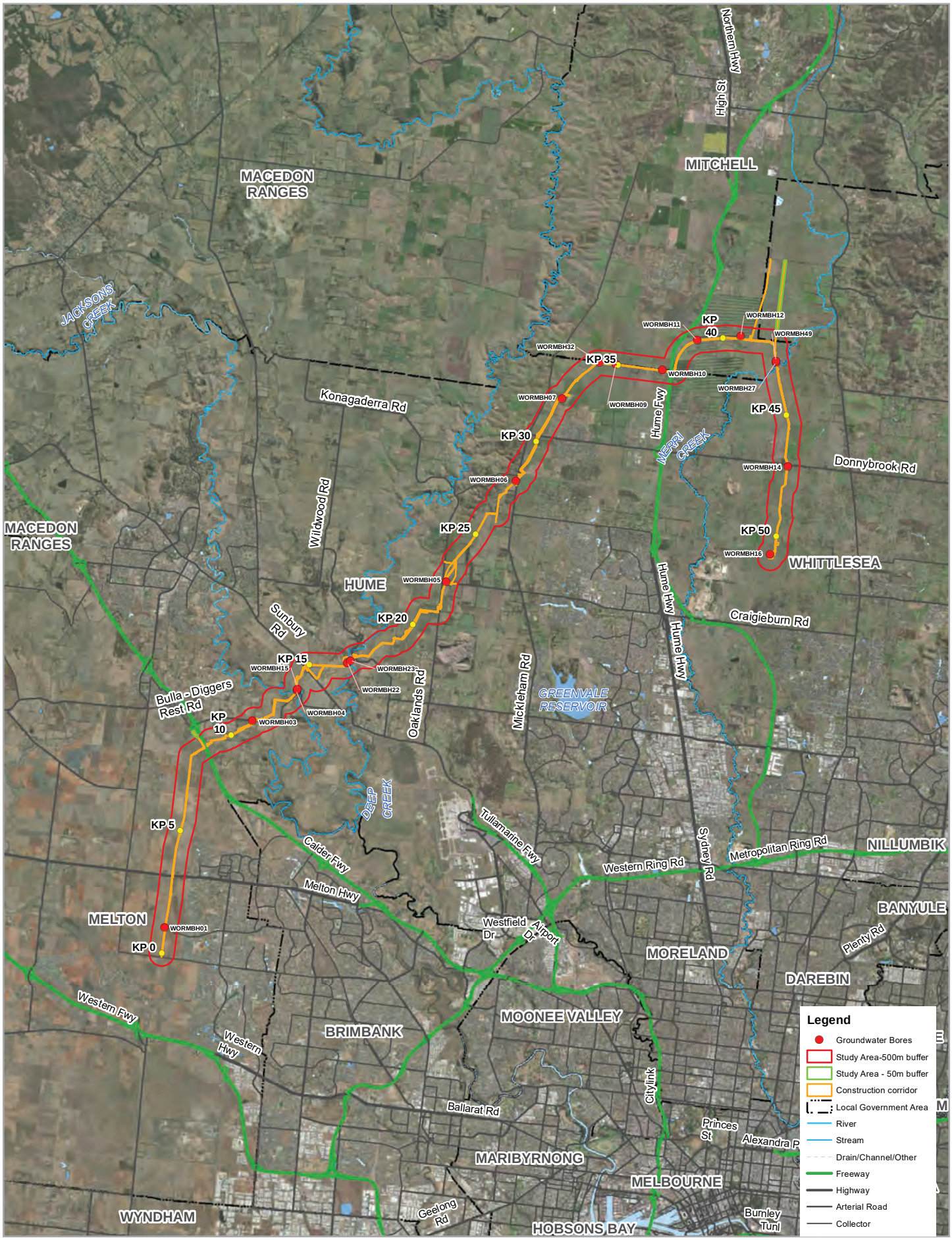
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Soil Sampling Locations

Figure A2-3

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 1.5 3 4.5 6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

N

APA VTS (Operations) Pty Ltd
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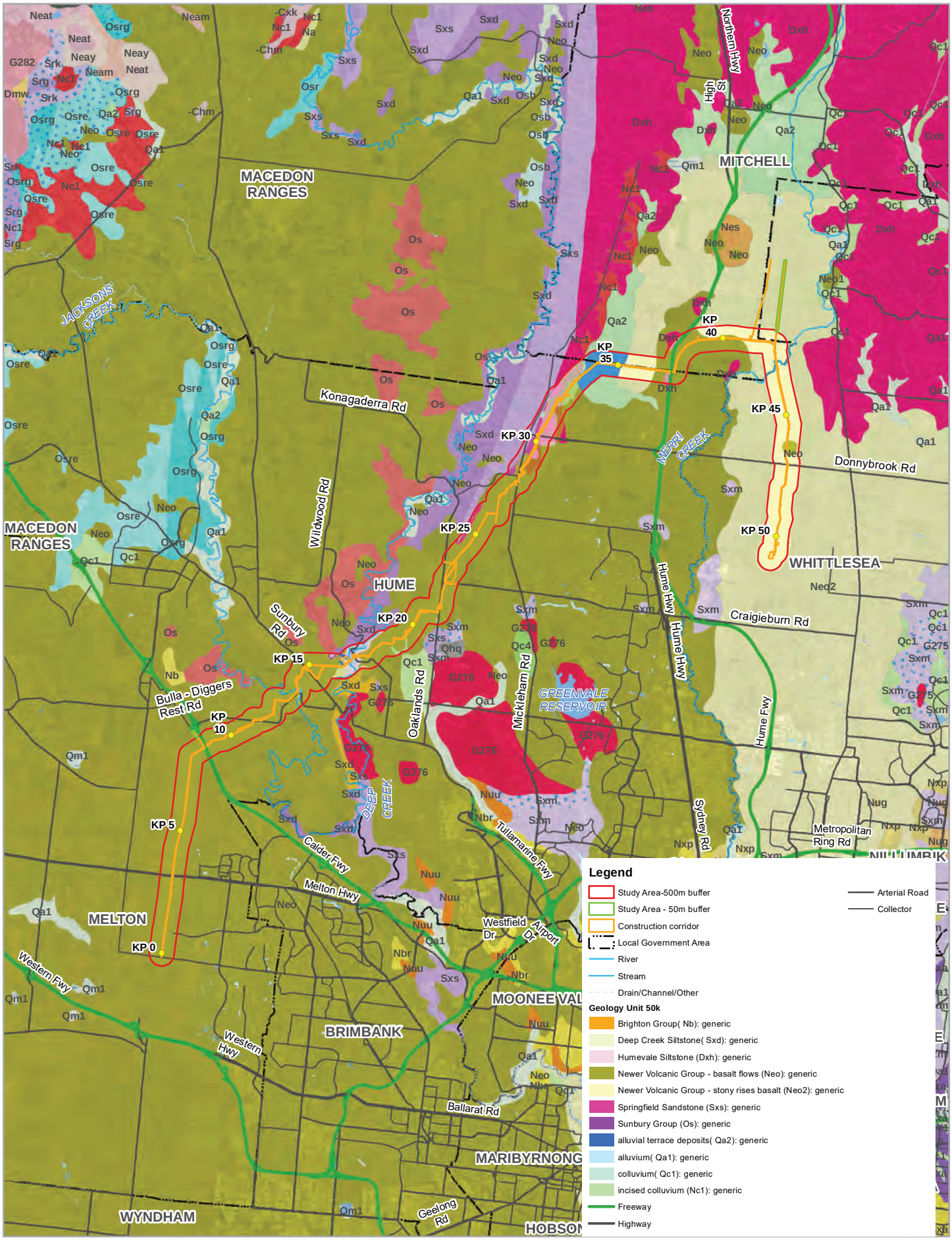
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Groundwater Sampling Plan

Figure A3

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 1.5 3 4.5 6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

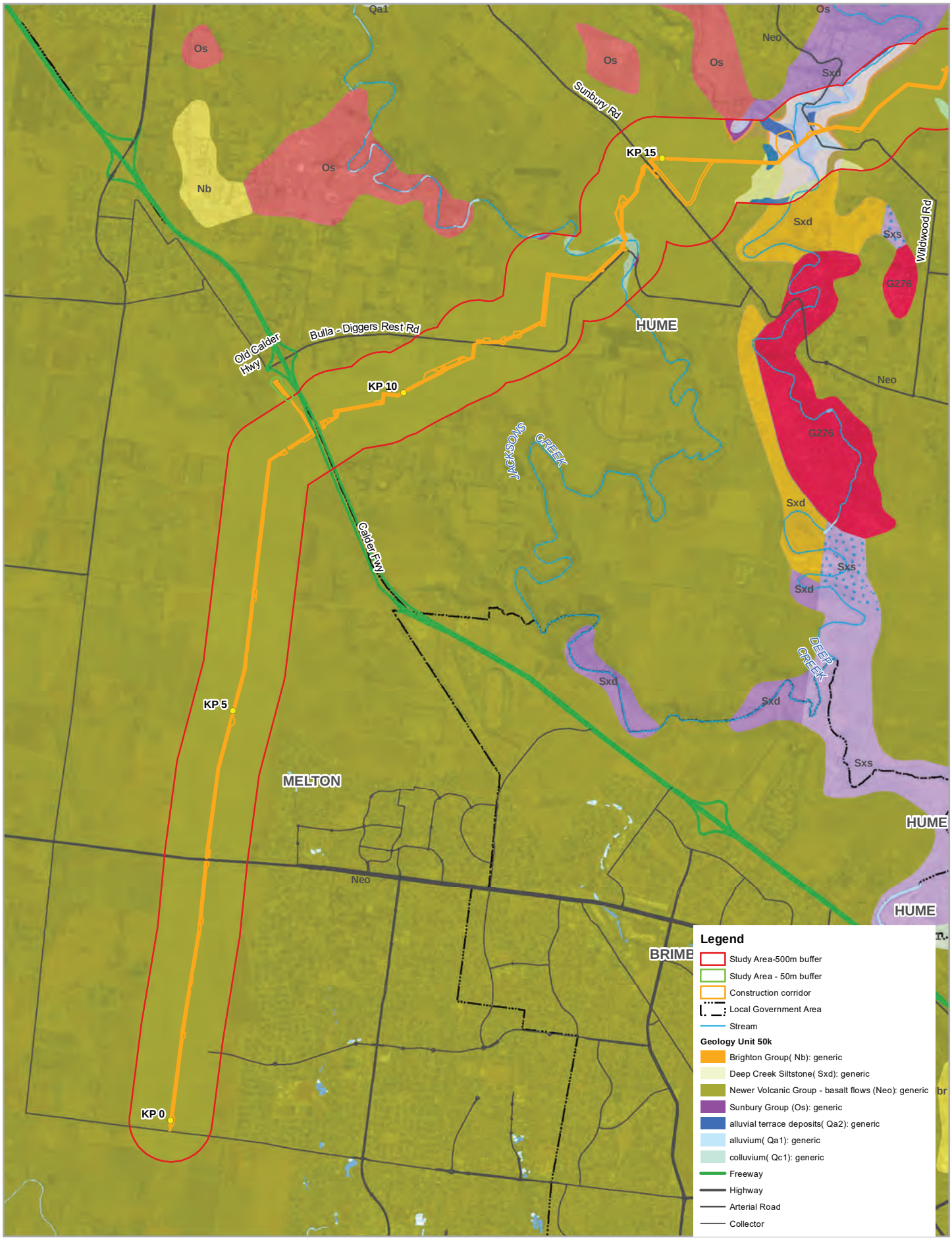
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Geology

Figure A4

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.4 0.8 1.2 1.6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

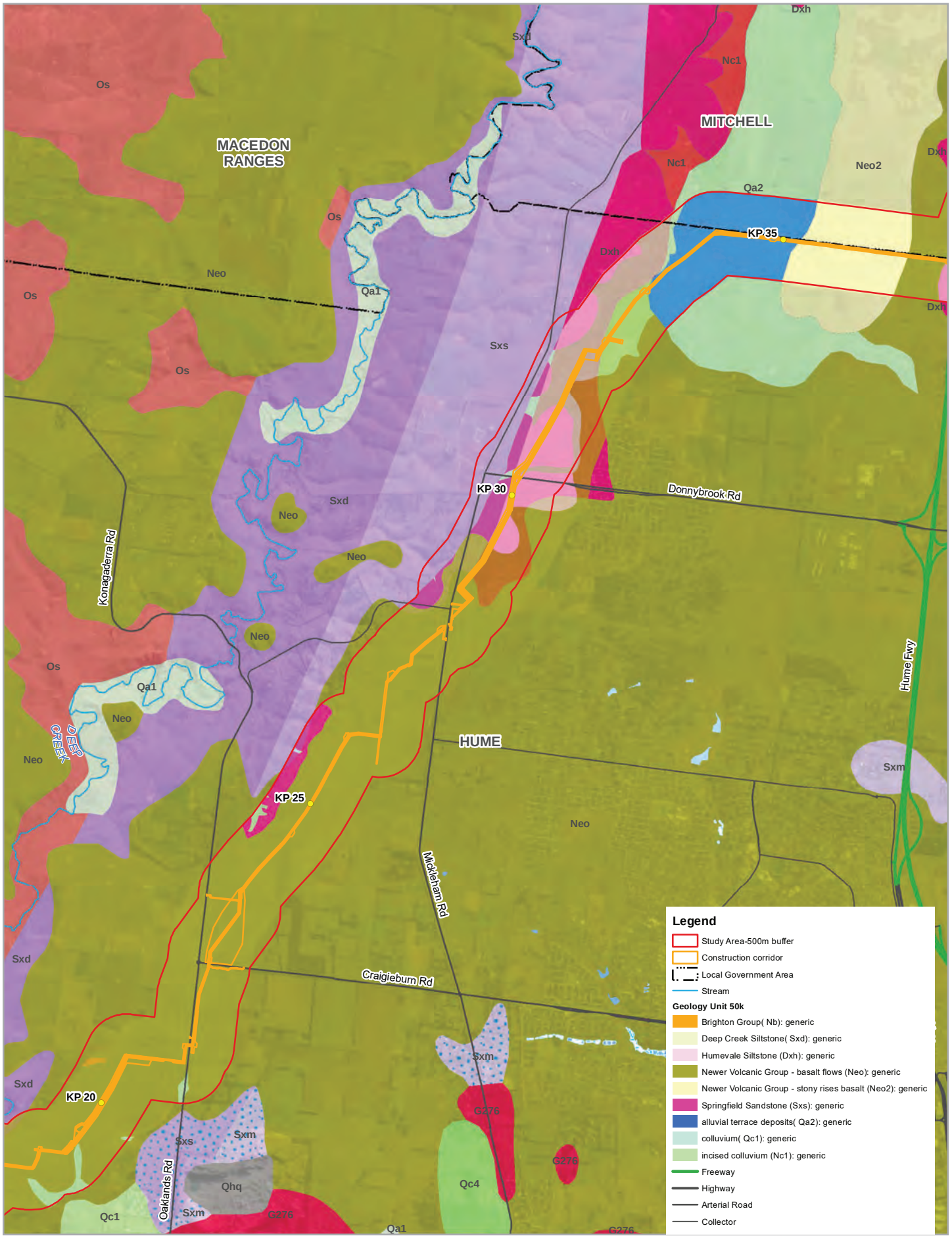
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Geology

Figure A4-1

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.4 0.8 1.2 1.6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

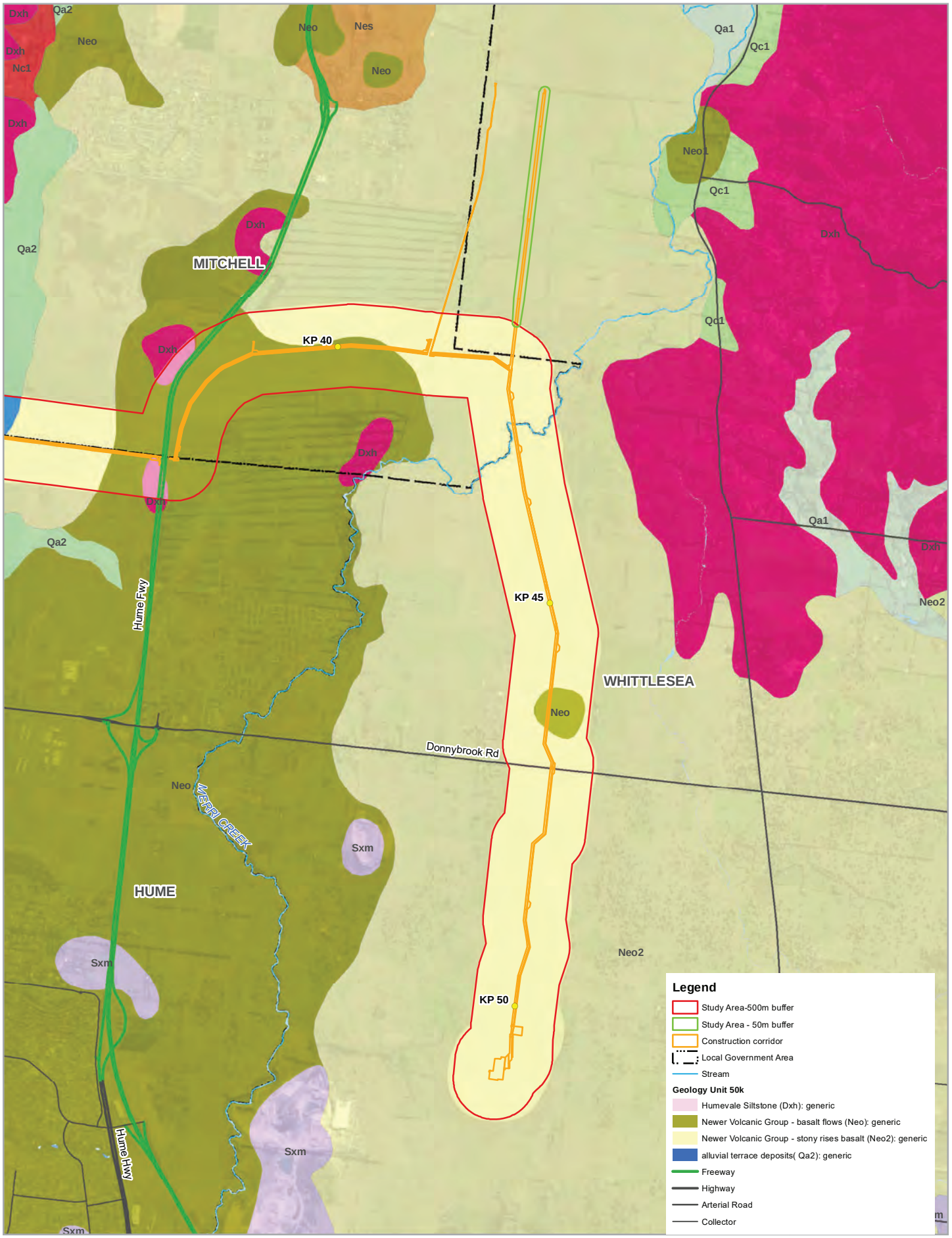
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Geology

Figure A4-2

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.4 0.8 1.2 1.6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

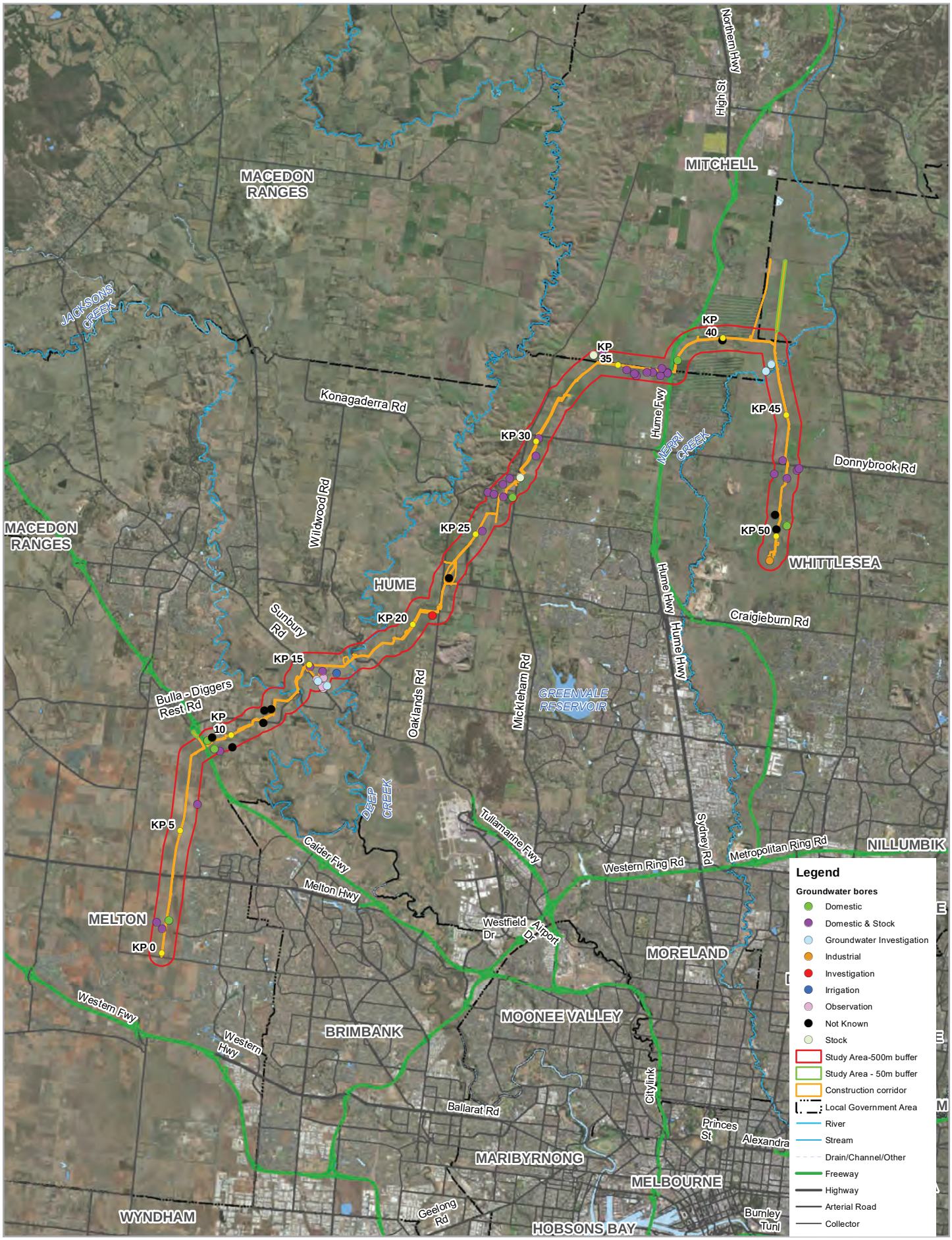
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Geology

Figure A4-3

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 1.5 3 4.5 6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

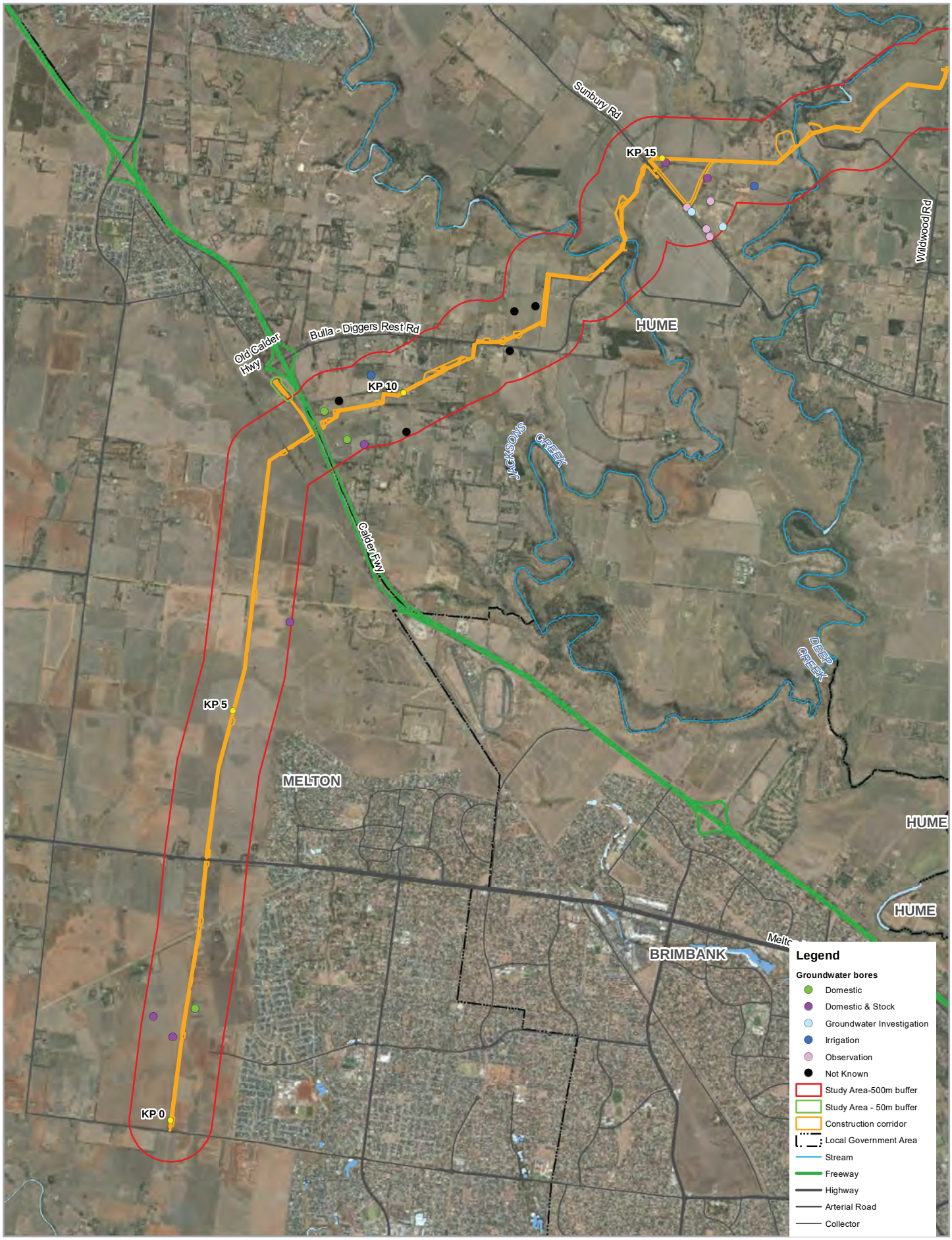
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Registered Groundwater Bores

Figure A5

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.4 0.8 1.2 1.6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

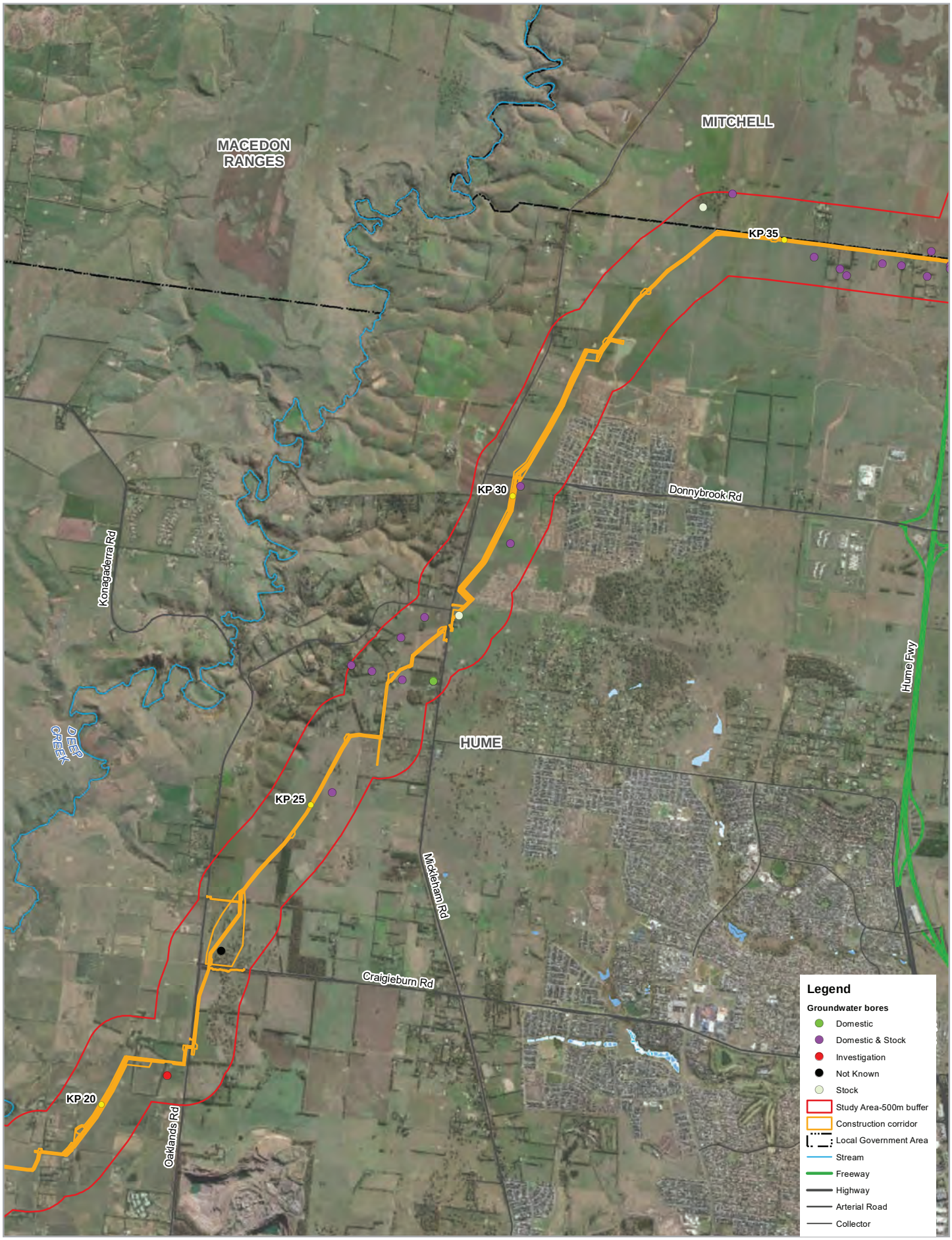
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Registered Groundwater Bores

Figure A5-1

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Paper Size ISO A4

0 0.4 0.8 1.2 1.6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

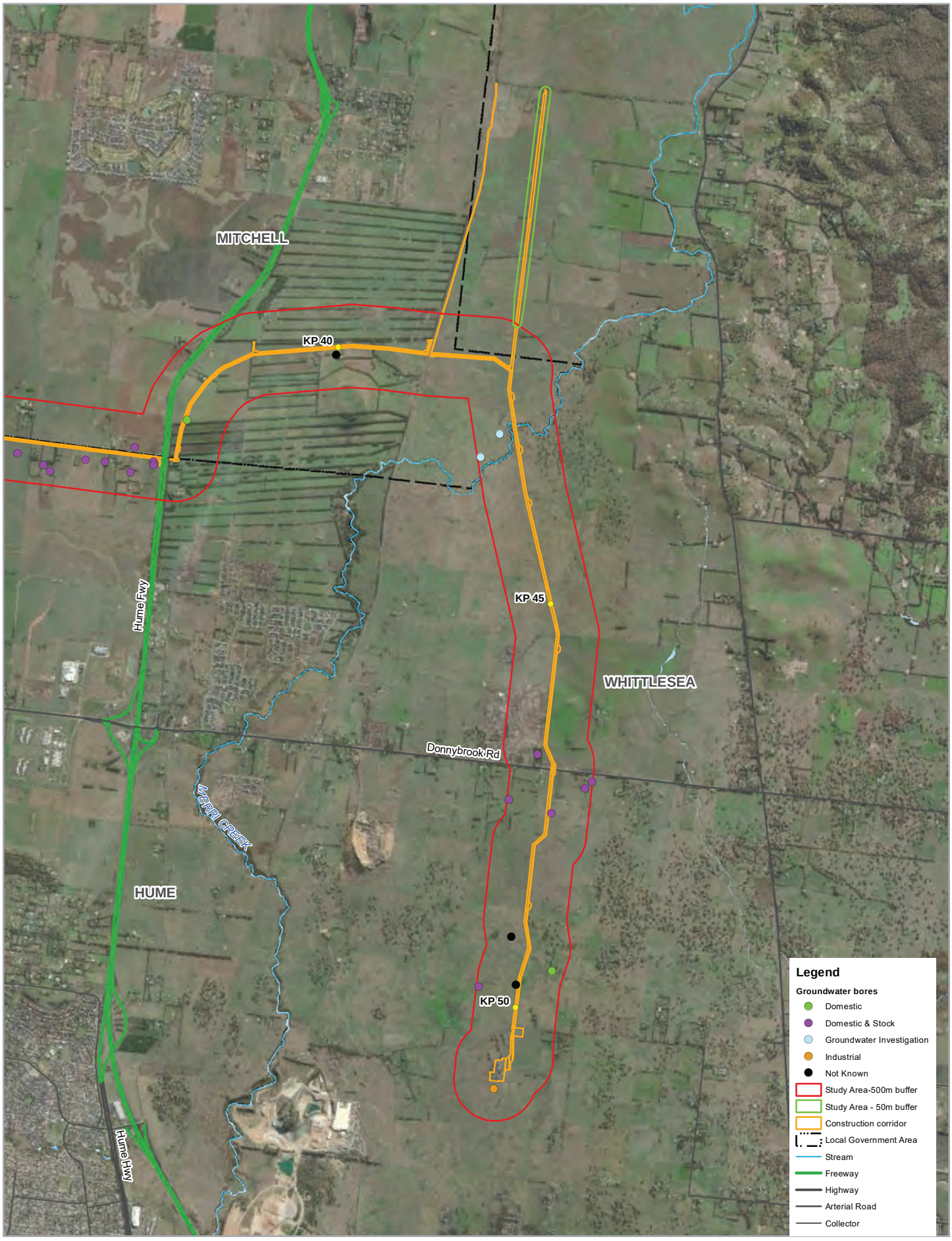
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Registered Groundwater Bores

Figure A5-2

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

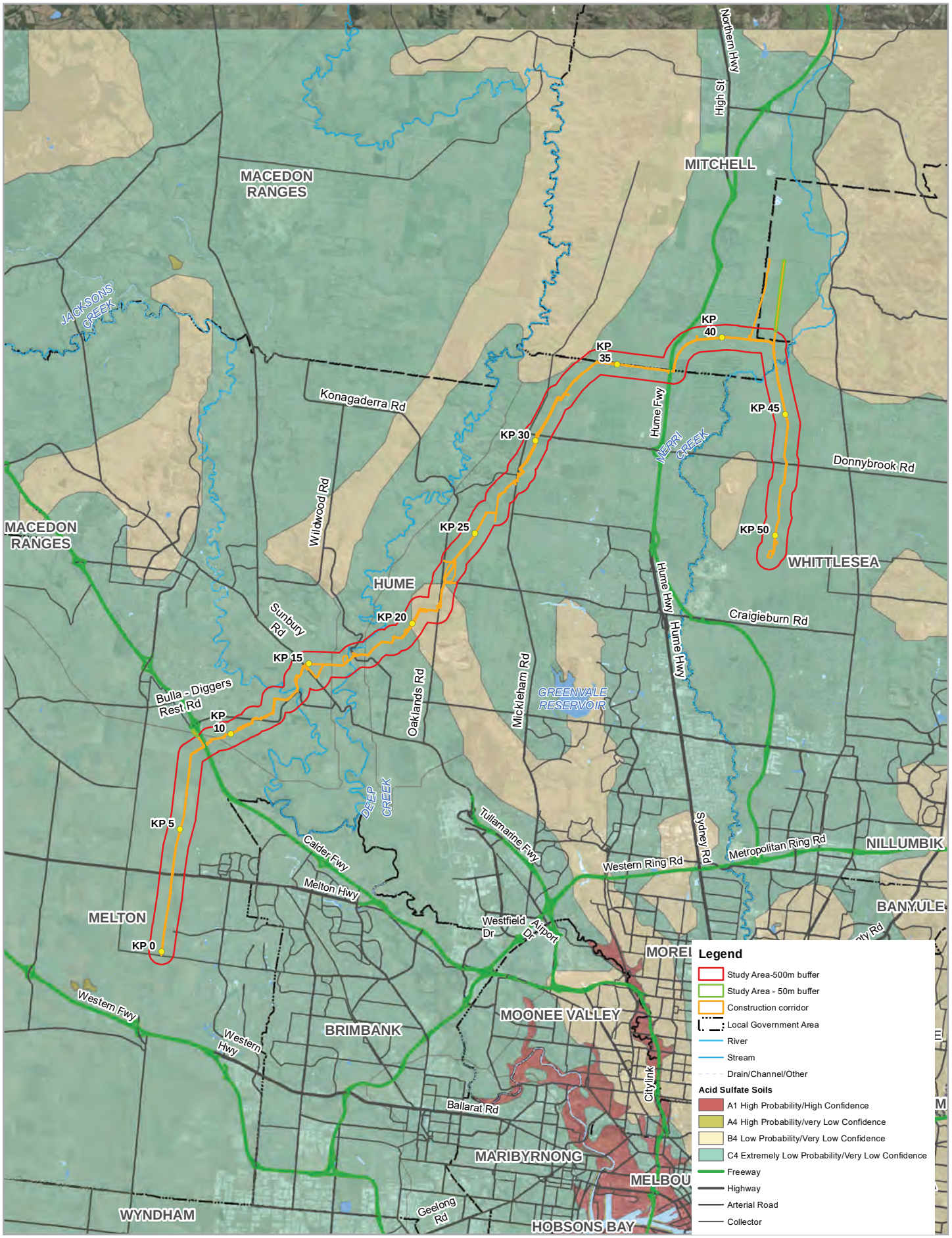
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Registered Groundwater Bores

Figure A5-3

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 1.5 3 4.5 6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

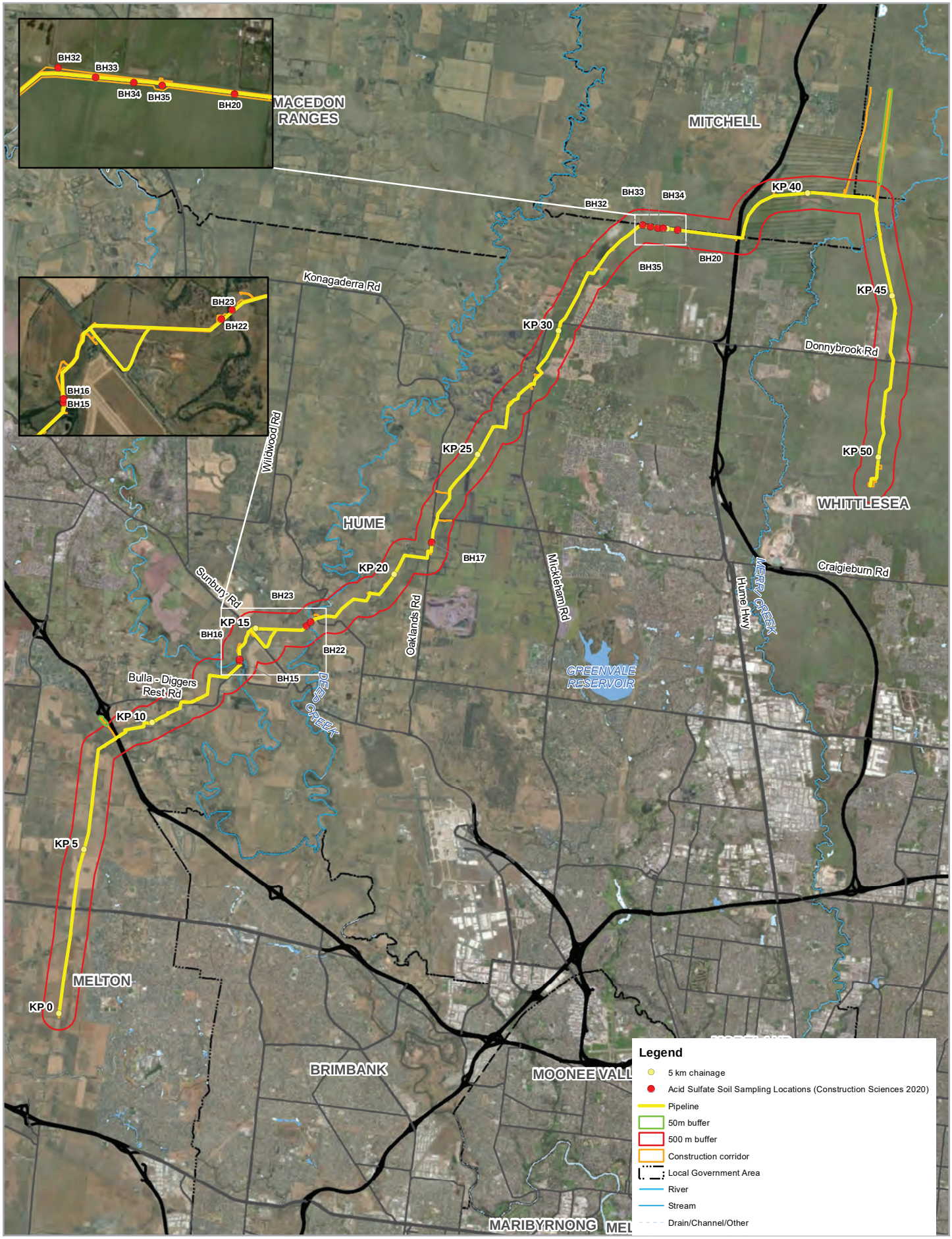
Project No. 31-12529997
Revision No. A
Date 08/12/2020

Acid sulfate soils

Figure A6

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 1 2 3 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Construction Sciences (2020)
Acid sulfate sampling

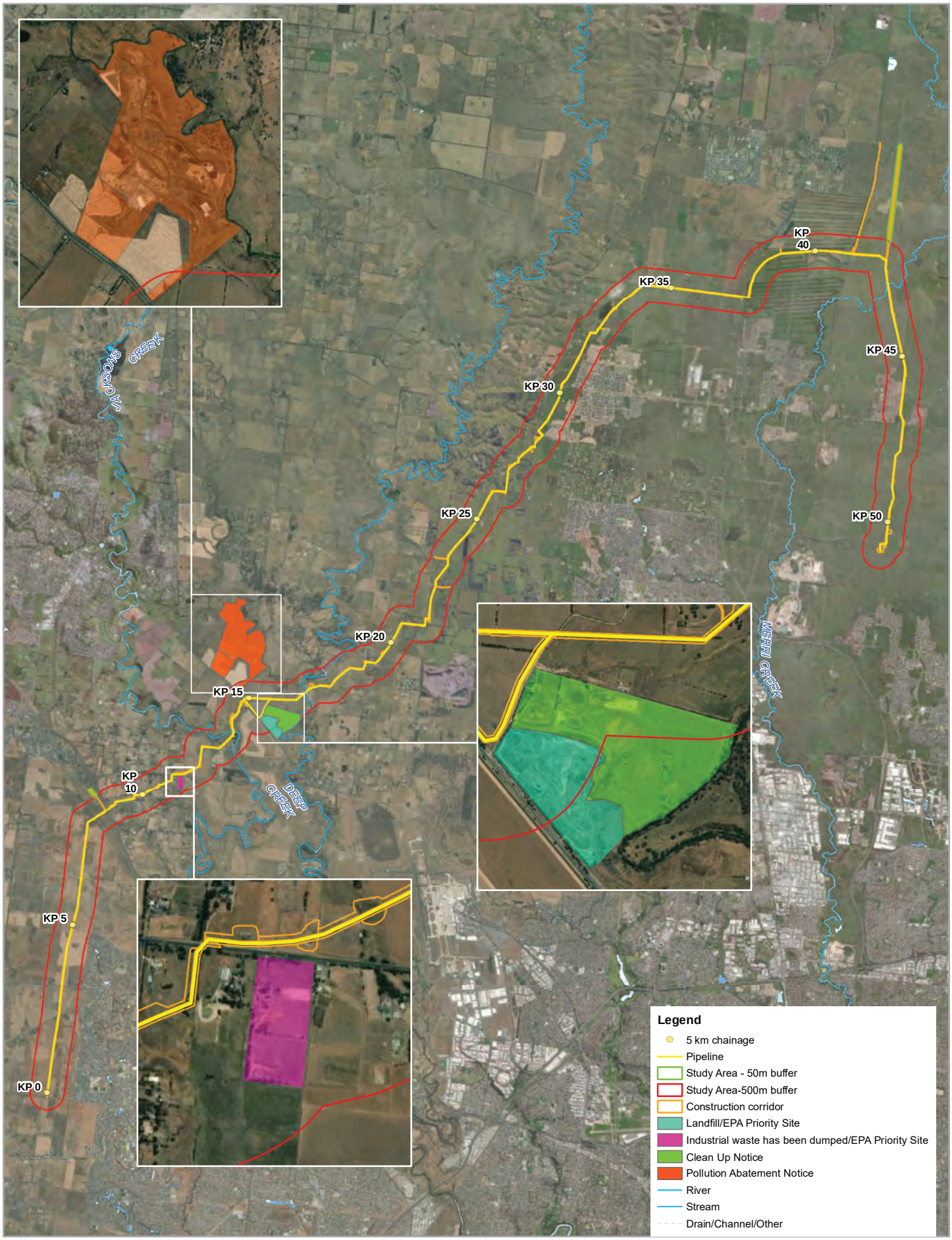
Project No. 31-12529997
Revision No. B
Date 11/03/2021

FIGURE A7

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Print date: 11 Mar 2021 - 15:26

Data source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: kgardner

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Paper Size ISO A4

0 1 2 3 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

APA VTS (Operations) Pty Ltd

Western Outer Ring Main Gas Project

Site listed on the EPA Victoria Priority Site Register and Current Clean Up Notices

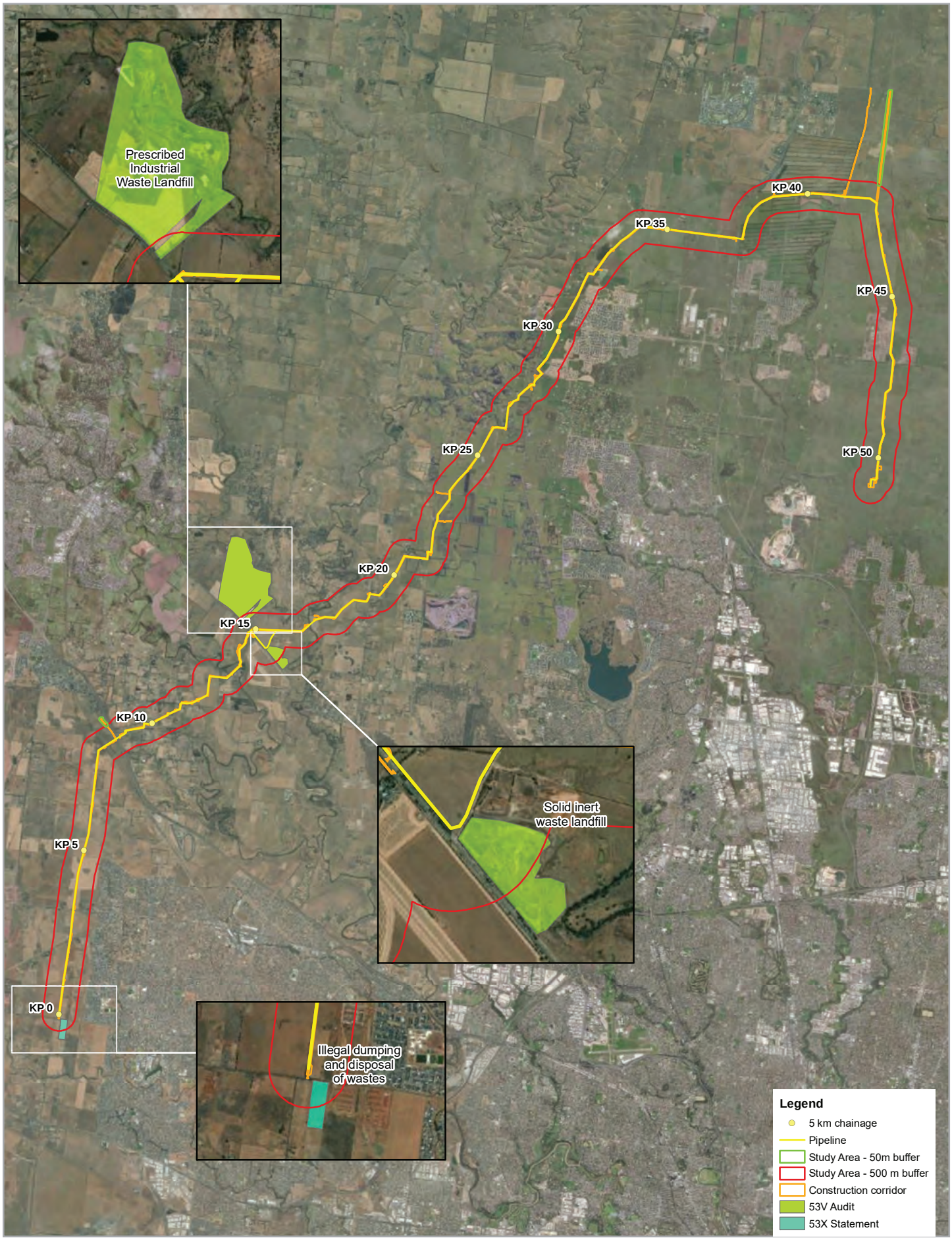
Project No. 31-12529997
Revision No. C
Date 11/03/2021

FIGURE A8

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Paper Size ISO A4

0 1 2 3 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Sites which have received a Statutory Environmental Audit

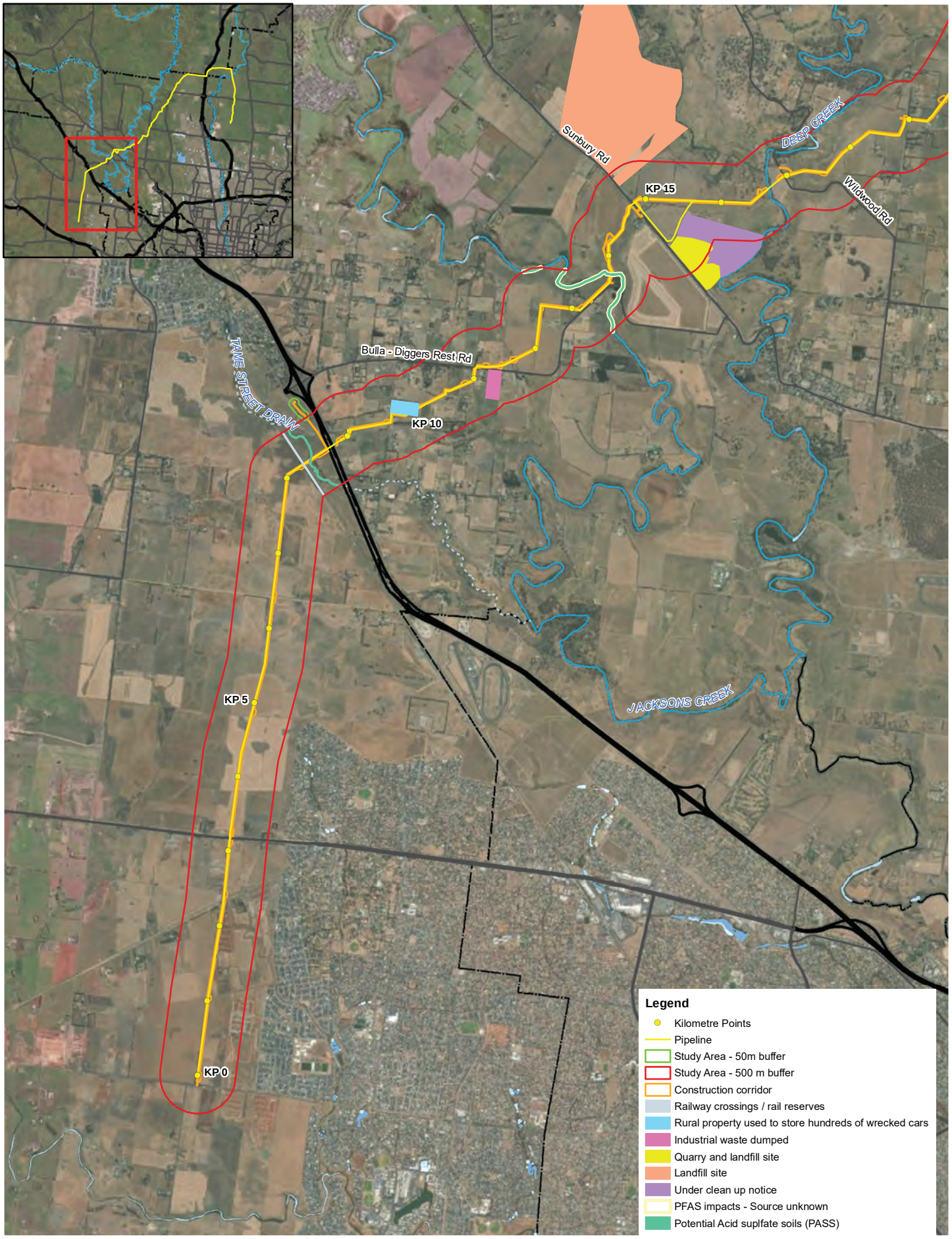
Project No.	31-12529997
Revision No.	C
Date	11/03/2021

FIGURE A9

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Print date: 11 Mar 2021 - 15:19

Data source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: kgardner

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Paper Size ISO A4

0 0.5 1 1.5

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

APA VTS (Operations) Pty Ltd

Western Outer Ring Main Gas Project

Potentially contaminated sites

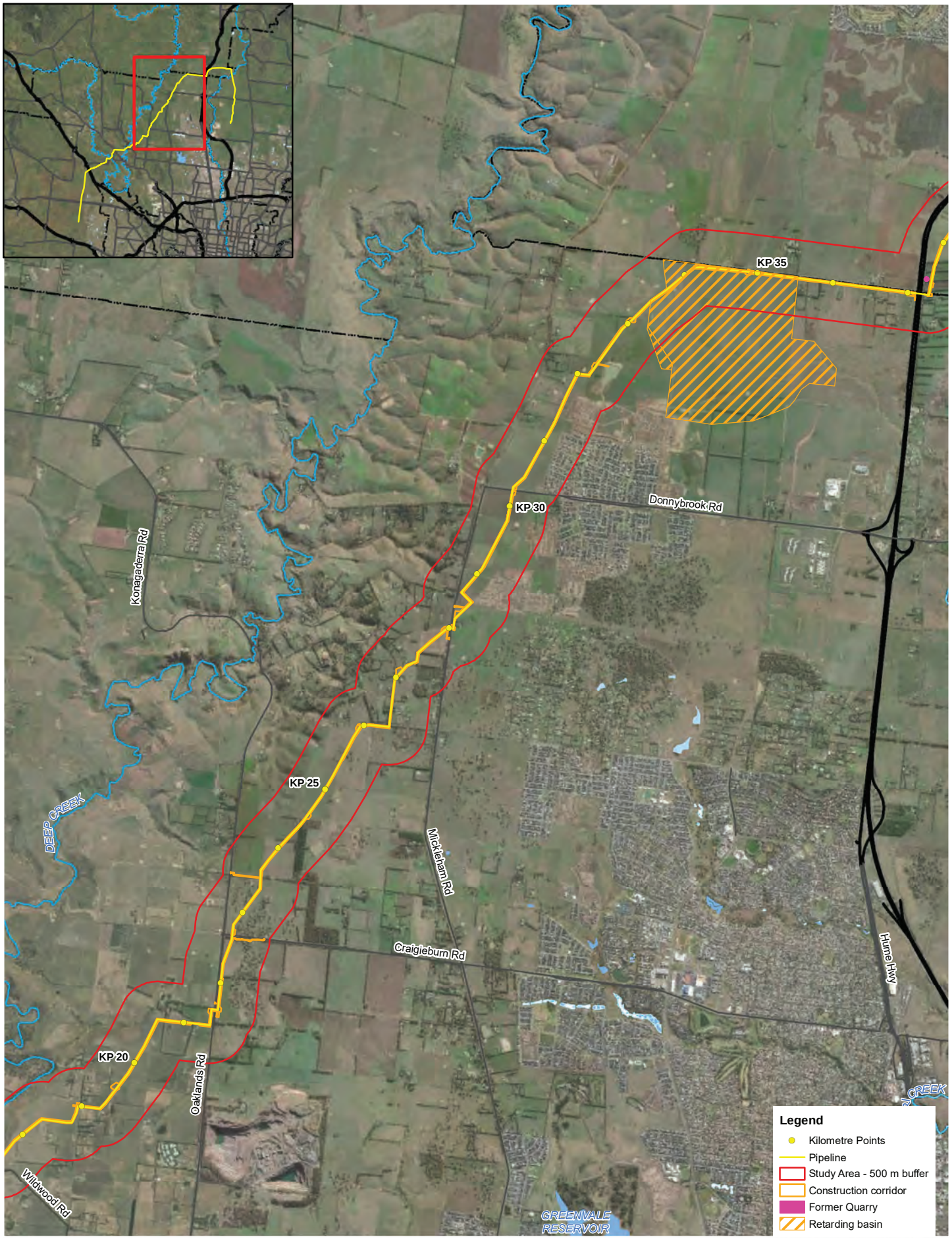
Project No.	31-12529997
Revision No.	B
Date	11/03/2021

FIGURE A10 - 1

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Paper Size ISO A4

0 0.5 1 1.5

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

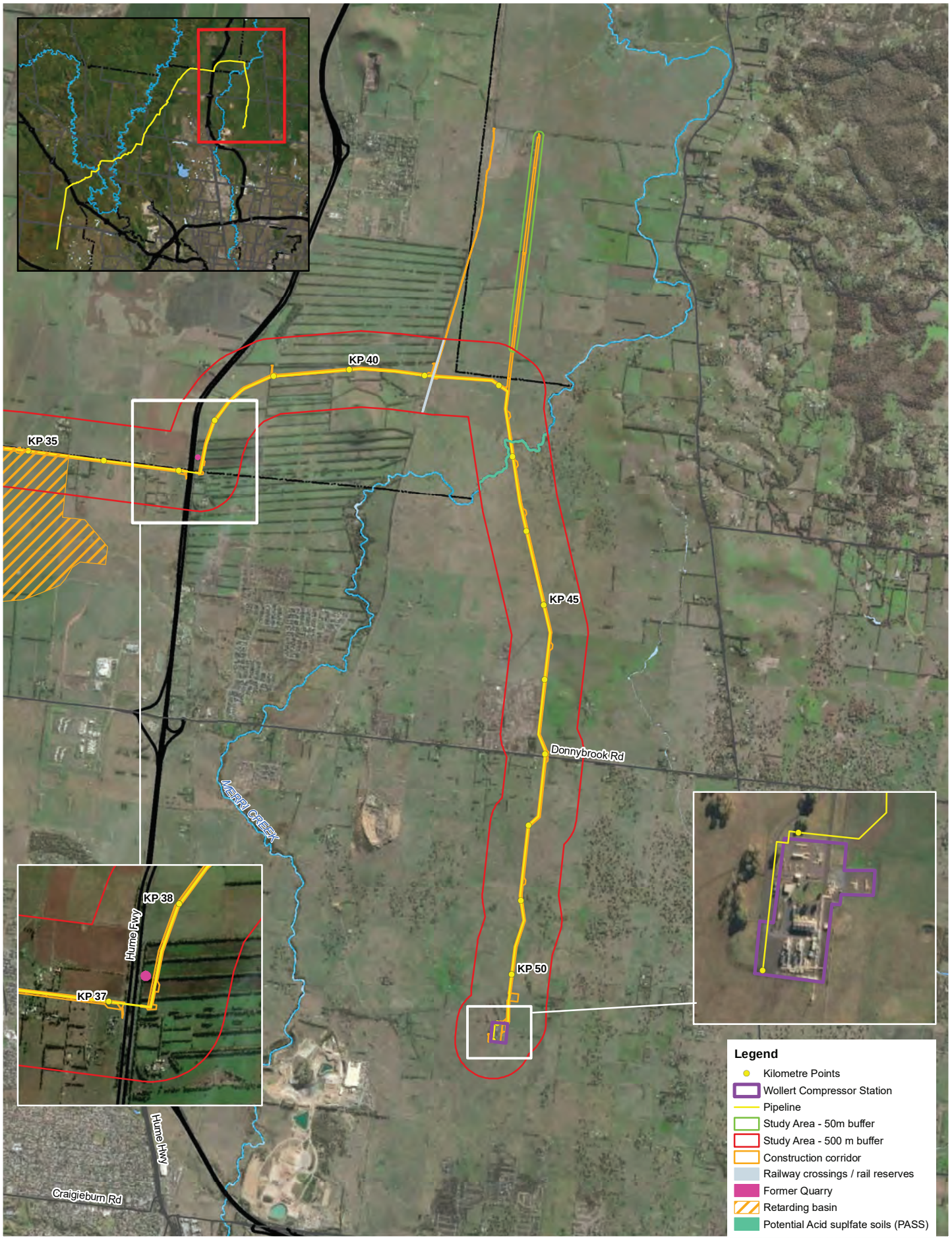
Project No. 31-12529997
Revision No. A
Date 25/11/2020

Potentially contaminated sites

FIGURE A10 - 2

Data source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: kgardner

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Paper Size ISO A4

0 0.5 1 1.5

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Potentially contaminated sites

Project No.	31-12529997
Revision No.	A
Date	25/11/2020

FIGURE A10 - 3

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Print date: 18 Feb 2021 - 15:32

Data source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: sacevedo

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Appendix B – Risk assessment

The scoping requirements require a risk-based approach to be adopted during the design of EES studies, so that a greater level of effort is directed at investigating and managing those matters that pose relatively higher risk of adverse effects.

The risk assessment as part of the assessment framework for the EES, is described in Chapter 5 Evaluation and assessment framework.

The risk pathways define the cause and effect topics relevant to Contamination based on an understanding of the existing conditions and the Project activities. The risk pathways are provided in Table B4. Each pathway shows the initial risk rating based on standard management measures, and a residual risk rating based on additional management measures (if required) recommended through the impact assessment process.

The consequence of the risk occurring were assigned using a consequence guide specific for each technical discipline. The consequence guide is provided in Table B1.

The likelihood was assigned using a likelihood guide applied to all technical disciplines. The likelihood guide is provided in Table B2.

The risk rating was determined using the risk matrix developed for this EES. The risk matrix is shown in Table B3.

Table B1 Consequence approach

Level	Qualitative and/or quantitative description
Insignificant	The release of contaminant(s) has no measurable effect on the environment. No disturbance of contaminated soils/rock, contaminated groundwater or ASS.
Minor	The release of contaminant(s) is measurable and may result in short term and reversible loss of one or more beneficial uses of the environment on a localised scale. Disturbance and handling (including transportation, treatment and/or disposal) of contaminated soils/rock, contaminated groundwater or ASS with short term localised risk to human health and/or the environment.
Moderate	The release of contaminant(s) into the environment causes medium term and reversible loss of one or more beneficial uses of the environment on a localised scale. Disturbance and handling (including transportation, treatment and/or disposal) of contaminated soils/rock, contaminated groundwater or ASS with localised risk to human health and/or the environment.
Major	The release of contaminant(s) into the environment causes long term loss of one or more beneficial uses of the environment on a localised scale. Disturbance and handling (including transportation, treatment and/or disposal) of contaminated soils/rock, contaminated groundwater or ASS with risk to human health and/or the environment in a number of localised areas.
Severe	The release of contaminant(s) into the environment causes permanent loss of one or more beneficial uses of the environment across a large geographic area. Widespread, irreversible risk to human health and/or the environment from disturbance and handling (including transportation, treatment and/or disposal) of contaminated soils/rock, contaminated groundwater or ASS.

Table B2 Likelihood approach

Level		Description
1	Rare	The event is conceivable and may occur only in exceptional circumstances
2	Remote	The event could occur but is not anticipated and may occur if certain abnormal circumstances prevail
3	Unlikely	The event is unlikely but could occur if certain circumstances prevail
4	Likely	The event would probably occur in most circumstances
5	Almost certain	The event is expected to occur in most circumstances or is planned to occur

Table B3 Risk rating approach

		Consequence rating				
		Insignificant	Minor	Moderate	Major	Severe
Likelihood rating	Almost certain	Low	Medium	High	Very high	Very high
	Likely	Low	Low	Medium	High	Very high
	Unlikely	Negligible	Low	Medium	High	High
	Remote	Negligible	Negligible	Low	Medium	High
	Rare	Negligible	Negligible	Negligible	Low	Medium

Table B4 Risk pathways

Risk ID	Staging	Risk Pathway	Initial Environmental Management Measures	Initial Risk			Additional Mitigation and Management Measures	Residual Risk		
C1	Construction	**Disturbance and management of existing contamination (inferred conditions)** Construction activities disturb contaminated soil, acid sulfate soil and/or contaminated materials impacting human health and the environment which require management, transport and disposal.	Environmental management measures should include those listed for EMM C1. Prepare and implement spoil management measures to be included in the Project CEMP in accordance with relevant regulations, standards and guidelines including EPA Publication 1834 Civil construction, building and demolition guide. The spoil management measures must be developed in consultation with the EPA Victoria and include processes and measures to manage all spoil types i.e. all excavated material. The main spoil types would include mostly uncontaminated soils and potentially small volumes of prescribed industrial waste (PIW) in the vicinity of the potential sources noted in Table 6-15. The spoil management measures must define roles and responsibilities and include requirements and methods for: <u>General</u> • Complying with applicable regulatory requirements including SEPP (Prevention and Management of Contaminated Land) • Investigations must consider the Australian Standard AS 4482.1:2005 Guide to the investigation and sampling of sites with potentially contaminated soil, the ASC NEPM and the EPA Victoria Industrial Waste Resource Guidelines (IWRGs) • Contaminated soils will be left in-situ to the extent possible. • Assessment of any material imported to the site for use as backfill in accordance with IWRG 621 and 702. Imported material must meet the 'Fill Material' criteria. <u>Assessment</u> • Completing further soil investigations to assess soil quality for analysis detailed in Table 6-15 prior to construction in order to inform the CEMP: – At the Diggers Rest (KP 9.95 - KP10.14), which is being used to store hundreds of wrecked cars, – A possible former quarry in Beveridge (KP 37.5) along the construction corridor to ascertain if the former quarry extents encroaches onto the Project and – The retarding basin (KP 34-35.5) prior to any excavation in these areas. – Wollert Compressor Station (KP 50.78 to KP 51.045) – Shallow sediments in Jacksons Creek • Areas of potential contaminated soils would be identified in the CEMP	Minor	Unlikely	Low		Minor	Unlikely	Low

Risk ID	Staging	Risk Pathway	Initial Environmental Management Measures	Initial Risk			Additional Mitigation and Management Measures	Residual Risk		
			• Identifying where any contaminated or hazardous material is exposed during construction and how it would be made safe for the site owner and the environment. Beneficial uses of land and ASC NEPM guidance on criteria protective of those beneficial uses must be considered for the land uses in these areas. <u>Unexpected contamination</u> • A procedure for identifying, containing and managing unexpected contamination in accordance with applicable regulatory requirements including EPA IWRG 621 and 702 <u>Handling, stockpiling and transport</u> • All spoil handling and transport is conducted in accordance with the EPA IWRGs • Construction works during wet weather can lead to runoff of contaminated and uncontaminated soil from stockpiles and excavations into nearby waterways and would be managed such that soils and surface water risks can be managed. • Personal protective equipment and standard hygiene practices implemented when handling spoil • Stockpile of trench spoil will be separated into contaminated and uncontaminated soil. As both of these waste types can adversely impact the environment (e.g. through runoff to waterways), all stockpiles would be managed in accordance with EPA Victoria Publication 1834 Civil construction, building and demolition guide and EPA Publication 1895 Managing Stockpiles, 2020. • Where it is necessary to excavate contaminated soils, they will be stockpiled separately, with containment and treatment measures appropriate to the type of contamination present and would include. – All stockpiles of potentially contaminated spoil are appropriately secured, lined and bunded to prevent leaching – All stockpiles of potentially contaminated spoil are appropriately covered and bunded to limit rainwater ingress, dust generation and contact by fauna – Stockpiling of contaminated soil is kept to a minimum and removed to landfill or other use at the earliest opportunity • Handling and transport of contaminated spoil for off-site treatment/disposal would be in accordance with Environment Protection (Industrial Waste Resource) Regulations 2009.							

Risk ID	Staging	Risk Pathway	Initial Environmental Management Measures	Initial Risk			Additional Mitigation and Management Measures	Residual Risk		
			Transport companies must be licensed by EPA Victoria to carry contaminated soil • Management of PFAS-impacted soil (if any) in accordance with the PFAS NEMP and EPA guidance (noting the discussion on PFAS in Section 6.4.2). • Detailed process for monitoring, recording and tracking spoil and other waste handling including stockpile management, trucking and destination tracking, sampling results etc. <u>Reuse or Disposal</u> • Assessment of potentially contaminated spoil, which is to be disposed of offsite, in accordance with IWRG 621 and 702. • The waste management hierarchy is considered including opportunities for reuse be investigated by the contractor and spoil that is unable to be reused be removed from site via designated haulage routes • Drilling muds will be disposed in accordance with Environment Protection (Industrial Waste Resource) Regulations 2009 and EPA Victoria Industrial Waste – Classification for Drilling Mud, Victoria Government Gazette G37. PASS may be present in saturated alluvium soils beneath and close to the creeks. Further assessment is required where dewatering of alluvium may occur, specifically at Jacksons Creek, and Merri Creek. Methods to minimise impacts from disturbance of acid sulfate soil, including but not limited to: • Characterising acid sulfate soil and rock prior to excavation • Developing appropriate stockpile areas including lining, covering and runoff collection to prevent release of acid to the environment • Identifying suitable sites for re-use management or disposal of acid sulfate soil • Preventing oxidation that could lead to acid formation if possible through cover and/or scheduling practices, i.e. ensuring acid sulfate soil is not left in stockpiles for any length of time and/or addition of neutralising compounds • Requirements and methods must be in accordance with the Industrial Waste Management Policy (Waste Acid Sulfate Soils), EPA Victoria Publication 655.1 Acid Sulfate Soil and Rock, and the Department of Sustainability and Environment's Victorian Best Practice Guidelines for Assessing and Managing Coastal Acid Sulfate Soil • Completing further acid sulfate soil assessment prior to construction in order to inform the CEMP at: – Jacksons Creek – Merri Creek						

Risk ID	Staging	Risk Pathway	Initial Environmental Management Measures	Initial Risk			Additional Mitigation and Management Measures	Residual Risk		
C2	Construction	**Disturbance and management of existing contamination (unidentified contamination)** Construction activities disturb unknown contaminated soil, acid sulfate soil and/or contaminated materials impacting human health and the environment which require management, transport and disposal.	In reference to Risk ID C2, the spoil management measures referenced in EMM C1 must include requirements and methods to address and manage any contamination that was not expected during construction. Such material may be identified by visual or olfactory observations, the presence of asbestos and other anthropogenic material. The spoil management measures would need to include contingency plans and appropriate responses in accordance with EPA guidelines. These might include, as a minimum: a. Cease ground disturbance at the unknown contamination location and within the immediate vicinity. b. Assess site contamination and identify appropriate management action.	Minor	Unlikely	Low		Minor	Unlikely	Low
C3	Construction	**Disturbance and management of uncontaminated spoil** Construction works will disturb a large volume of uncontaminated spoil as part of trenching which could impact human health and the environmental from dust generation and runoff to waterways.	Environmental management measures should include those listed for EMM C1, specifically: • Construction works during wet weather can lead to runoff of uncontaminated soil from stockpiles and excavations into nearby waterways and would be managed such that soils and surface water risks can be managed. • Stockpile of trench spoil will contain large volumes of uncontaminated soil which can adversely impact the environment (e.g. through runoff to waterways), all stockpiles would be managed in accordance with EPA Victoria Publication 1834 Civil construction, building and demolition guide and EPA Publication 1895 Managing Stockpiles, 2020.	Minor	Unlikely	Low		Minor	Unlikely	Low
C4	Construction	**Mobilisation of contaminated groundwater** Construction works cause mobilisation of existing contaminated groundwater impacting beneficial uses.	Groundwater management measures would be developed in accordance with EMM GM3.	Moderate	Remote	Low		Moderate	Remote	Low
C5	Construction	**Leaks or spills** Leaks or spills during construction from plant/machinery operations, fuel and chemical storage leads to affecting soil quality, surface water quality and/or groundwater quality.	In reference to Risk ID C5, the CEMP mentioned in EMM C1 must include requirements for management of chemicals, fuels and hazardous materials including: • Minimise chemical and fuel storage on site and store hazardous materials and dangerous goods in accordance with the relevant guidelines and requirements. • Comply with the Victorian WorkCover Authority and Australian Standard AS1940 Storage Handling of Flammable and Combustible Liquids and EPA Victoria publications 1834 Civil construction, building and demolition guide and 1698 Liquid Storage and Handling Guidelines. • Develop and implement management measures for dangerous substances, including:	Minor	Unlikely	Low		Minor	Unlikely	Low

Risk ID	Staging	Risk Pathway	Initial Environmental Management Measures	Initial Risk			Additional Mitigation and Management Measures	Residual Risk		
			– Creating and maintaining a dangerous goods register – Disposing of any hazardous materials, including asbestos, in accordance with Industrial Waste Management Policies, regulation and relevant guidelines – Implementing requirements for the installation of bunds and precautions to reduce the risk of spills. • Contingency and emergency response procedures to handle fuel and chemical spills, including availability of on-site hydrocarbon spill kits • Spill kits will be available at all locations where machinery/plant are operating, refuelling points and fuel and chemical storage locations • The type and volume of liquid material (fuel, oil, lubricant) stored on-site for construction activities is to be limited to only that which is required • Liquid material would not be stored within 50 metres of waterways • Selection of appropriate inert drilling fluids • Excess or recovered drilling fluids shall be disposed as per IWR Regulations							
C6	Operation	**Leaks or spills** Ongoing operation of the facility and MLV leads to leaks (due to maintenance works) or spills affecting soil quality, surface water quality and/or groundwater quality.	The Project will be incorporated into the existing VTS OEMP. Key measures include: • Conducting all operations and maintenance (including wastes) in accordance with EPA Industrial Waste Resource Guidelines • No permanent storage of fuel or other chemicals along the pipeline corridor • Compressor on a concrete area and surrounded by crushed rock hard stand and under cover with a shelter roof • Above ground oily water separator with triple interceptor and underground overflow pit with level sensors, serviced annually • Provision of general and regulated waste collection bins • Use of quick break detergents suitable for oily water separator • Annual stack test monitoring and servicing of compressors • Ensuring PIW (such as waste oils, oily water mixtures, oily rags and oil filters, etc) are segregated, labelled and securely stored and transported to a facility licensed to accept these wastes • Appropriately classifying and disposing waste, including using a regulated waste contractor and completion of waste transport certificates for PIW	Minor	Unlikely	Low		Minor	Unlikely	Low

Risk ID	Staging	Risk Pathway	Initial Environmental Management Measures	Initial Risk			Additional Mitigation and Management Measures	Residual Risk		
			• Maintain spill kits onsite at all times and providing training for use of spill kit • Inducting all staff and contractors into APA HSE policies and procedures including risks and controls associated with: waste management, chemical management and refuelling, weed and pest management and incident response. • Carrying out toolbox meetings including specific awareness on chemical management /refuelling and differences between waste types to facilitate correct segregation, storage and disposal • Pre-start checks of plant, equipment and vehicles will be conducted to check for oil leaks • Storing any fuels or chemicals on site in an AS1940 compliant bund or double skinned tanks to prevent any spills impacting soil or water • Regular inspections on spill controls/bunding • Designating chemical and waste storage and refuelling areas away from watercourses to minimise the risk of contamination during handling and use • Refuelling to be carried out on hardstand or over a drip tray to capture spills and minor leaks • Collecting spilt material into regulated waste bins to be taken offsite by an EPA licenced third party to an approved facility. Regulated waste disposal records must be provided • Providing designated covered bins for general waste to minimise litter generation • Providing a detailed process for monitoring, recording and tracking waste handling.							
C7	Construction	**Exposure to ground gases and vapour** Construction activities releasing vapours and / or ground gases from contaminated soil and / or contaminated groundwater, impacting human health or beneficial uses. This includes possible volatile contamination from the auto wreckers site in Diggers Rest and landfill gas migrating from adjacent landfill in Bulla.	Relevant sections of the Project must consider vapours and gases associated with any construction that interfaces with landfill sites (within 500 metres of the boundary of the waste or contaminated areas. These include the section of the alignment adjacent to the Bulla Landfill (approx. KP 15.3 to KP 16 and along the non-preferred alignment) and near the Diggers Rest property (approx. KP 9.95 - KP 10.14). In reference to Risk ID C7, the spoil management measures referenced in EMM C1 must include requirements for assessment, monitoring and management of intrusive vapour, including potentially flammable or explosive conditions, in enclosed spaces in the vicinity of the Bulla Landfill (KP 15.3-KP 16 and along the non-preferred alignment) and Diggers Rest (KP 9.95- KP 10.14) property and trenches in those areas. The plan must address vapour risks associated with excavation of impacted soils, extraction of impacted	Moderate	Unlikely	Medium	Specifically associated with the Bulla Landfill (KP 15.3-KP 16 and the non-preferred alignment), this must include, where relevant: • Securing of the excavation and stockpile area from the public and livestock including signage warning of open excavations • Continuous monitoring of landfill gas conditions when any person is in the trench or during hot works or works that could potentially produce a spark within the trench. • Setting of trigger values that require action within areas being trenched and including any temporary structures within the vicinity of the landfill. These would be developed in	Moderate	Remote	Low

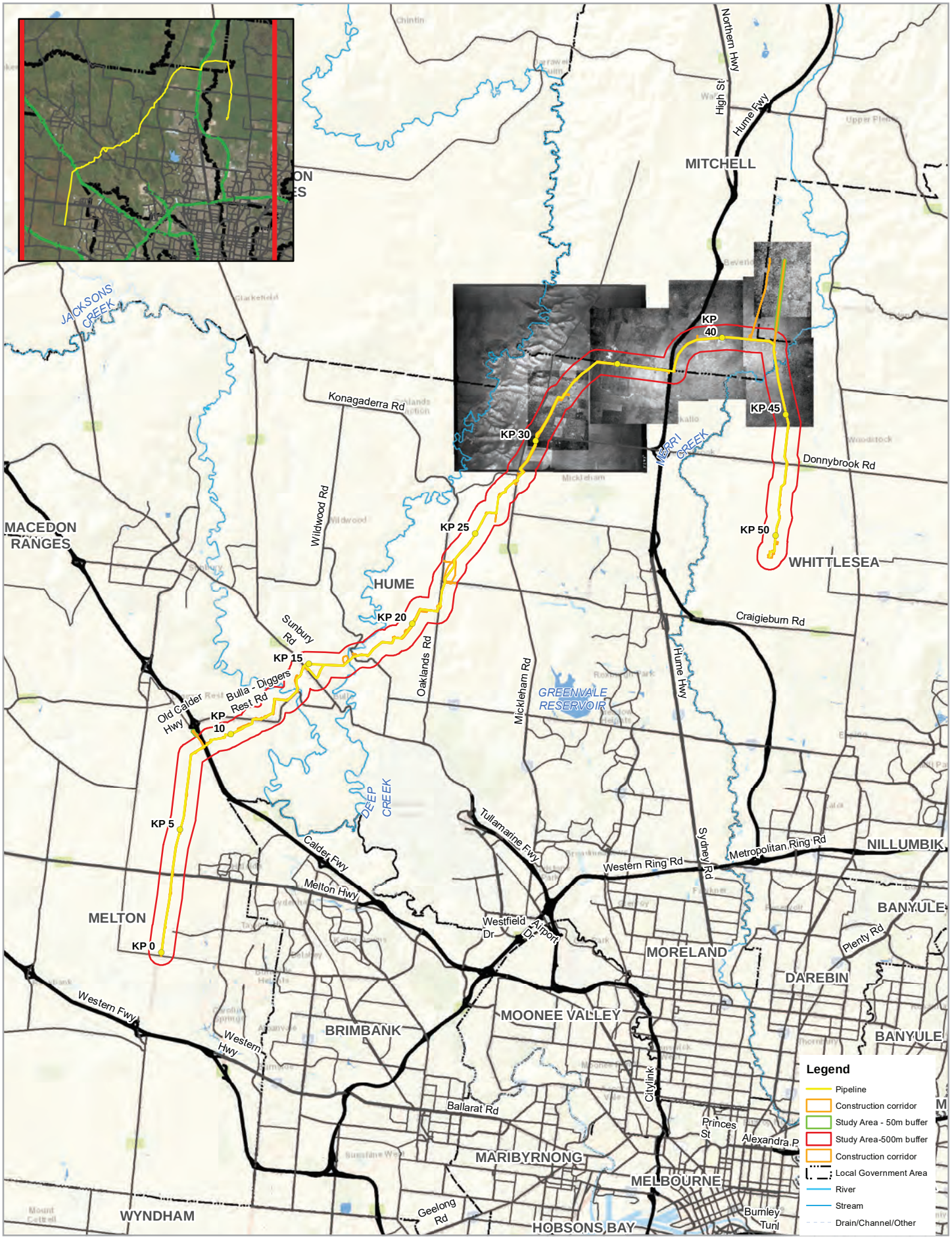
Risk ID	Staging	Risk Pathway	Initial Environmental Management Measures	Initial Risk			Additional Mitigation and Management Measures	Residual Risk		
			groundwater, open excavations and stockpiles and gases.				accordance with EPA Victoria Publication 788 Best Practice Management; Siting, design, operation and rehabilitation of landfills (landfill BPEM) and relevant occupational health and safety regulations and compliance codes. • Contingencies to address any breaches of trigger values including temporary cessation of work until a reappraisal of risks is conducted, additional monitoring at a higher frequency, implementation of additional safety measures and or vapour extraction systems in response to the risk assessment. • The aforementioned EMMs should be implemented at: – The non-preferred alignment – the preferred alignment between KP15.3 - 16 Specifically relevant to the Diggers Rest property (approx.. KP 9.95-KP 10.14), this must include, where relevant prior to construction to inform the CEMP:: • Investigation of soils within the construction corridor to assess for the presence contamination including metals, TPHs, BTEX, PAHs and solvents. • If volatile contamination is identified a risk assessment to determine the risk from vapours to construction workers during trenching may be required. • Monitor vapours in trenches during construction, if required			
C8	Construction	**Management of waste streams** Mismanagement of waste streams generated during Project construction affects human health, aesthetics and the environment	In reference to Risk ID C8 the CEMP would include the following mitigation measures to manage non hazardous waste: • Wastes to be managed in accordance with the IWR Regulations • Undertake an assessment of potential wastes to be generated for the construction phase of the project that identifies waste elimination, reduction measures and opportunities for the re-use and recycle of construction waste • Appropriately designated/designed facilities to handle the identified waste streams including necessary segregation and storage requirements. This will include dedicated and	Minor	Unlikely	Low		Minor	Unlikely	Low

Risk ID	Staging	Risk Pathway	Initial Environmental Management Measures	Initial Risk			Additional Mitigation and Management Measures	Residual Risk		
			labelled on site disposal locations, which segregates wastes into streams for offsite disposal or recycling • Waste facilities shall be located away from natural drainage systems and low-lying areas • PIW (such as waste oils, oily water mixtures, oily rags and oil filters, etc) are segregated, labelled and securely stored and transported to a facility licensed to accept these wastes • Appropriate waste classification and disposal to be used, including a licensed waste contractor and completion of waste transport certificates for PIW • Toolbox includes specific awareness on chemical management/refuelling and differences between waste types to facilitate correct segregation, storage and disposal • Putrescible wastes shall be sufficiently enclosed for odour control • No PIW shall be comingled with other waste streams • Detailed process for monitoring, recording and tracking waste handling							
C9	Operation	**Management of waste streams** Mismanagement of waste streams generated during Project operation affects human health, aesthetics and the environment	The Project will be incorporated into the existing VTS OEMP. Key measures include: • Conducting all operations and maintenance (including wastes) in accordance with EPA Industrial Waste Resource Guidelines • No permanent storage of fuel or other chemicals along the pipeline corridor • Compressor on a concrete area and surrounded by crushed rock hard stand and under cover with a shelter roof • Above ground oily water separator with triple interceptor and underground overflow pit with level sensors, serviced annually • Provision of general and regulated waste collection bins • Use of quick break detergents suitable for oily water separator • Annual stack test monitoring and servicing of compressors • Ensuring PIW (such as waste oils, oily water mixtures, oily rags and oil filters, etc) are segregated, labelled and securely stored and transported to a facility licensed to accept these wastes • Appropriately classifying and disposing waste, including using a regulated waste contractor and completion of waste transport certificates for PIW • Maintain spill kits onsite at all times and providing training for use of spill kit • Inducting all staff and contractors into APA HSE policies and procedures including risks	Minor	Unlikely	Low		Minor	Unlikely	Low

Risk ID	Staging	Risk Pathway	Initial Environmental Management Measures	Initial Risk			Additional Mitigation and Management Measures	Residual Risk		
			and controls associated with: waste management, chemical management and refuelling, weed and pest management and incident response. • Carrying out toolbox meetings including specific awareness on chemical management /refuelling and differences between waste types to facilitate correct segregation, storage and disposal • Pre-start checks of plant, equipment and vehicles will be conducted to check for oil leaks • Storing any fuels or chemicals on site in an AS1940 compliant bund or double skinned tanks to prevent any spills impacting soil or water • Regular inspections on spill controls/bunding • Designating chemical and waste storage and refuelling areas away from watercourses to minimise the risk of contamination during handling and use • Refuelling to be carried out on hardstand or over a drip tray to capture spills and minor leaks • Collecting spilt material into regulated waste bins to be taken offsite by an EPA licenced third party to an approved facility. Regulated waste disposal records must be provided • Providing designated covered bins for general waste to minimise litter generation • Providing a detailed process for monitoring, recording and tracking waste handling.							
C10	Construction	**Contaminated hydrostatic test water** Handling, storage or disposal of water from hydrostatic testing affects human health and the environment from exposure to contaminants	In reference to Risk ID C10, the CEMP mentioned in EMM C1 must include appropriate management options for hydrostatic testing water including: • Hydrostatic test water would be managed in accordance with SEPP (Waters) • Water to be used for hydrostatic testing would be sampled to determine water quality prior to use. • Prior to hydrostatic testing, the pipeline would be pre-cleaned to remove weld debris, dust and surface scale. • Water would be reused where practicable to minimise the number of discharge locations and conserve water. • Hydrostatic test water discharge would only be undertaken where water designated for release into the environment is of a quality that is within relevant statutory water quality guidelines. Relevant landholder(s) would be consulted prior to any discharge of hydrostatic test water to land. • Any discharge of hydrostatic test water would not result in soil erosion or sedimentation of land or water. Sediment control devices to	Minor	Remote	Negligible		Minor	Remote	Negligible

Risk ID	Staging	Risk Pathway	Initial Environmental Management Measures	Initial Risk			Additional Mitigation and Management Measures	Residual Risk		
			remove suspended solids such as geotextile fabric filters would be used. • No direct discharge would occur to watercourses or drains.							
C10	Construction	**Drilling fluids used for HDD** Drilling fluids used for HDD sections impacting groundwater and surface water quality and land.	In reference to Risk ID C11, the CEMP must include appropriate management options for drilling fluids including: • Spill kits or similar would be available to contain spills on land, preventing runoff into surface water and drains • Identification of contingency measures when HDD activities are in the vicinity of waterway zones • Drilling fluids will be disposed in accordance with Environment Protection (Industrial Waste Resource) Regulations 2009 and EPA Victoria Industrial Waste – Classification for Drilling Mud, Victoria Government Gazette G37. • If HDD occurs through a potentially contaminated site the IWRG 621 and 702 would be considered for offsite disposal • Selection of appropriate inert drilling fluids	Minor	Unlikely	Low		Minor	Unlikely	Low

Appendix C – Historical aerial photographs



Paper Size ISO A4

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Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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Project No. 31-12529997
Revision No. C
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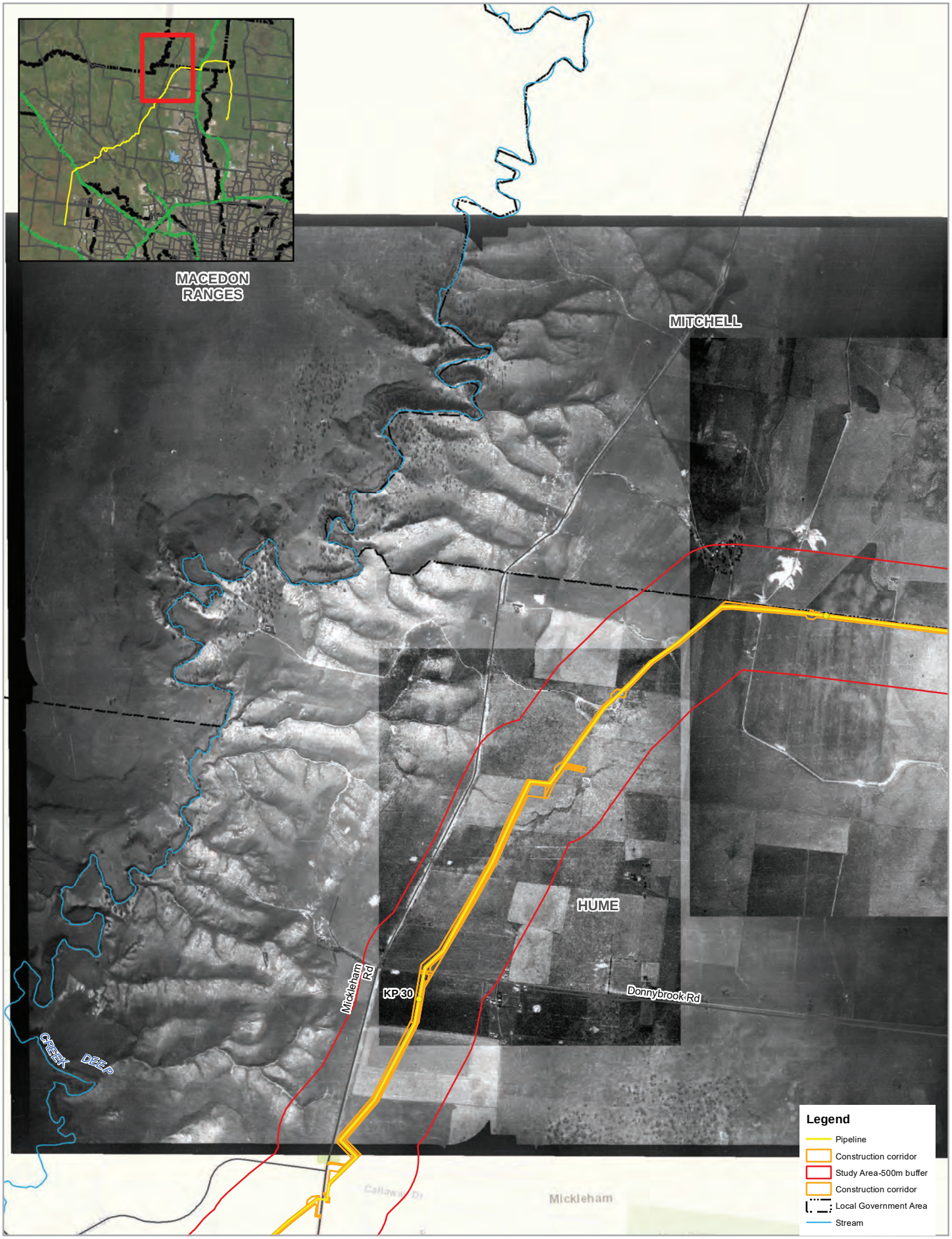
Overview
Aerial Imagery 1946

Appendix

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Print date: 09 Dec 2020 - 16:59

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

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Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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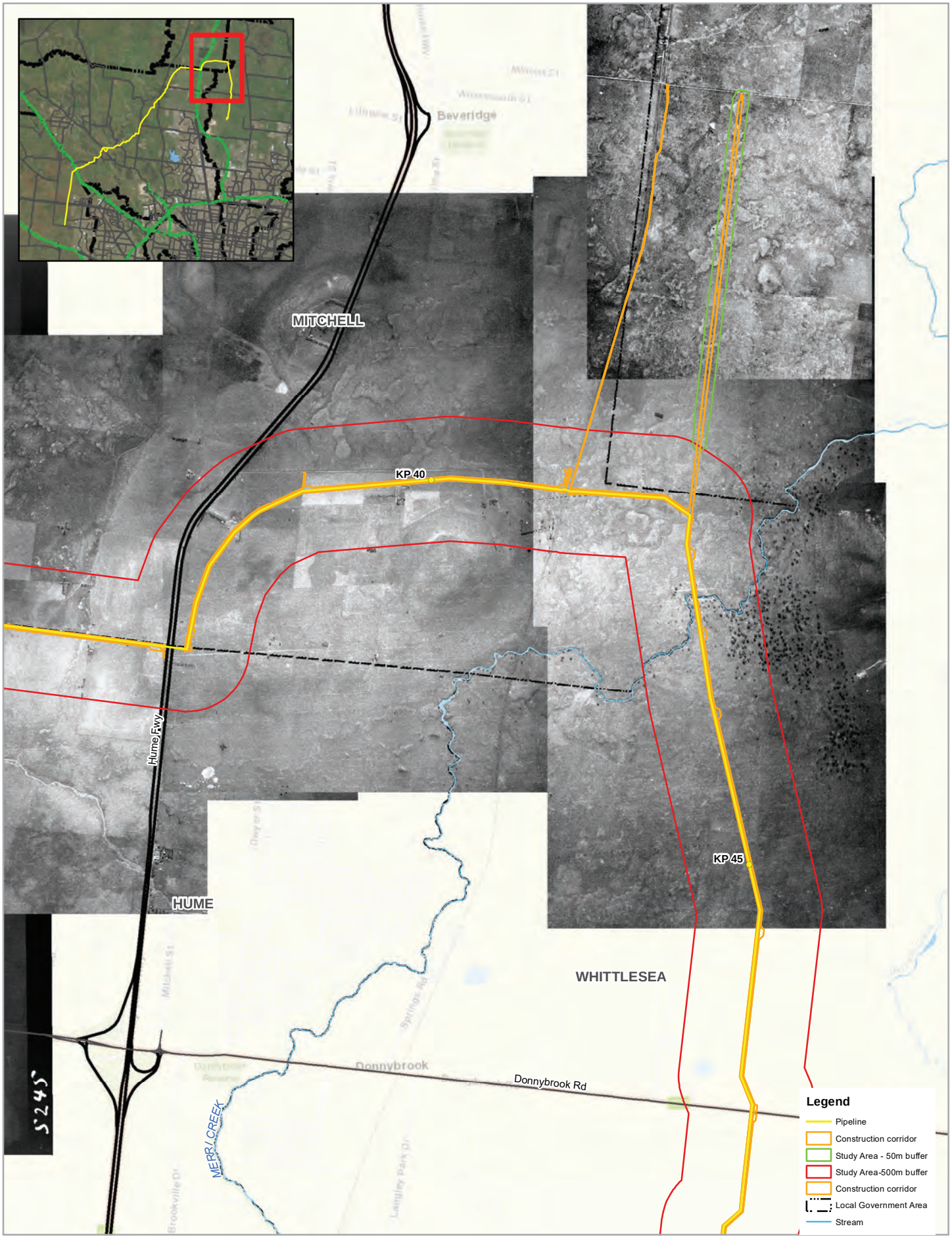
Aerial Imagery 1946

Appendix 1 of 2

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Print date: 09 Dec 2020 - 17:00

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

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Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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Revision No. C
Date 09/12/2020

Aerial Imagery 1946

Appendix 2 of 2

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Print date: 09 Dec 2020 - 17:01

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

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Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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Revision No. C
Date 09/12/2020

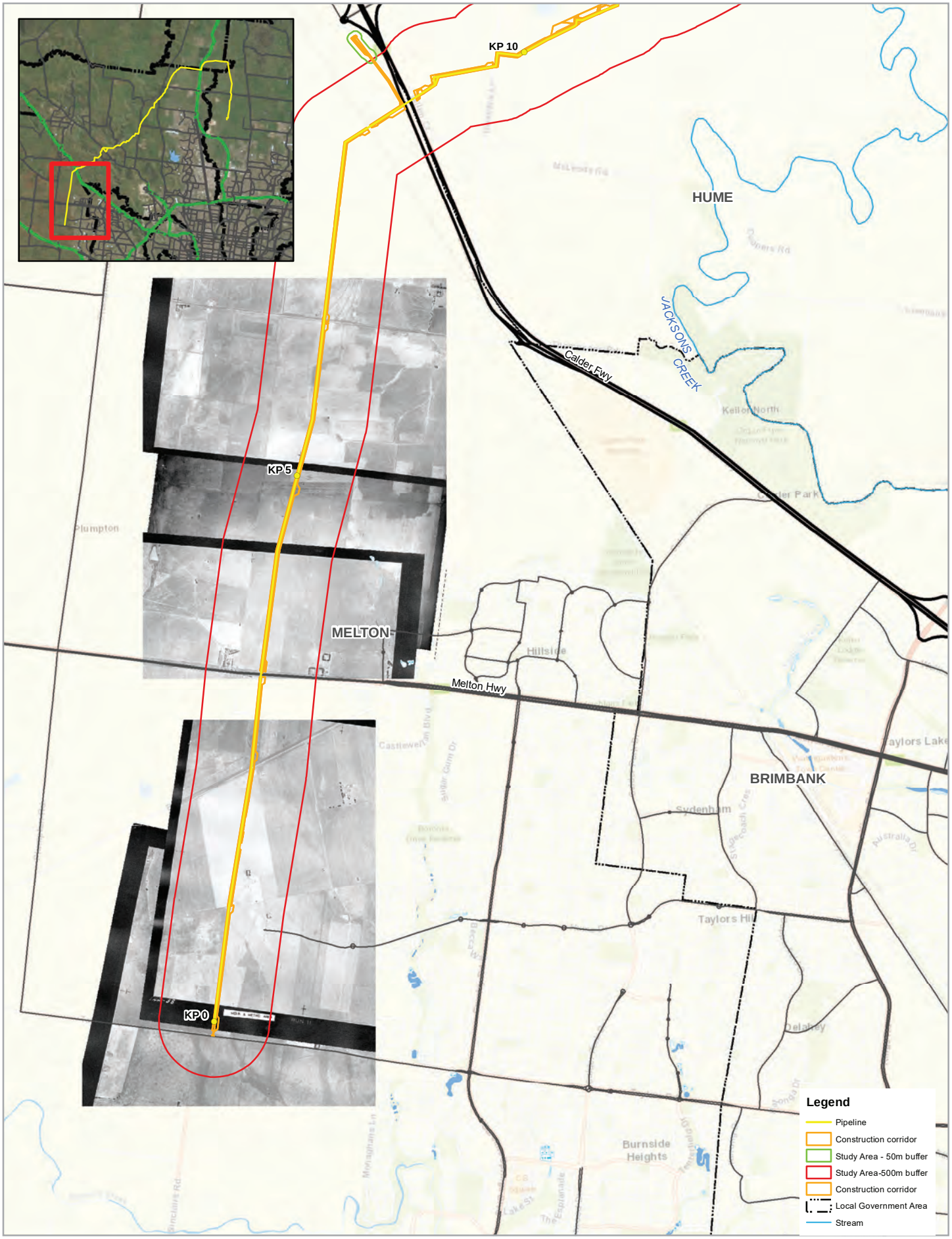
Overview
Aerial Imagery 1951

Appendix

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 16:58

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

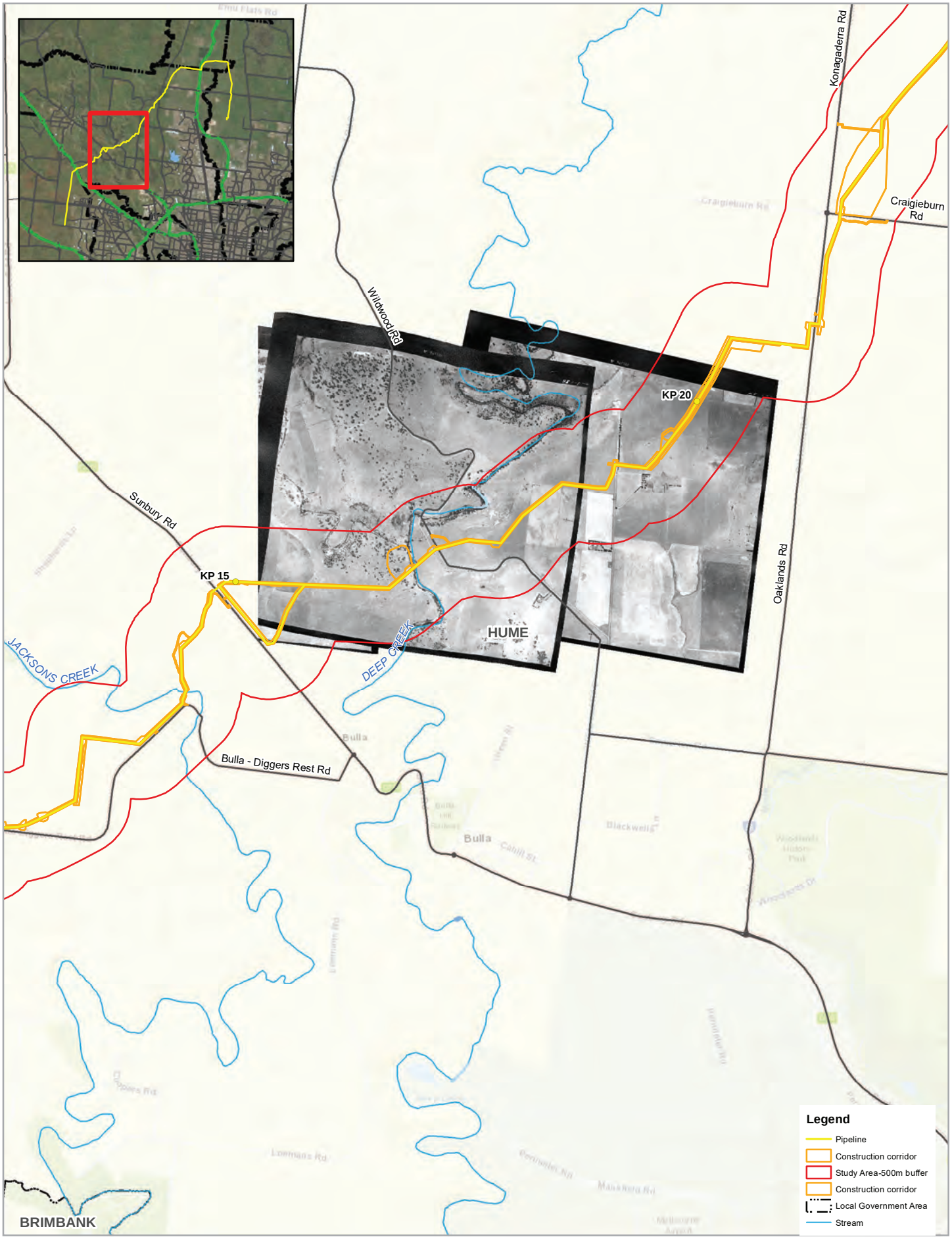
Aerial Imagery 1951

Appendix 1 of 2

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 16:59

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1951 Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

Aerial Imagery 1951

Appendix 2 of 2

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 17:00

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1951 Created by: sacevedo

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Paper Size ISO A4

0 1.5 3 4.5 6

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

Overview
Aerial Imagery 1960

Appendix

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 16:57

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

Aerial Imagery 1960

Appendix

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 17:02

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

0 1.5 3 4.5 6

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

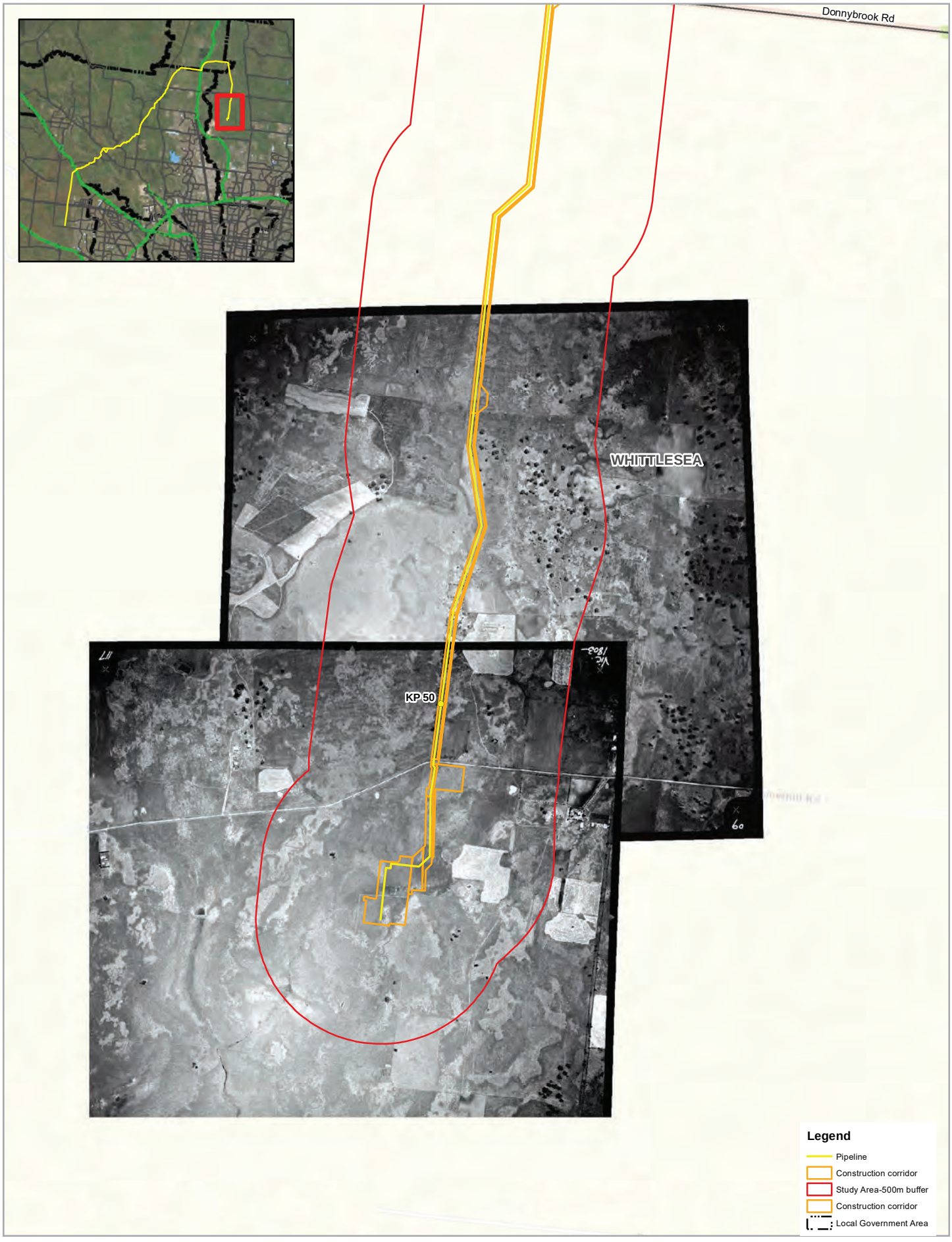
Overview
Aerial Imagery 1963

Appendix

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Print date: 09 Dec 2020 - 16:56

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

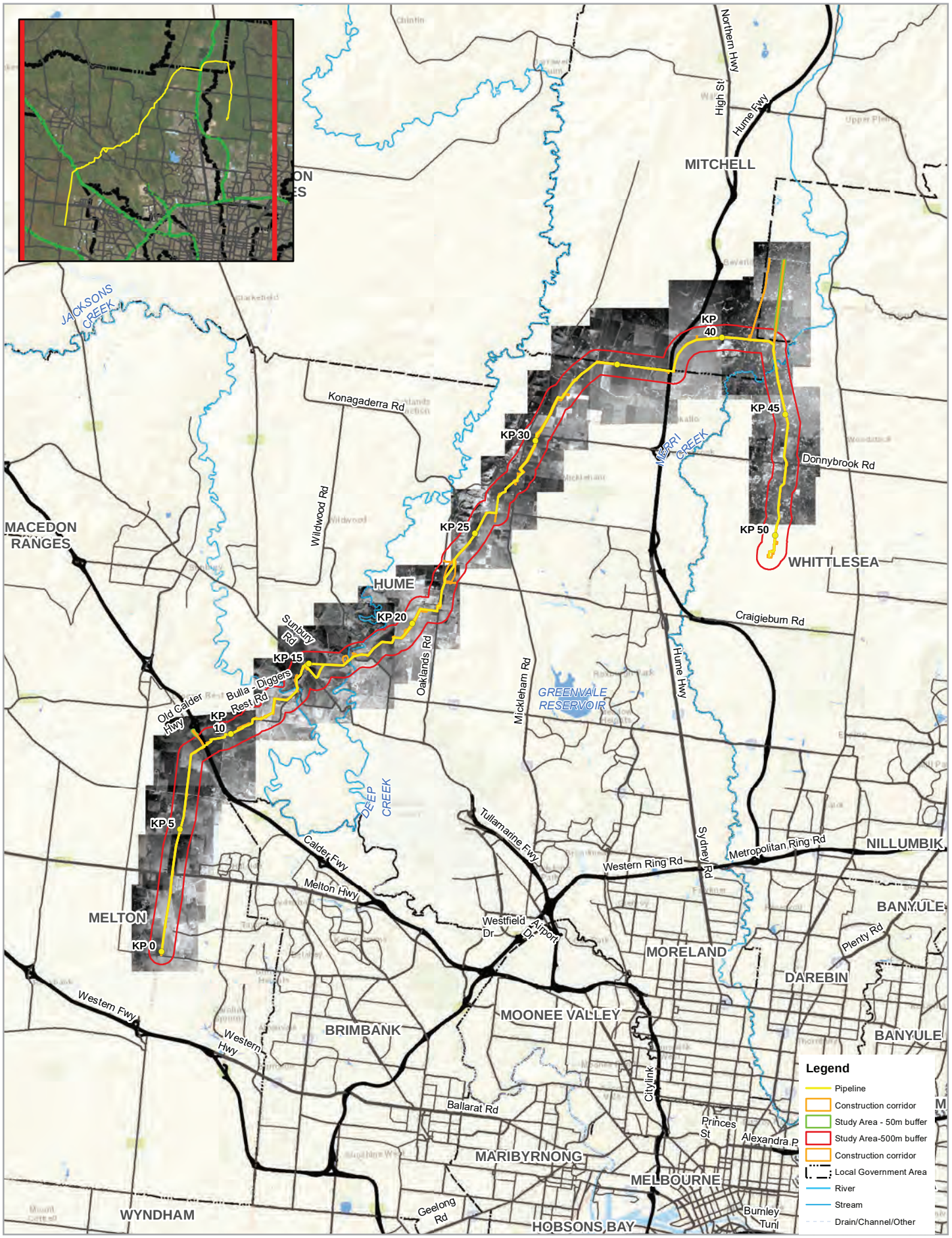
Aerial Imagery 1963

Appendix

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Print date: 09 Dec 2020 - 17:02

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

0 1.5 3 4.5 6

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

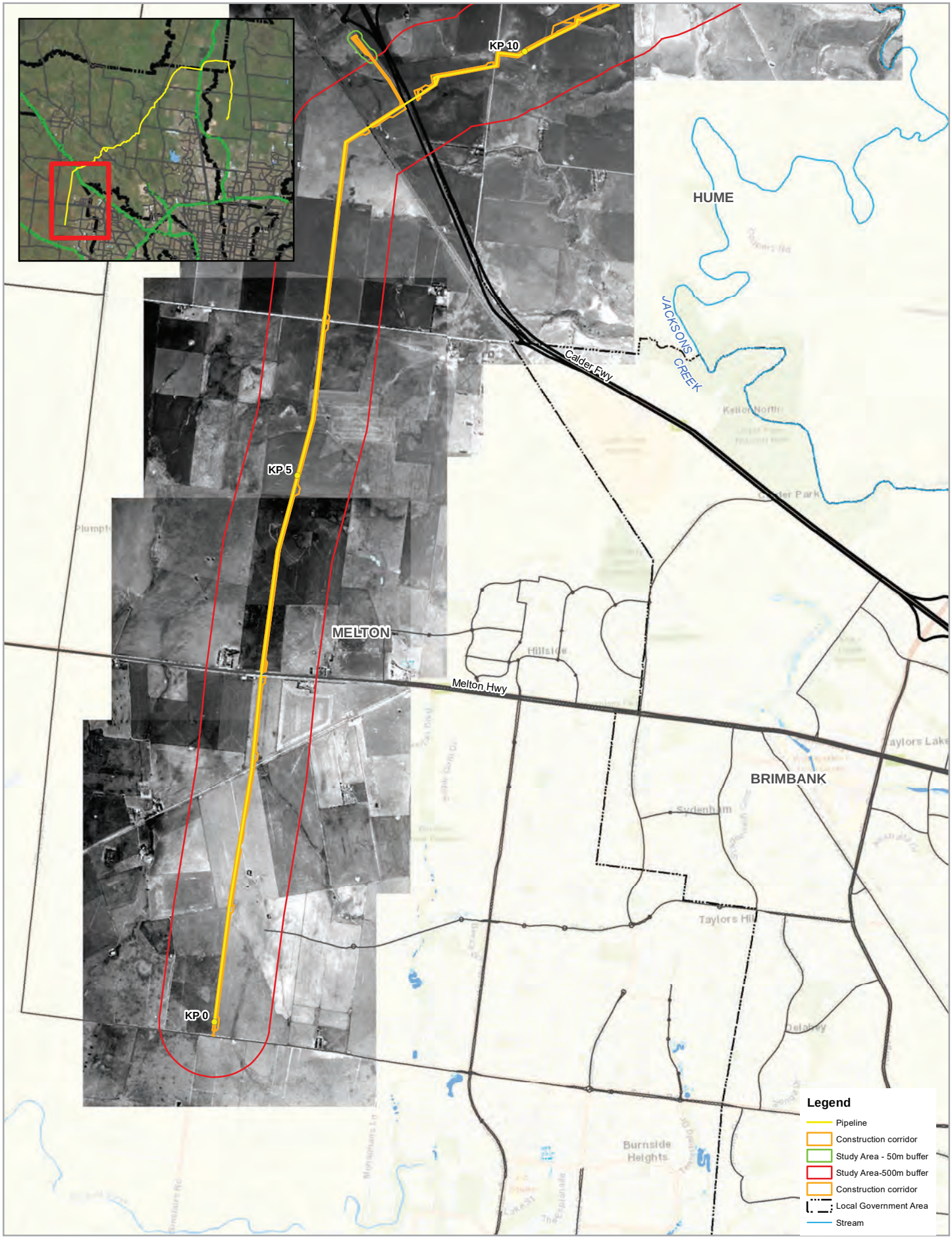
Overview
Aerial Imagery 1968

Appendix

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Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. c
Date 09/12/2020

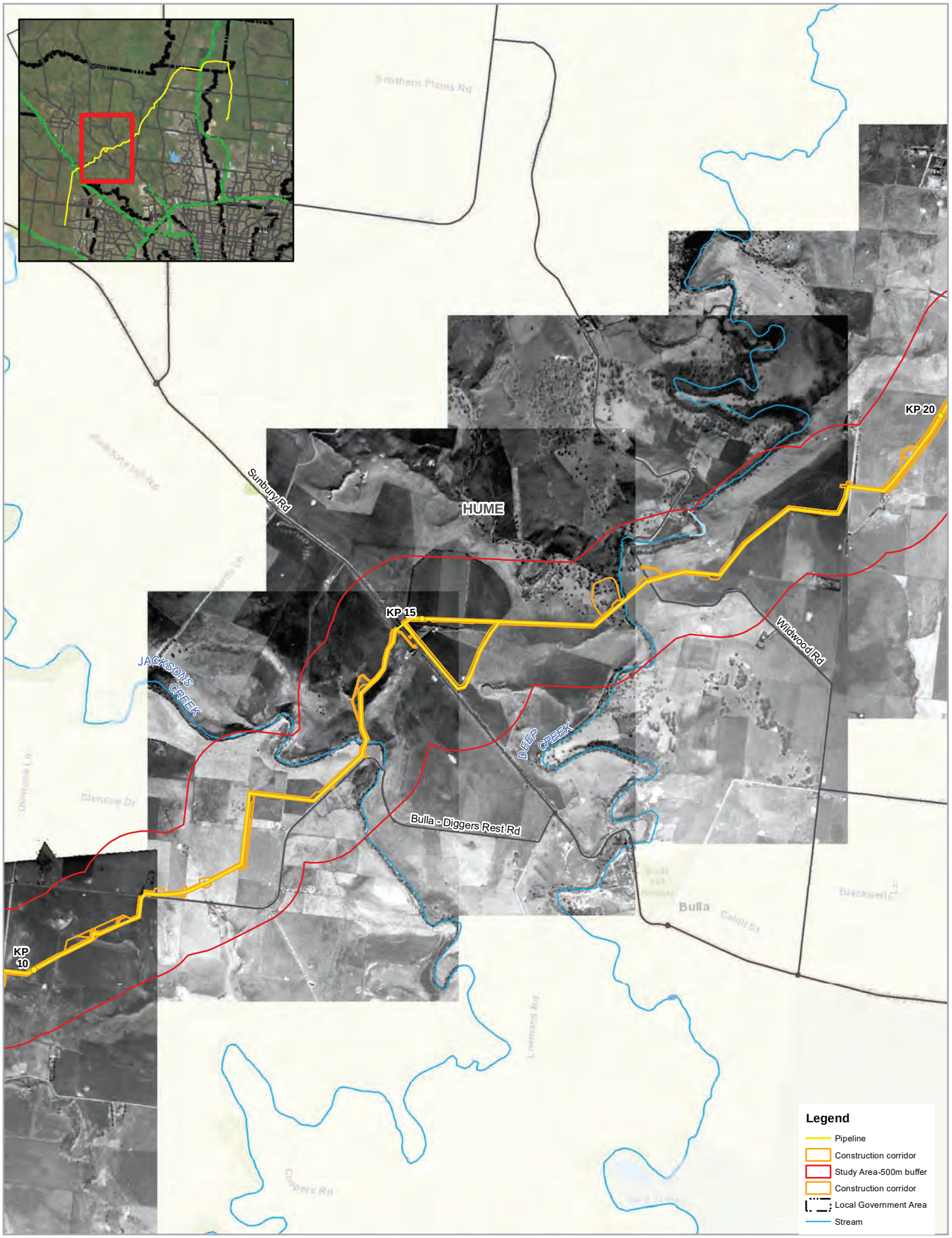
Aerial Imagery 1968

Appendix 1 of 6

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Print date: 09 Dec 2020 - 17:16

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1951 Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. c
Date 09/12/2020

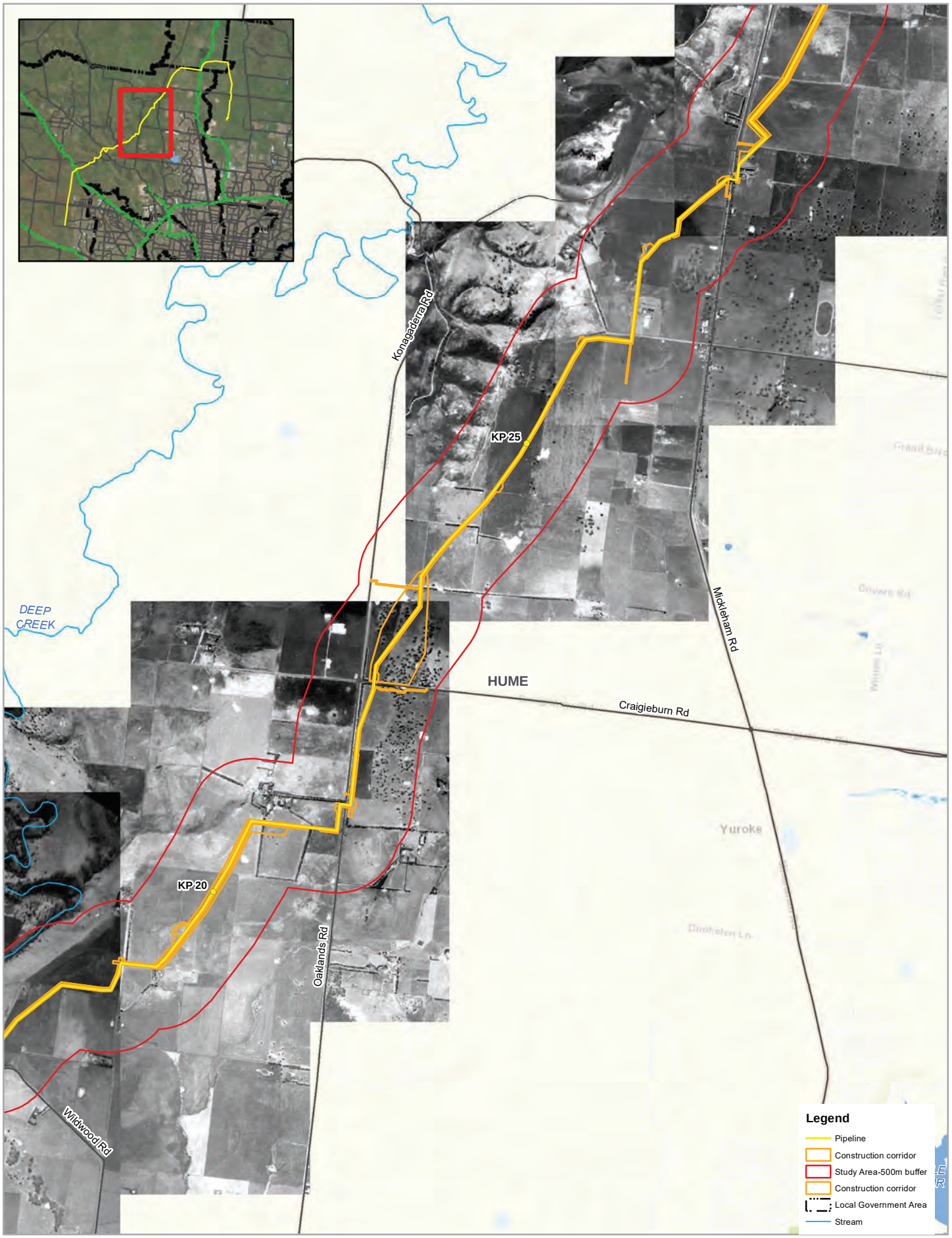
Aerial Imagery 1968

Appendix 2 of 6

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 16:50

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1960 Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
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Project No. 31-12529997
Revision No. c
Date 09/12/2020

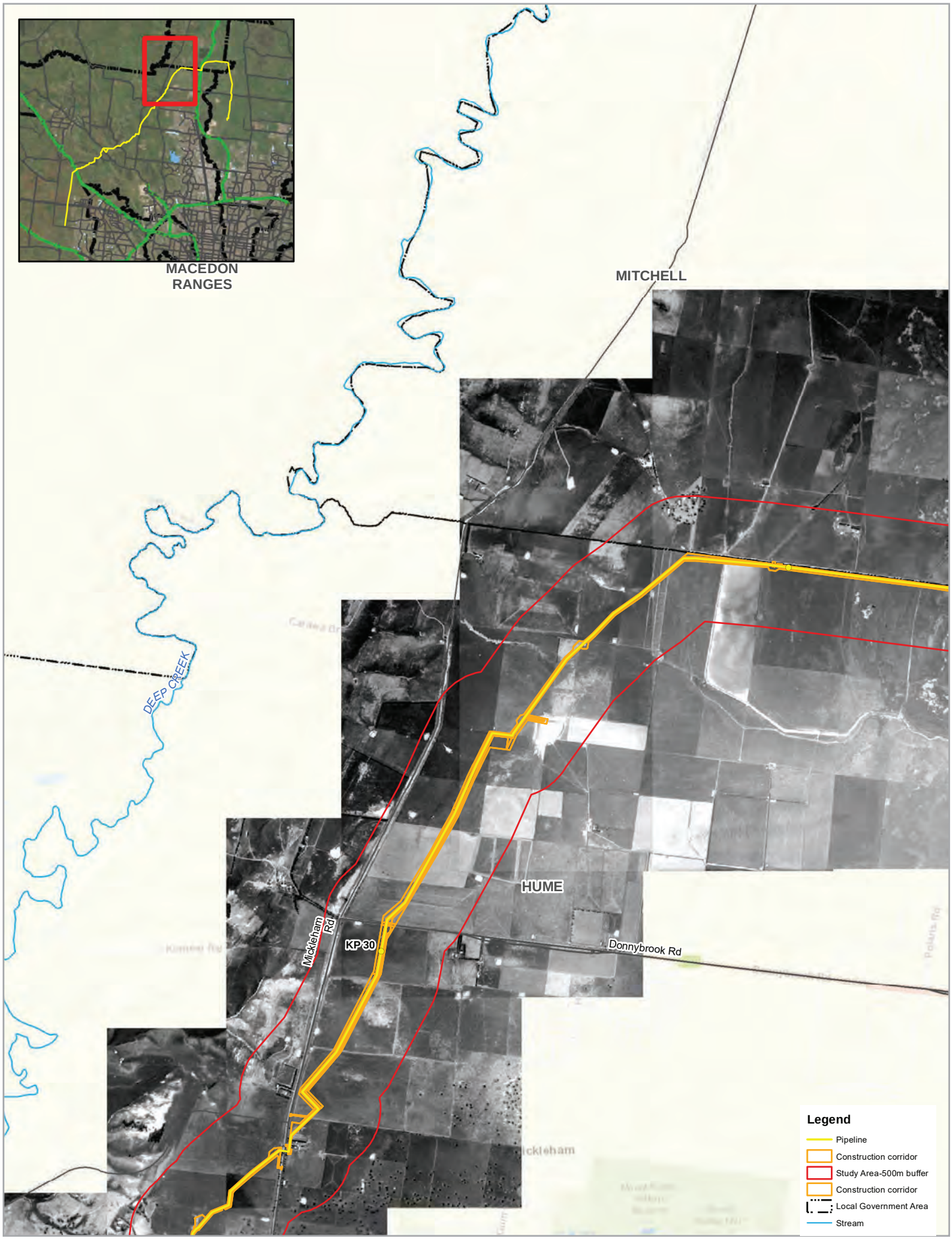
Aerial Imagery 1968

Appendix 3 of 6

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Print date: 09 Dec 2020 - 16:50

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1963 Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. c
Date 09/12/2020

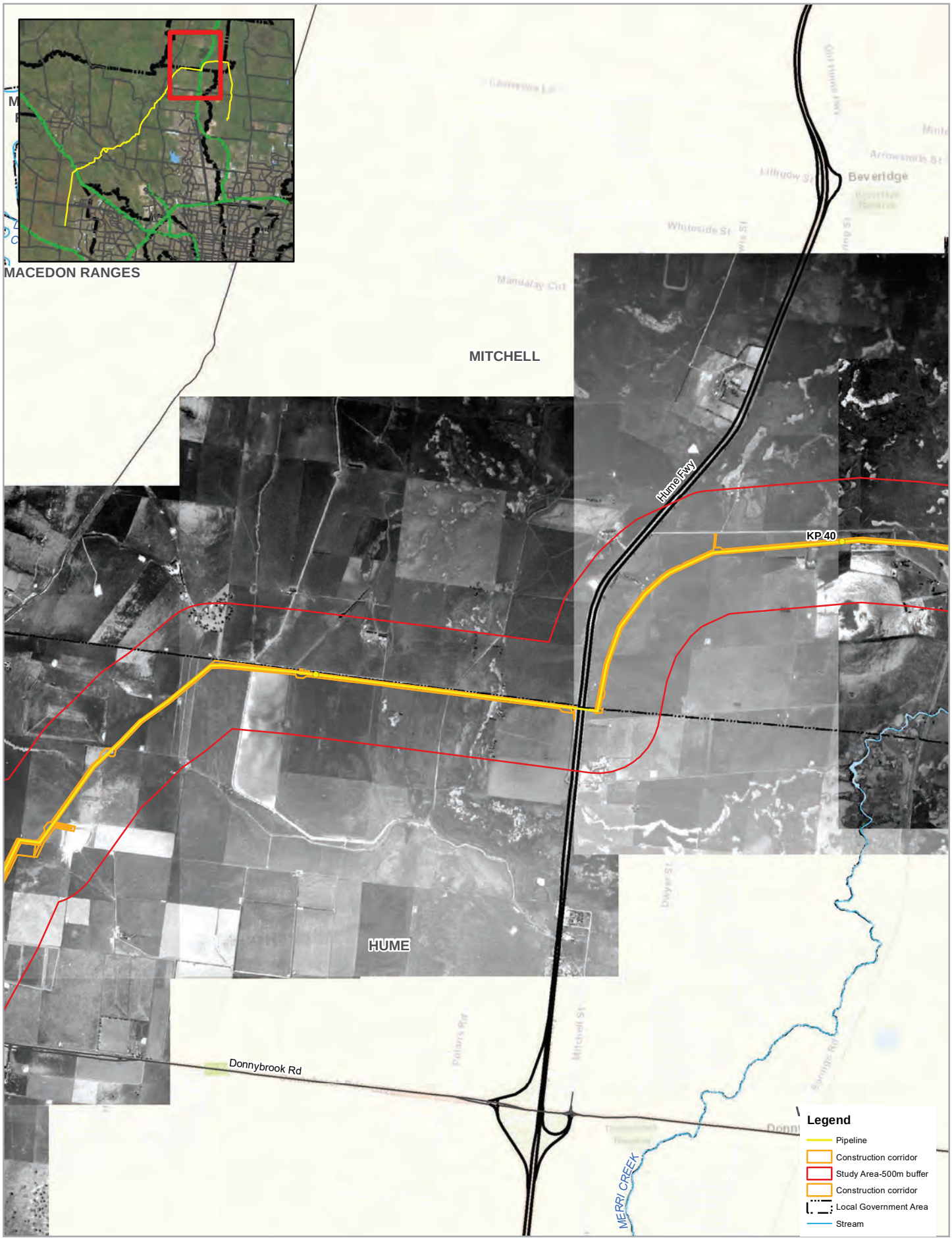
Aerial Imagery 1968

Appendix 4 of 6

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Print date: 09 Dec 2020 - 16:51

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1960 Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. c
Date 09/12/2020

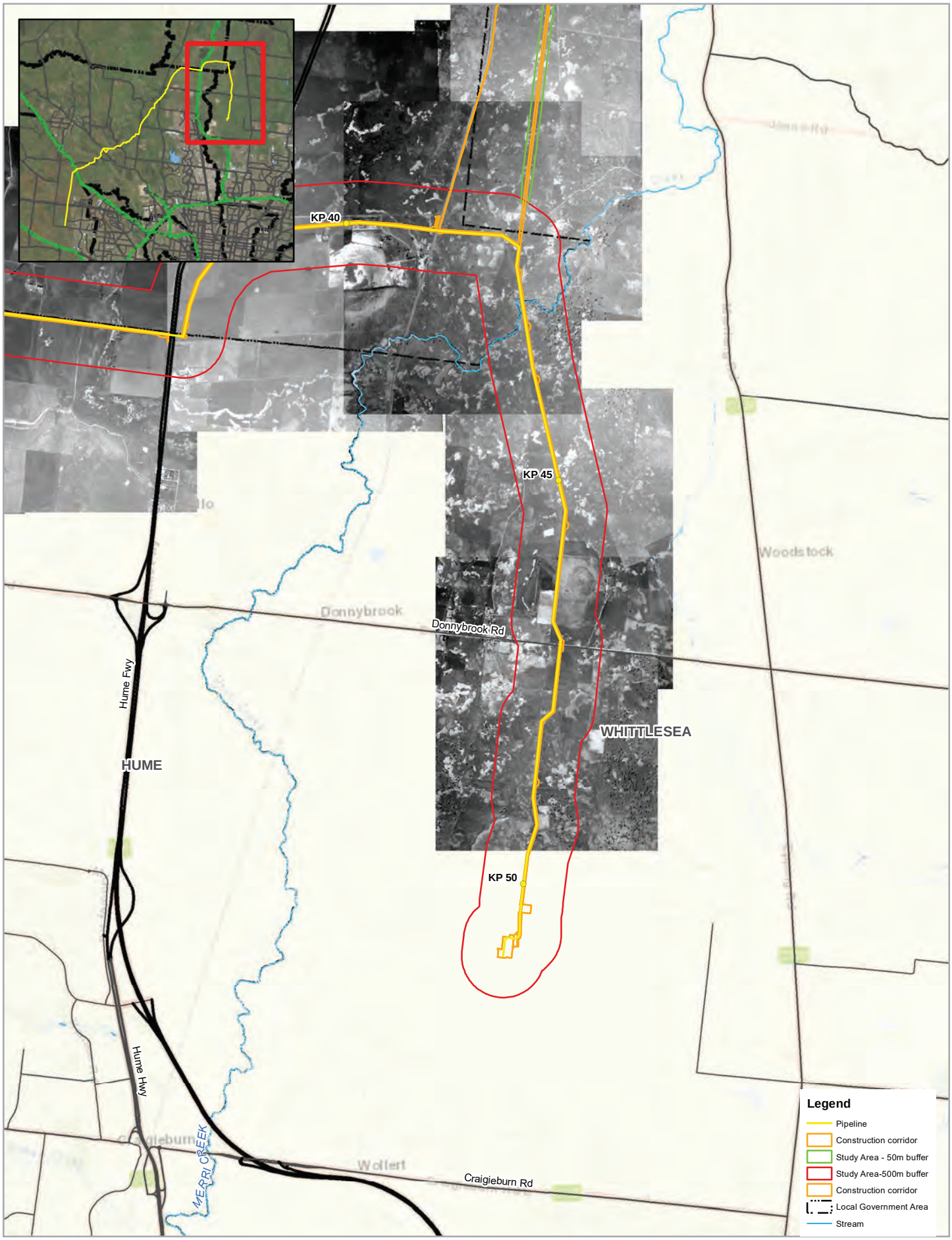
Aerial Imagery 1968

Appendix 5 of 6

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Print date: 09 Dec 2020 - 16:51

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1963 Created by: sacevedo

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Paper Size ISO A4

0 0.4 0.8 1.2 1.6

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. c
Date 09/12/2020

Aerial Imagery 1968

Appendix 6 of 6

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 16:52

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1963 Created by: sacevedo

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Paper Size ISO A4

0 1.5 3 4.5 6

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Overview
Aerial Imagery 1978-1979

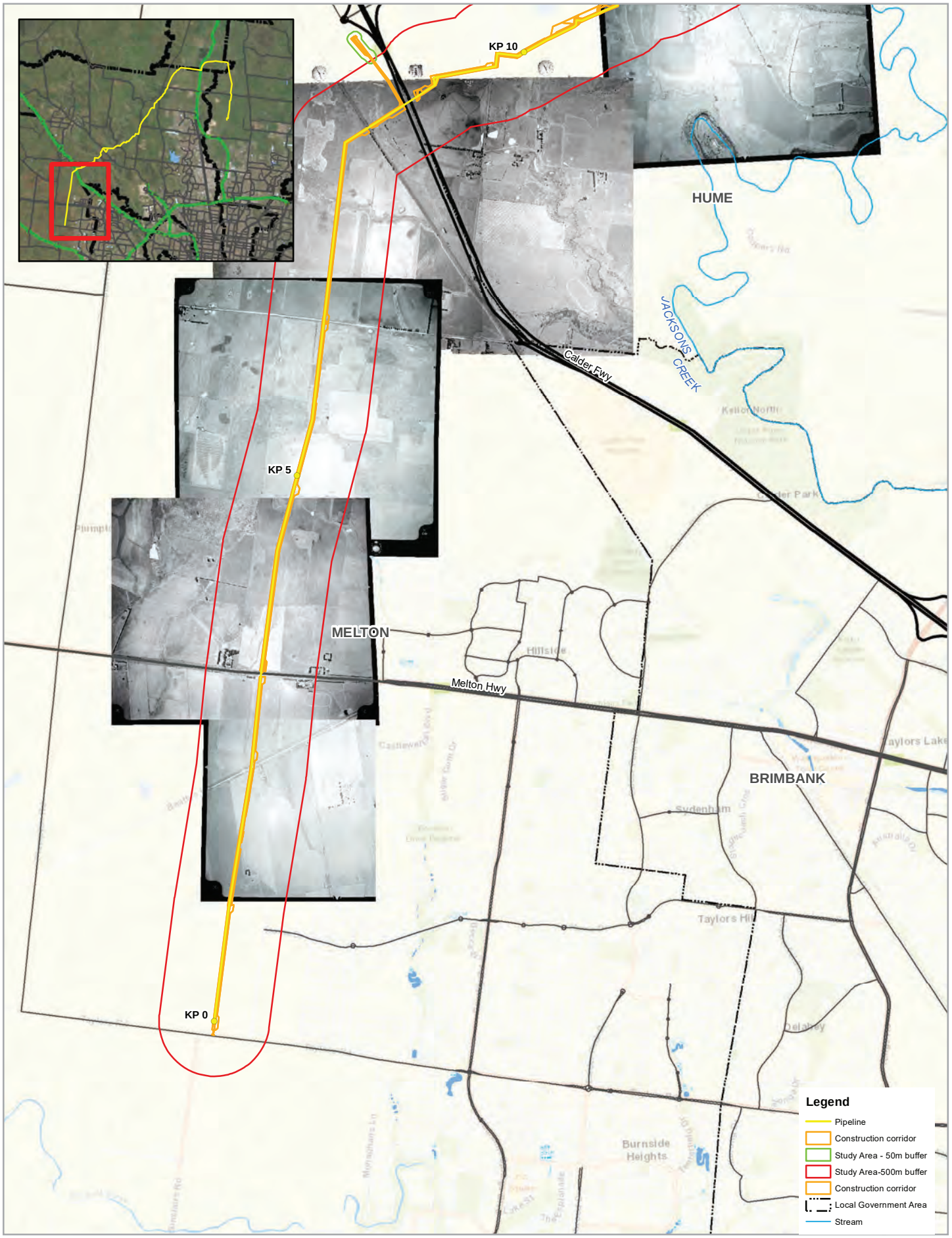
Project No. 31-12529997
Revision No. C
Date 09/12/2020

Appendix

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Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

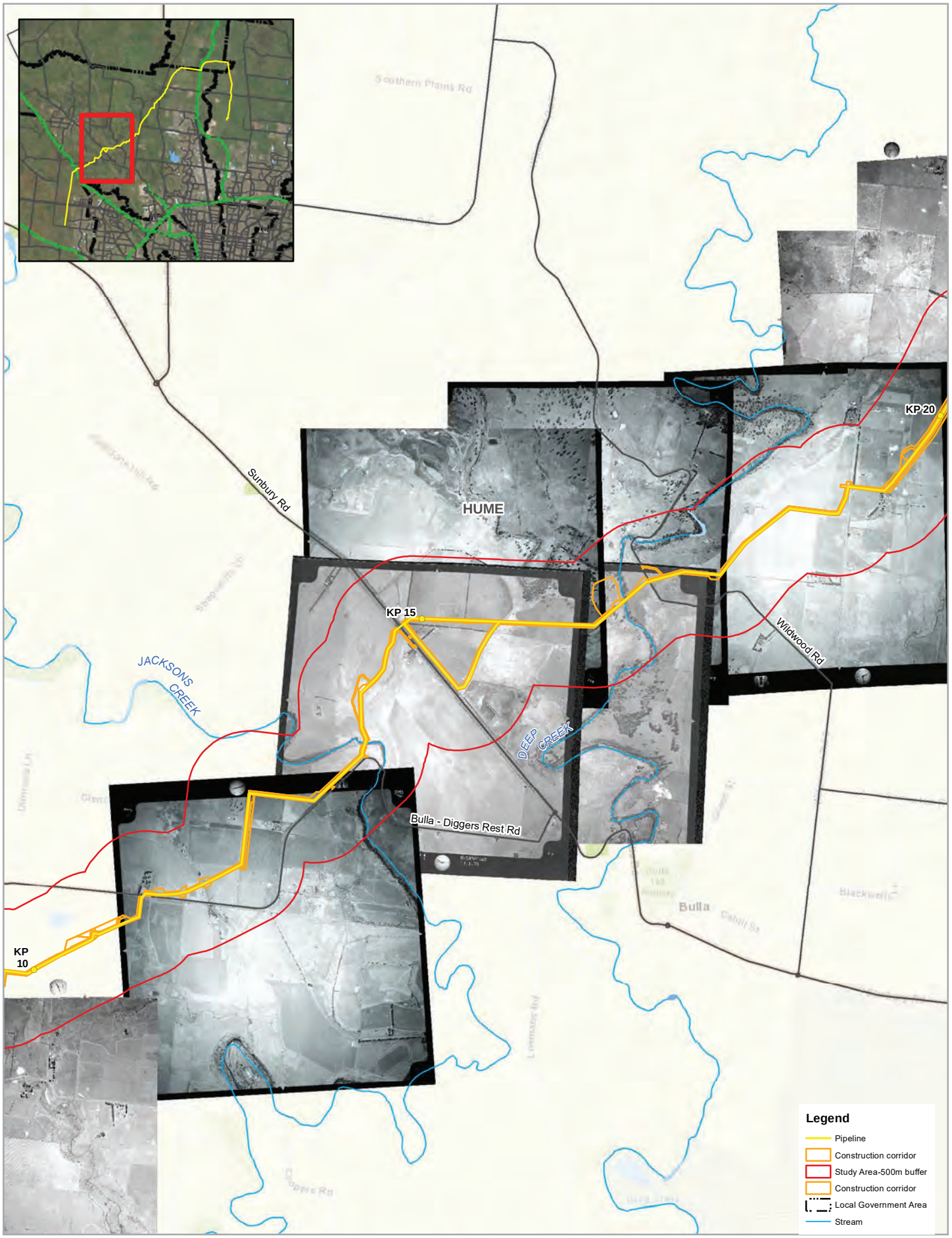
Aerial Imagery 1978-1979

Appendix 1 of 7

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Print date: 09 Dec 2020 - 16:46

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1951 Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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GHD

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

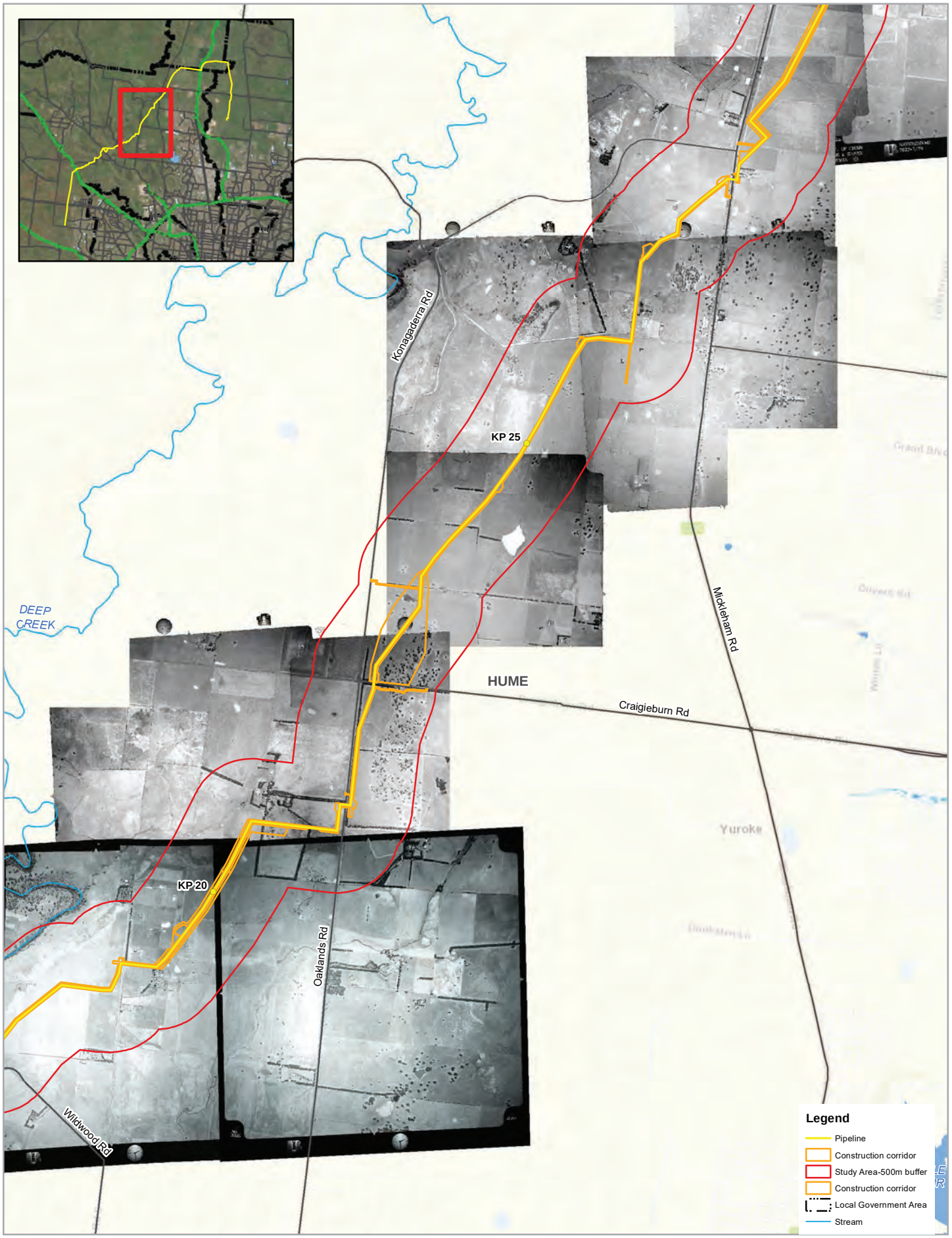
Aerial Imagery 1978-1979

Appendix 2 of 7

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 16:46

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1960 Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

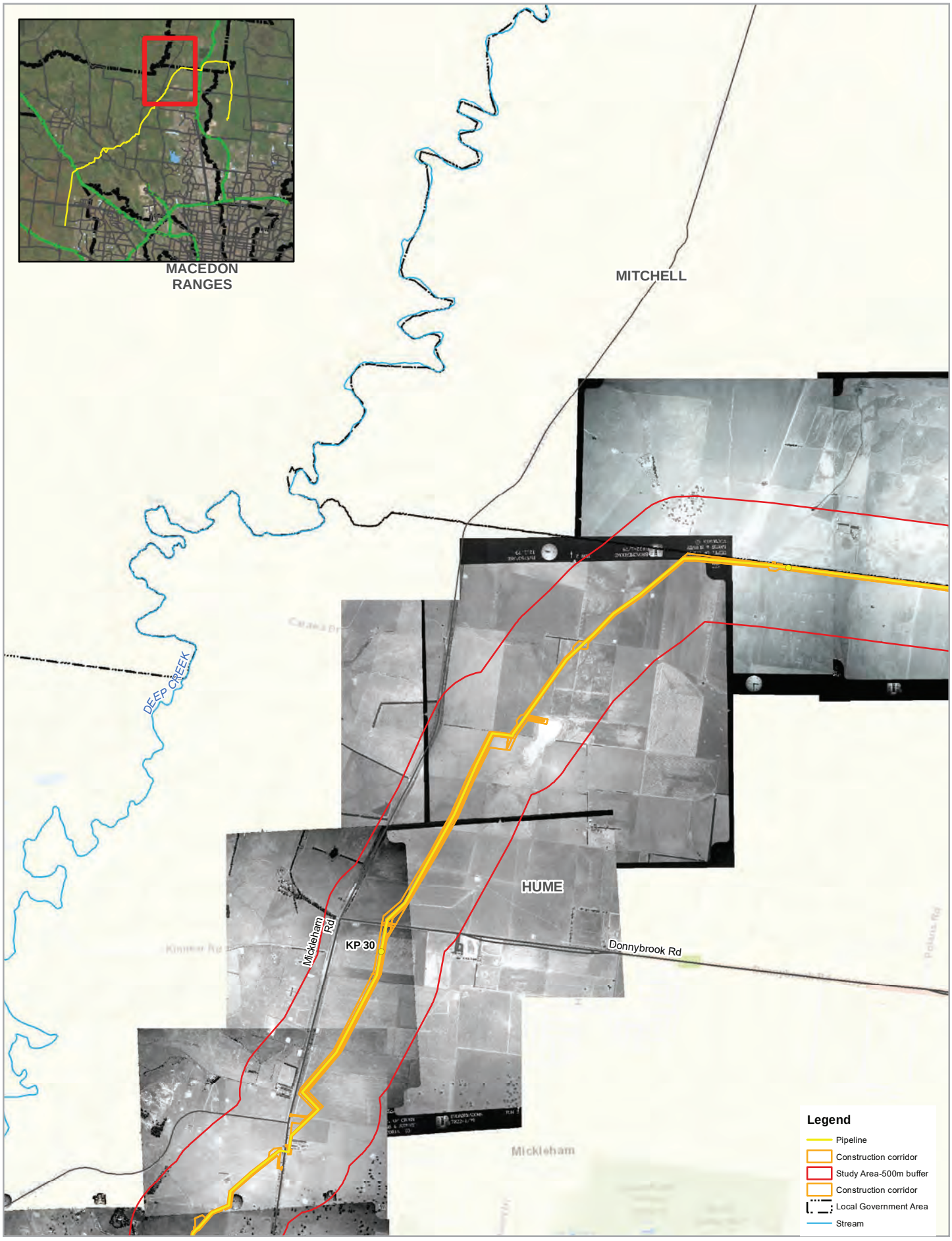
Aerial Imagery 1978-1979

Appendix 3 of 7

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 16:47

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1963 Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

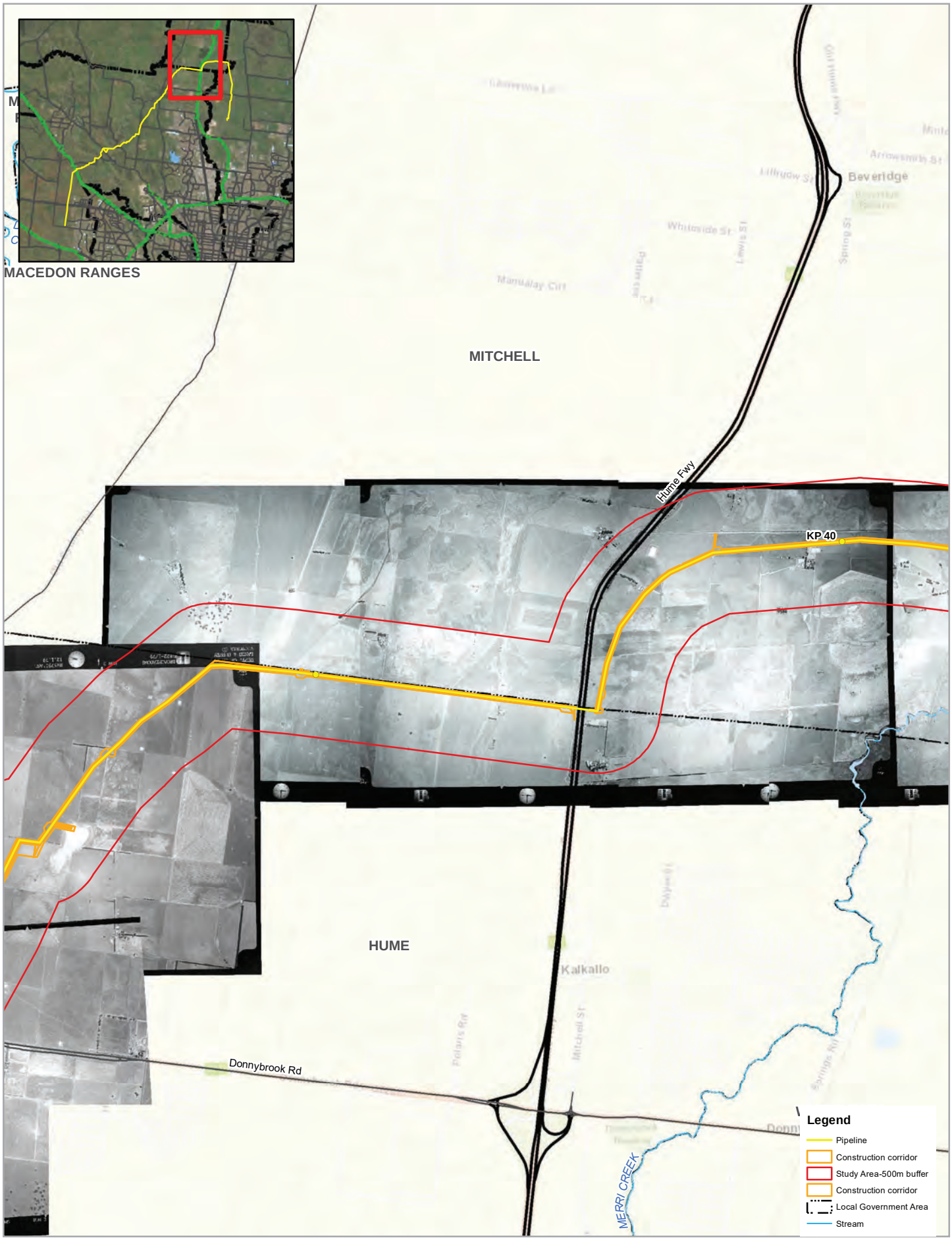
Aerial Imagery 1978-1979

Appendix 4 of 7

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 16:47

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1960 Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

Aerial Imagery 1978-1979

Appendix 5 of 7

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 16:48

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1963 Created by: sacevedo

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Paper Size ISO A4

0 0.2 0.4 0.6 0.8

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

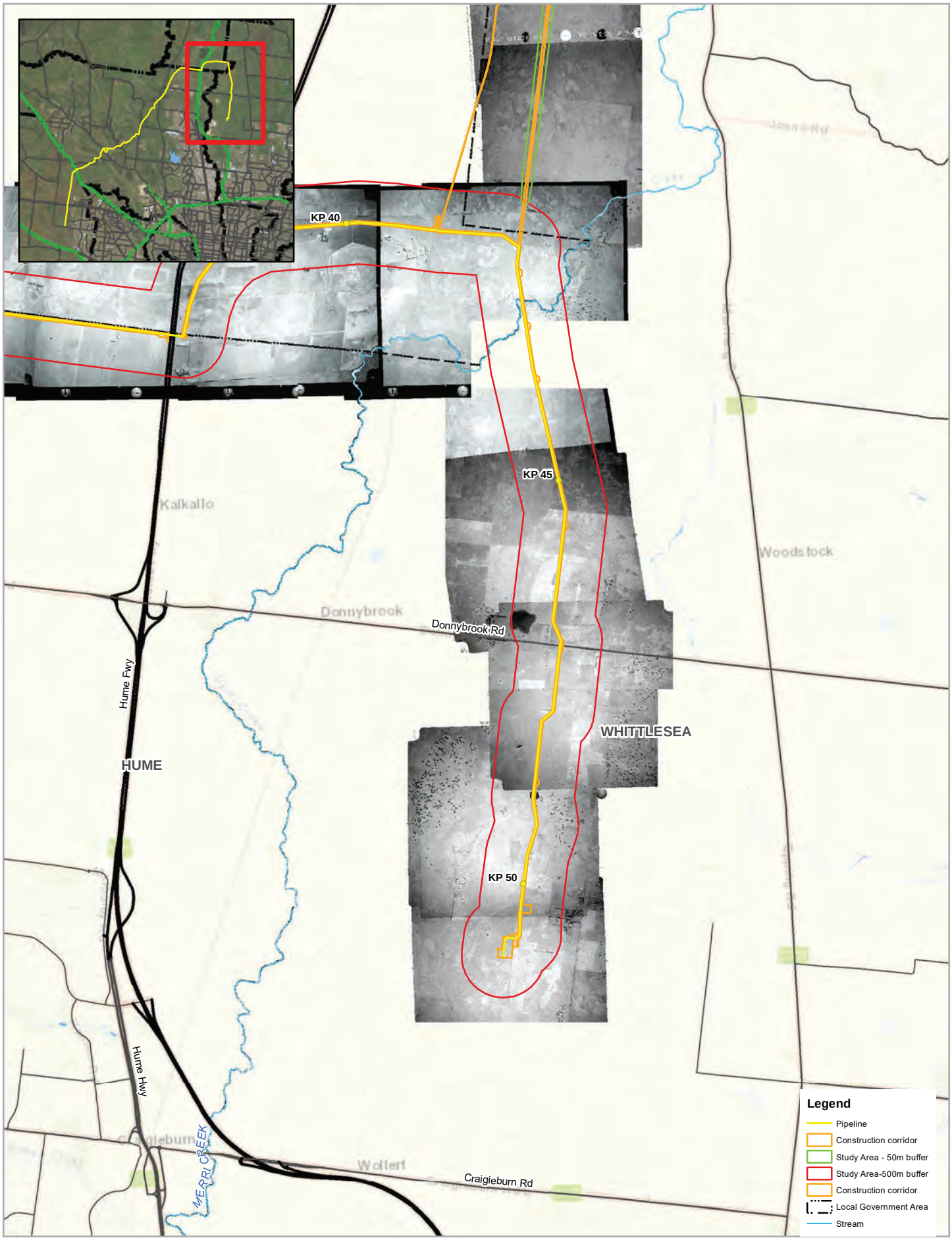
Aerial Imagery 1978-1979

Appendix 6 of 7

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 16:49

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1963 Created by: sacevedo

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Paper Size ISO A4

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Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

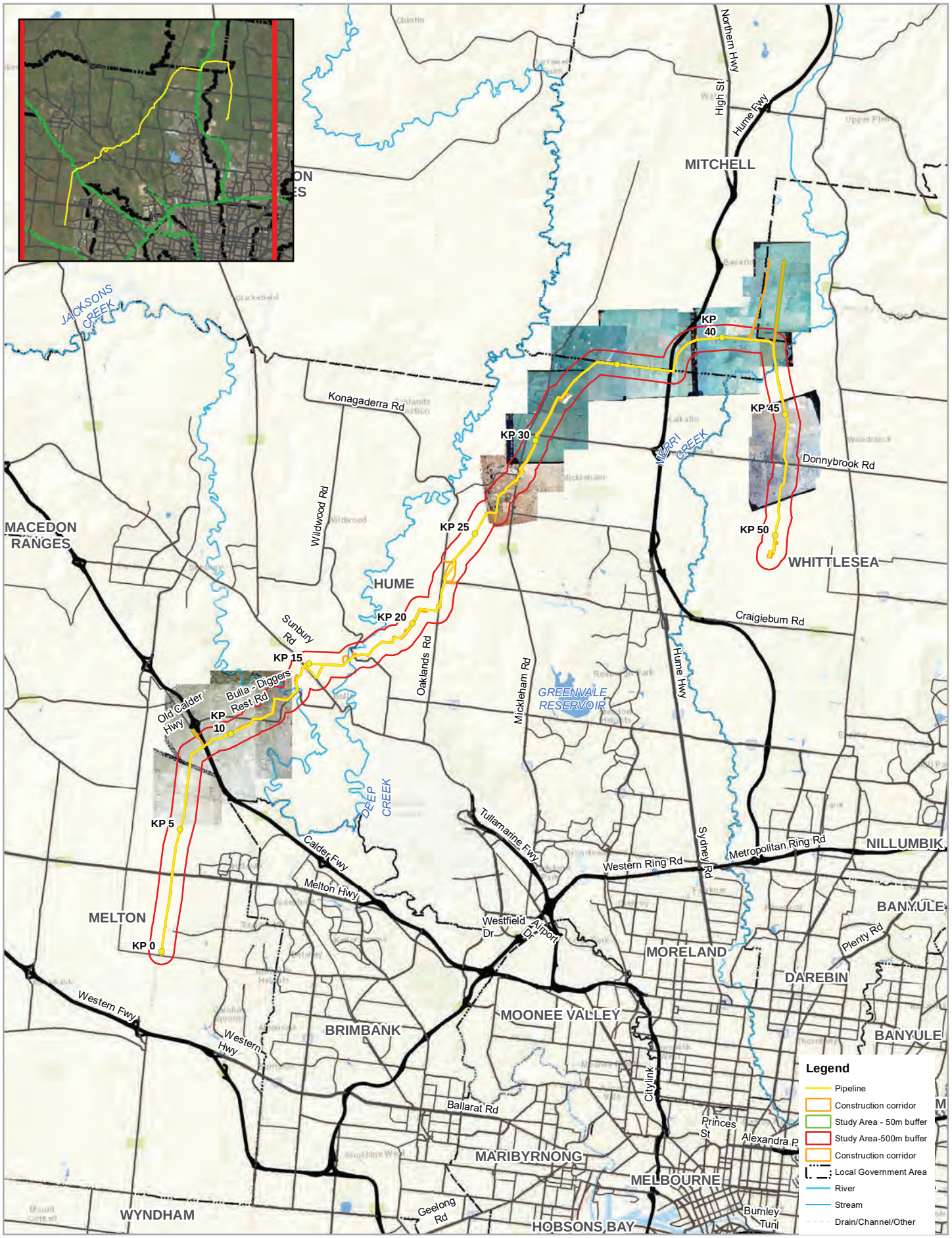
Aerial Imagery 1978-1979

Appendix 7 of 7

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 16:48

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1963 Created by: sacevedo

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Paper Size ISO A4

0 1.5 3 4.5 6

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Overview
Aerial Imagery 1989-1990

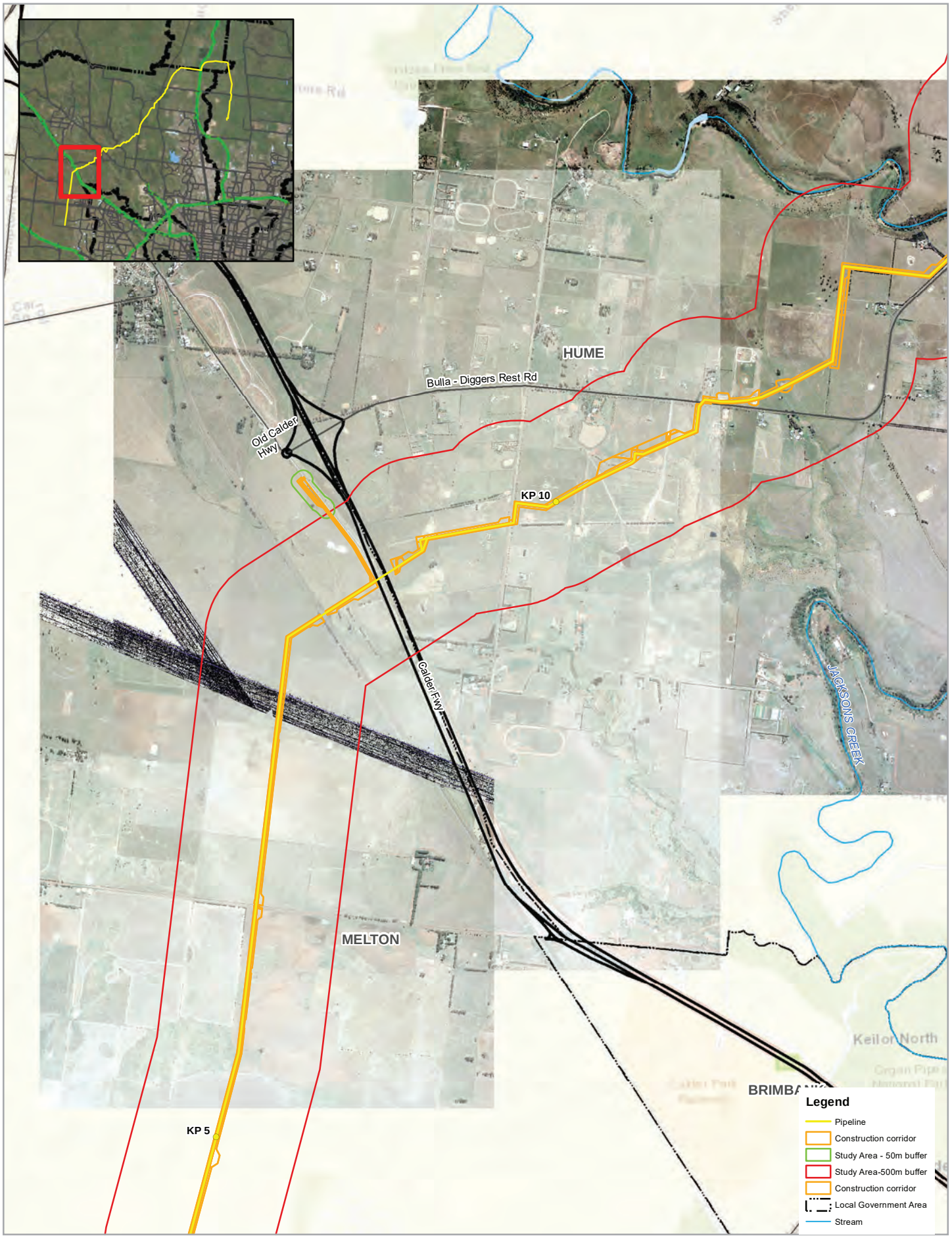
Project No. 31-12529997
Revision No. C
Date 09/12/2020

Appendix

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 16:54

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.2 0.4 0.6 0.8

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

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Project No. 31-12529997
Revision No. C
Date 09/12/2020

Aerial Imagery 1989-1990

Appendix 1 of 5

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 17:05

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

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Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

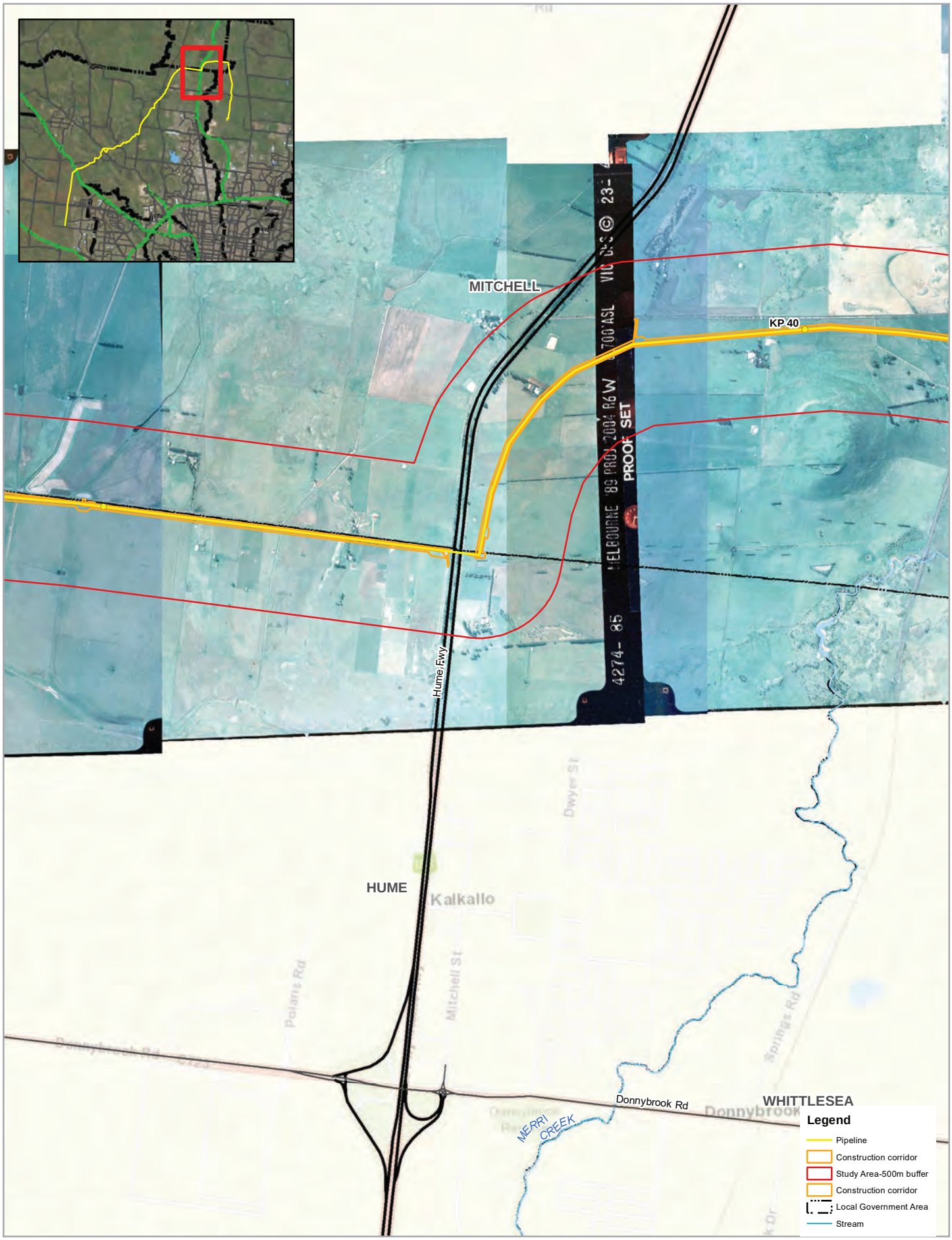
Aerial Imagery 1989-1990

Appendix 2 of 5

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
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Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

0 0.2 0.4 0.6 0.8

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

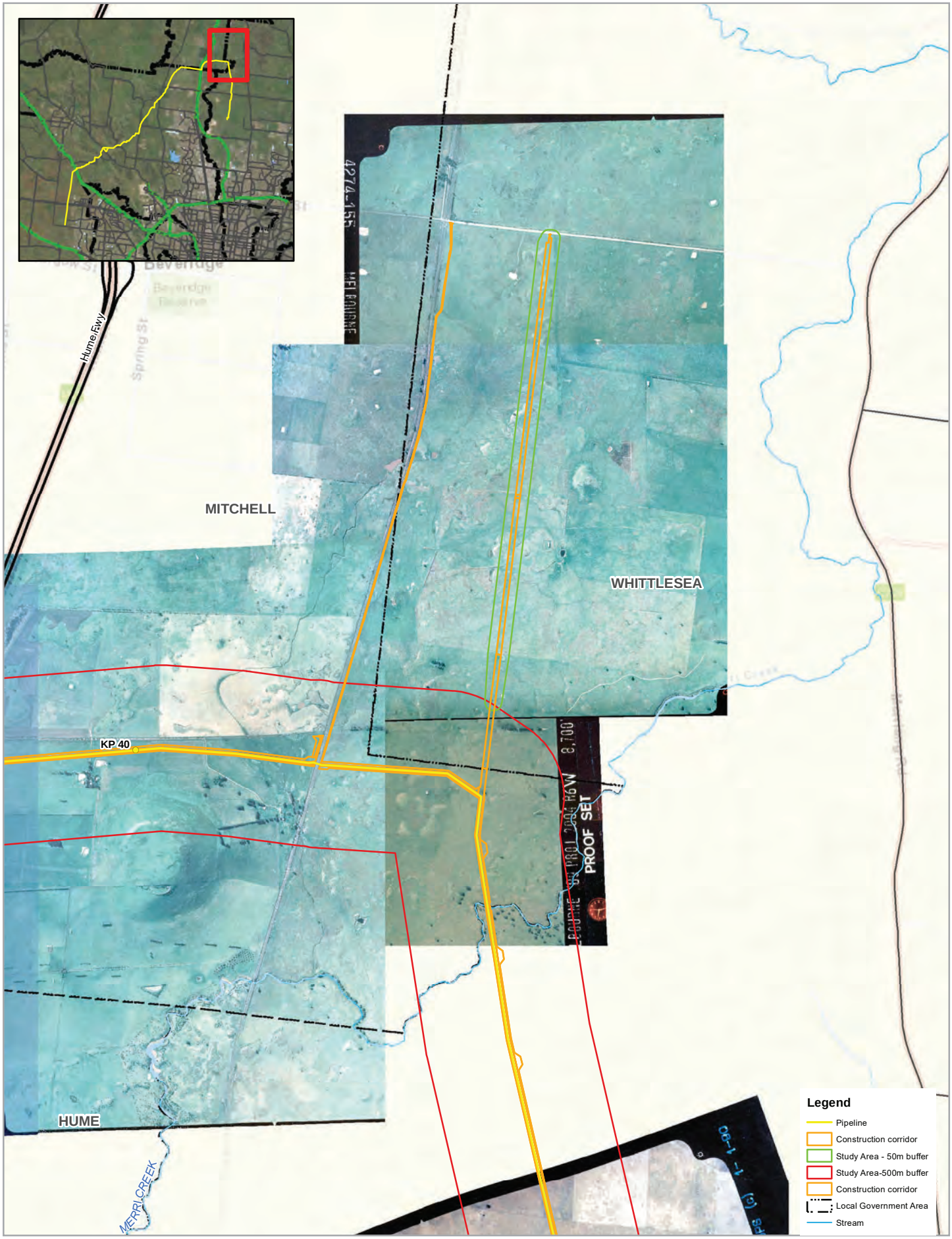
Aerial Imagery 1989-1990

Appendix 3 of 5

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 17:03

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

0 0.2 0.4 0.6 0.8

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

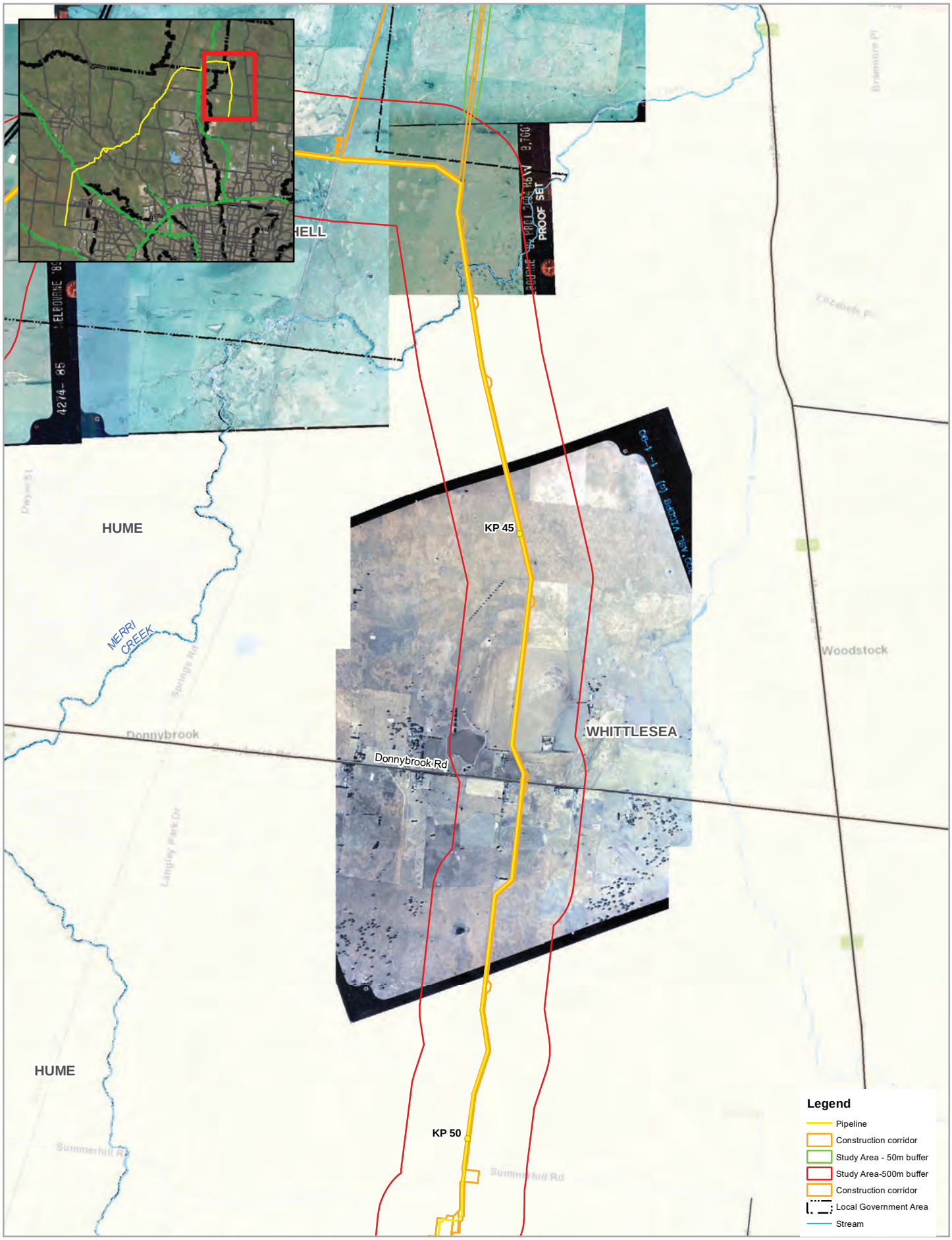
Aerial Imagery 1989-1990

Appendix 4 of 5

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 17:04

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

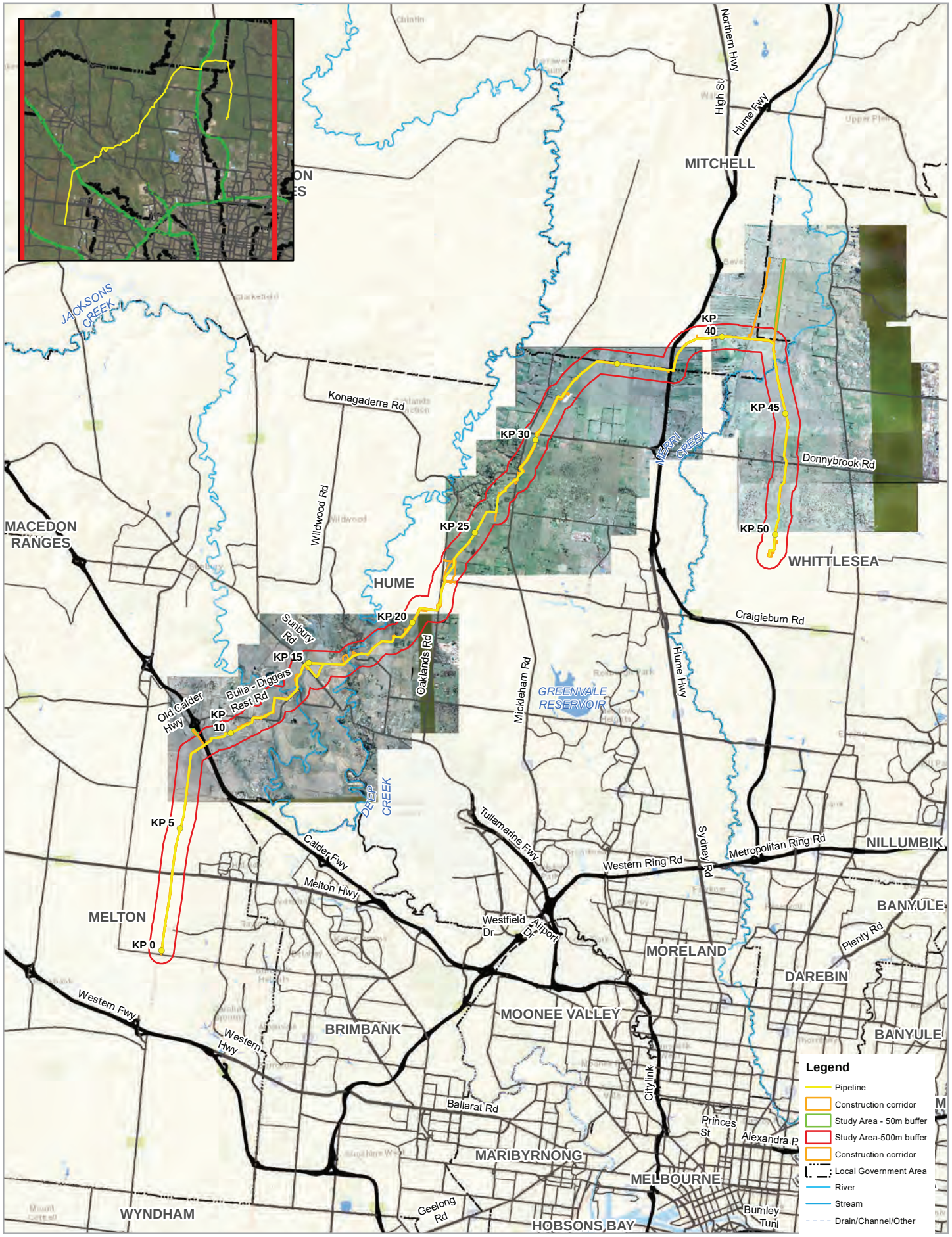
Aerial Imagery 1989-1990

Appendix 5 of 5

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 17:05

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

0 1.5 3 4.5 6

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Overview
Aerial Imagery 2002, 2004-2005

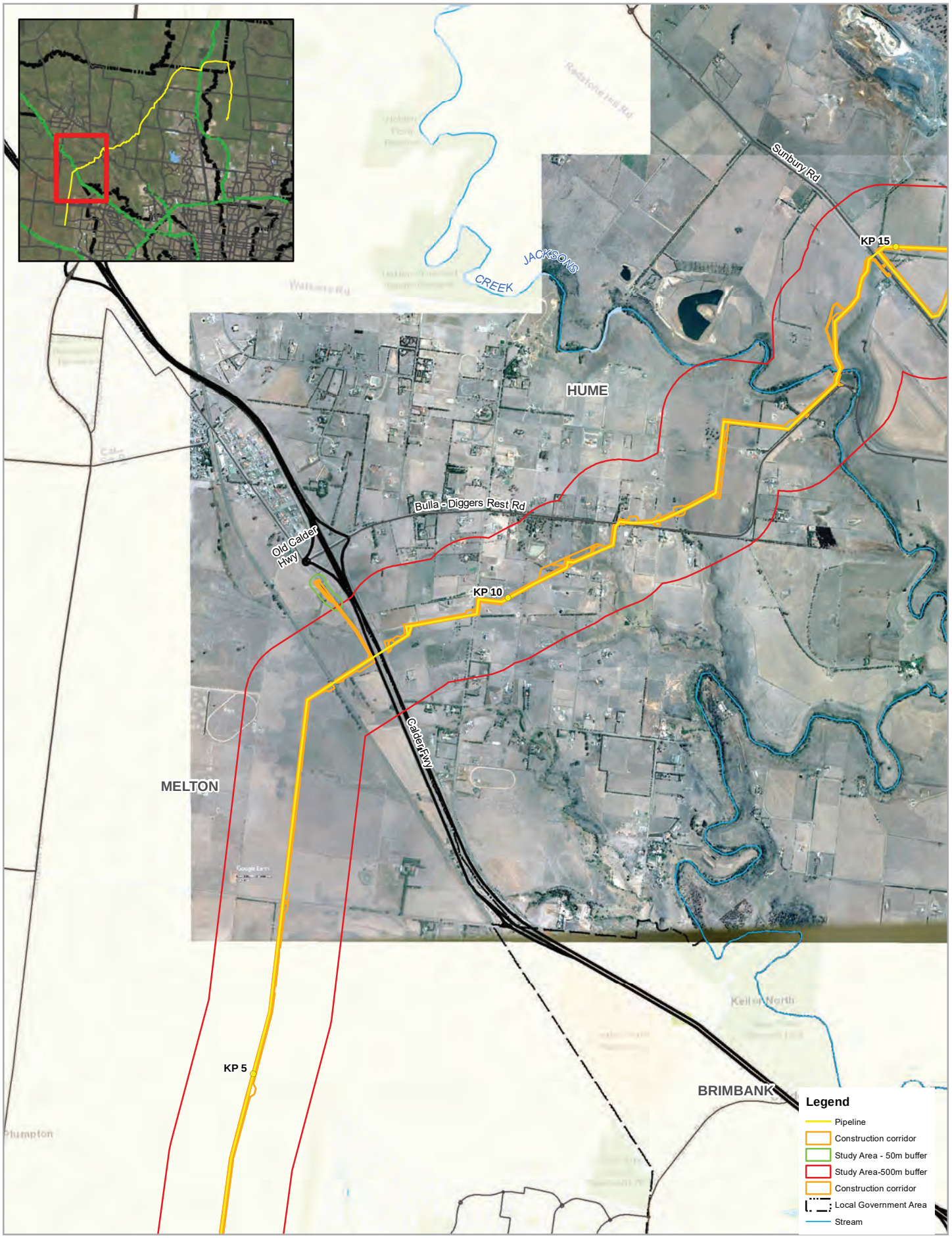
Project No. 31-12529997
Revision No. c
Date 09/12/2020

Appendix

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Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Vicmap basemap imagery Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

Aerial Imagery 2002, 2004-2005

Appendix 1 of 5

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 17:08

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

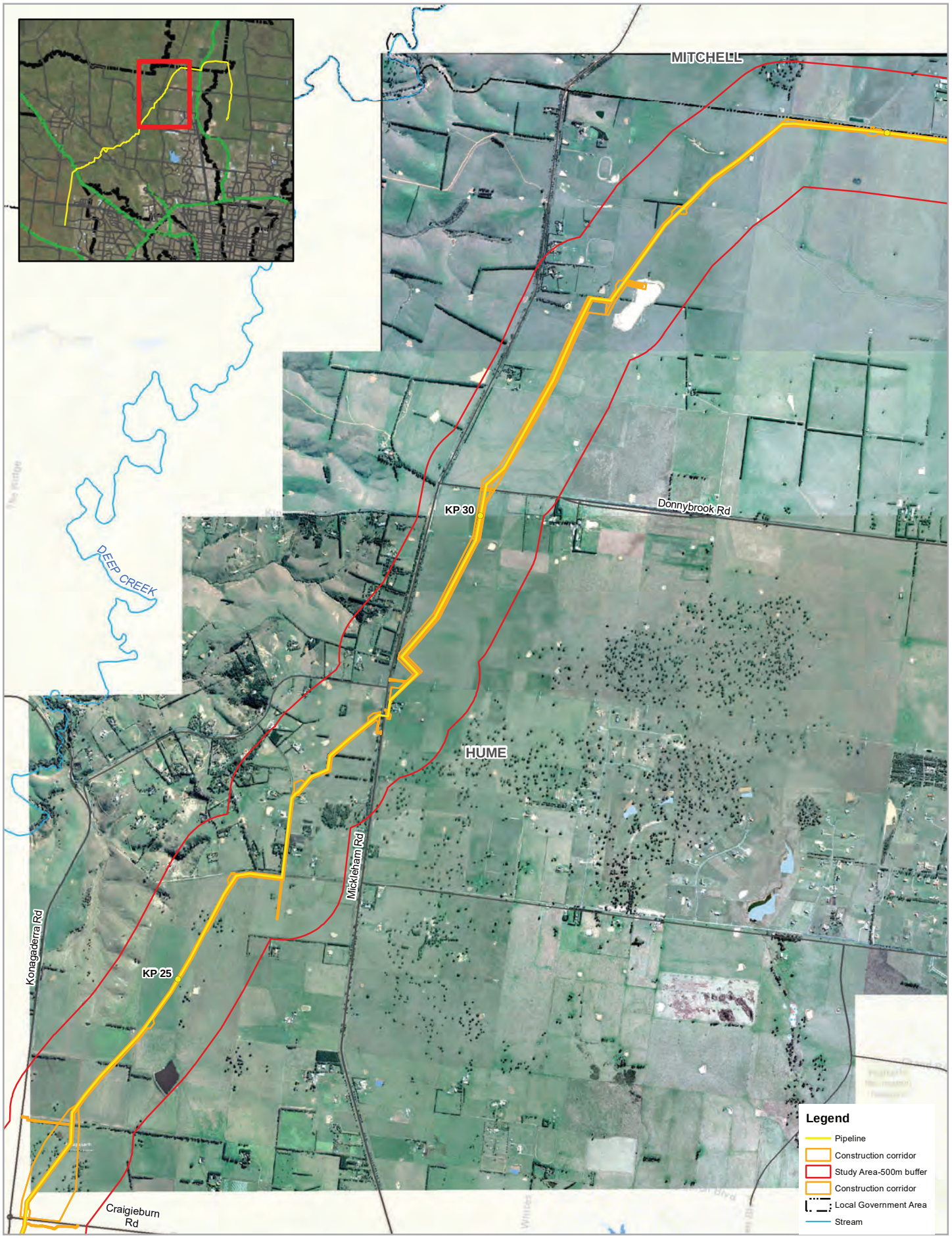
Aerial Imagery 2002, 2004-2005

Appendix 2 of 5

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 17:08

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

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Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

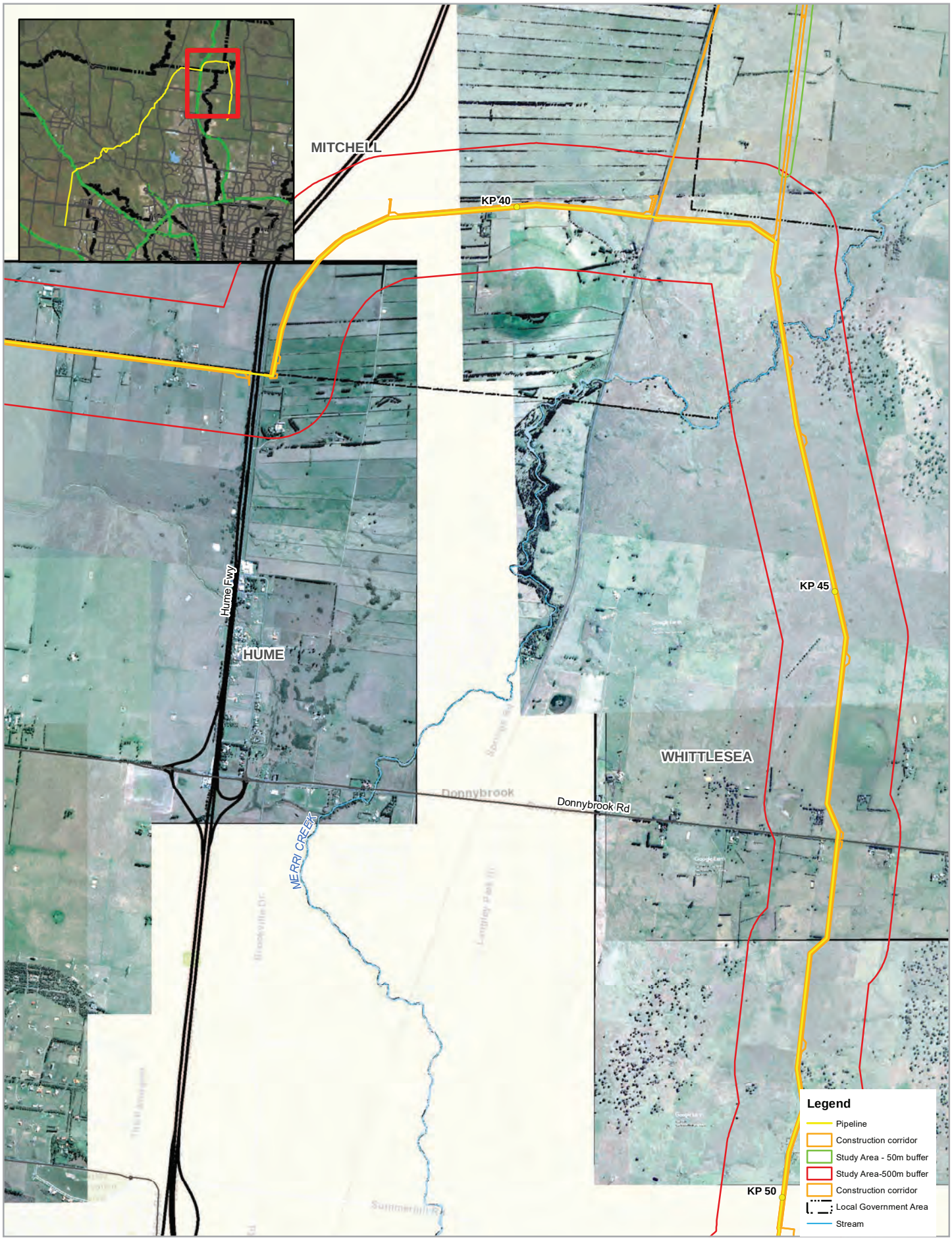
Aerial Imagery 2002, 2004-2005

Appendix 3 of 5

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Print date: 09 Dec 2020 - 17:06

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

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Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

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APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

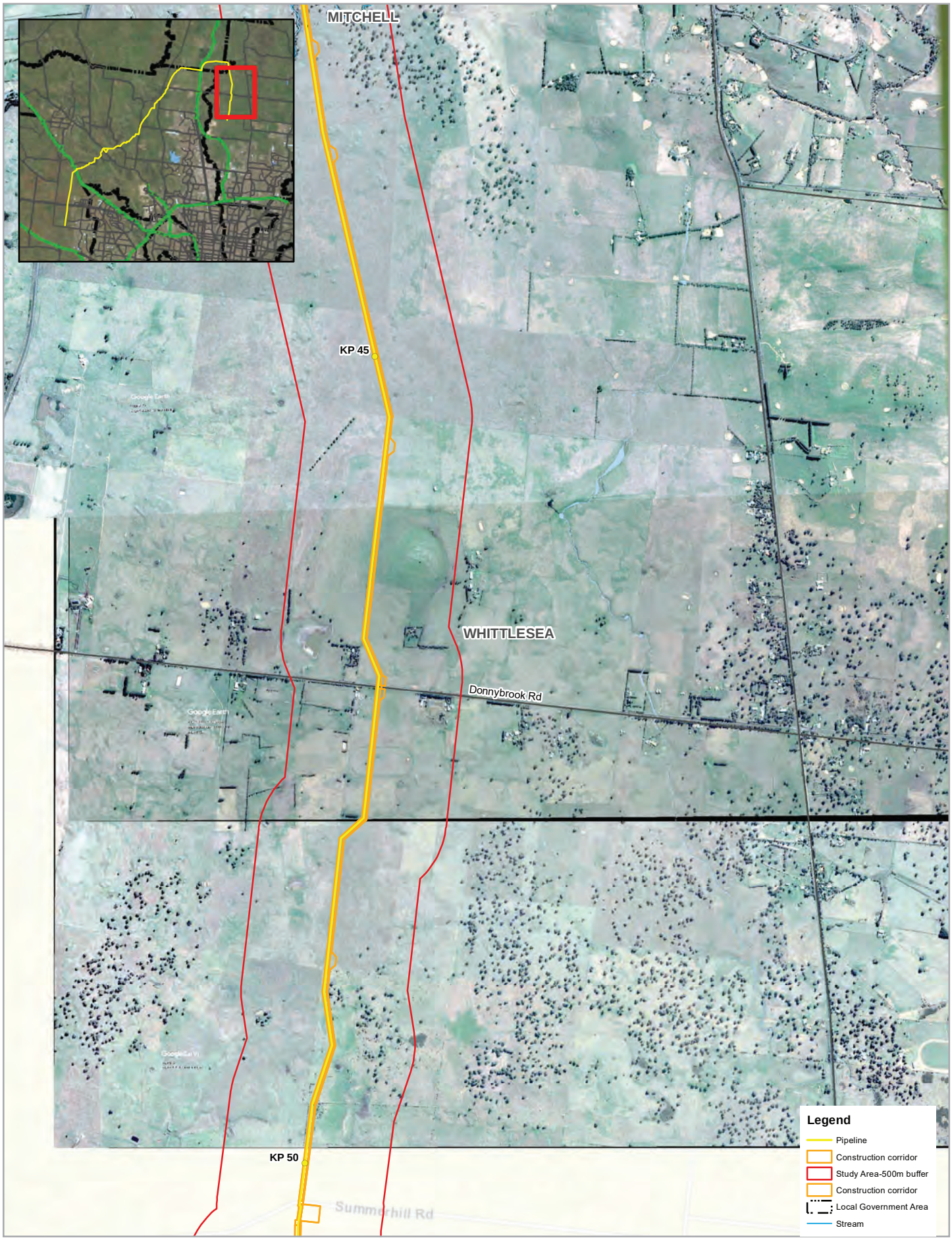
Aerial Imagery 2002, 2004-2005

Appendix 4 of 5

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 17:07

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Paper Size ISO A4

0 0.2 0.4 0.6 0.8

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

APA VTS (Operations) Pty Ltd
Western Outer Ring Main Gas Project

Project No. 31-12529997
Revision No. C
Date 09/12/2020

Aerial Imagery 2002, 2004-2005

Appendix 5 of 5

N:\AU\Melbourne\Projects\31\12529997\GIS\Maps\Deliverables\12529997_KBM_A4P.mxd
Print date: 09 Dec 2020 - 17:07

Data source: DELWP, VicMap, 2020; Geoscience australia 2012, GHD, 2020,Lotsearch imagery 1946 Created by: sacevedo

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Appendix D – Aerial photograph interpretation

Available aerial photographs have been reviewed at approximately ten yearly intervals across the study area to identify potential impacts to shallow soils (less than 2 metres). Chainage (kilometre points) have been referenced in order to identify the portion of the study area that the review relates to.

Table D1 Review of historical aerial photographs

Photograph [1]	Observations
Year: 1946 / 1951 **Source:** DELWP Vicmap Topographic Mapping Program	Land uses within the study area and surrounding area include grazing land and associated farming infrastructure, dams and rural residential houses and to a lesser extent agricultural activities such as crops.
Years: 1960, 1962 **Source:** DELWP Vicmap Topographic Mapping Program	Study area and surrounding area largely unchanged. The land use for KP 6 to 16 are consistent with observations made in 1951 for other areas of the study area.
Years: 1968, 1979 **Source:** DELWP Vicmap Topographic Mapping Program	The Sunbury Railway Line and Calder Fwy were present in 1968, the earliest historical photograph provided for this section of the study area. Evidence of quarry activity observed to the south east of KP15 (now known as the Bulla Tip and Quarry). The proposed pipeline runs adjacent to the quarry and does not appear to intersect.
Year: 1984 **Source:** DELWP Vicmap Topographic Mapping Program	Gas compressor station in Wollert is evident in 1984 (KP 50.7)
Year: 1990 / 1991 **Source:** DELWP Vicmap Topographic Mapping Program	Land uses within the study area and surrounding area remain unchanged. There is an increase in the presence of farming related infrastructure. Bulla Tip and Quarry has grown significantly in size however the proposed pipeline does not insect the quarry. A rural property also located near KP15 appears to be storing a large amount above ground storage tanks. Based on google maps the company is a domestic and stock water carrier.
Year: 2001 / 2002 **Source:** Aerometrex Pty Ltd	A rural property to the south of Taylors Road, Deanside (south of KP 0) appears unkept with debris scatter around the property. Land uses within the remaining portion of the study area remain unchanged.
Year: 2009 **Source:** Aerometrex Pty Ltd	The rural property noted in 2001 (south of KP 0) appears very poorly maintained and industrial in nature. Duplication of the Calder Fwy, an increase in the rural residential housing as well as crops / orchards present in surrounding areas between KP 9 to 12. A small pine plantation present near Jacksons Creek (KP 14). Significant portion of the Bulla Tip and Quarry appears to have been filled. The pipeline runs through a plantation (KP24.5). Land uses within the remaining portion of the study area remain unchanged.

Photograph [1]	Observations
Year: 2020 **Source:** Aerometrex Pty Ltd	Low density residential development has commenced within the study area, particularly from KPs 0 to 4, 28.5 to 31.5 and 46 to 47. Substation present to the north of Taylors Road, Fraser Rise. The rural property noted in 2001 and 2009 photographs appears to be in the process of clean up (south of KP 0). Property located at 140 Duncans Lane Diggers Rest near KP10, comprises of hundreds of vehicles assumed to be disused. The proposed pipeline runs through the eastern portion of the property. Various other properties within the vicinity of KP 11 include what appears to be numerous vehicles and shipping containers.

Appendix E – Laboratory documentation and chain of custody

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2003567**	Page	: 1 of 8
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12517812	Date Samples Received	: 04-Mar-2020 10:10
Order number	: ----	Date Analysis Commenced	: 04-Mar-2020
C-O-C number	: ----	Issue Date	: 11-Mar-2020 15:54
Sampler	: MM		
Site	:		
Quote number	: EN/005/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
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. 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*
[redacted]	Non-Metals Team Leader	Me bourne Inorganics, Springvale, VIC
[redacted]	Senior Inorganic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	Senior Inorganic Instrument Chemist	Me bourne Inorganics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

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

- Ionic Balance out of acceptable limits for sample #1 and #5 due to analytes not quantified in this report.
- EA010: Conductivity EM2003567 #7 has been confirmed by reanlaysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- ED041G: EM2003561 #2 Poor matrix spike recovery for Sulfate due to sample matrix. Confirmed by re-extraction and re-analysis.
- EA010-P: Electrical Conductivity @ 25°C was analysed by manual method (EA010).
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- 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: GROUNDWATER (Matrix: WATER)				Client sample ID	BH32_020320	BH24_020320	BH23_020320	BH49_030320	BH27_030320
				Client sampling date / time	02-Mar-2020 00:00	02-Mar-2020 00:00	02-Mar-2020 00:00	03-Mar-2020 00:00	03-Mar-2020 00:00
Compound	CAS Number	LOR	Unit		EM2003567-001	EM2003567-002	EM2003567-003	EM2003567-004	EM2003567-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.09	7.73	8.06	8.30	8.36
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		7780	5710	6460	2460	1400
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		5060	3710	4200	1600	910
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	3
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		106	322	542	232	159
Total Alkalinity as CaCO3	----	1	mg/L		106	322	542	232	162
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		453	446	286	114	41
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		2500	1460	1730	675	385
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		135	106	136	18	7
Magnesium	7439-95-4	1	mg/L		95	205	236	64	21
Sodium	7440-23-5	1	mg/L		1200	804	895	345	217
Potassium	7440-09-7	1	mg/L		10	22	37	23	17
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.002	0.001	0.003	0.001	0.003
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		0.060	<0.001	<0.001	<0.001	0.002
Copper	7440-50-8	0.001	mg/L		0.012	0.011	0.012	0.028	0.022
Nickel	7440-02-0	0.001	mg/L		0.007	0.019	0.014	0.008	0.006
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.001
Zinc	7440-66-6	0.005	mg/L		0.036	0.105	0.032	0.053	0.048
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.33	0.16	0.41	0.09	0.05
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH32_020320	BH24_020320	BH23_020320	BH49_030320	BH27_030320
				Client sampling date / time	02-Mar-2020 00:00	02-Mar-2020 00:00	02-Mar-2020 00:00	03-Mar-2020 00:00	03-Mar-2020 00:00
Compound	CAS Number	LOR	Unit		EM2003567-001	EM2003567-002	EM2003567-003	EM2003567-004	EM2003567-005
					Result	Result	Result	Result	Result
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<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	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**15.1**	**0.3**	**14.1**	<0.1	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**15.1**	**0.3**	**14.1**	<0.1	**0.3**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**6.07**	**0.03**	**20.6**	**0.25**	**0.29**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**82.1**	**56.9**	**65.6**	**26.0**	**15.0**
ø Total Cations	----	0.01	meq/L		**67.0**	**57.7**	**66.1**	**21.8**	**12.0**
ø Ionic Balance	----	0.01	%		**10.1**	**0.69**	**0.38**	**8.97**	**11.1**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH15_030320	----	----	----	----
				Client sampling date / time	03-Mar-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2003567-006	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.85**	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**7420**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		**4820**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**1360**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**1360**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**41**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**1820**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**187**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**290**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**990**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**60**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**0.018**	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.019**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.068**	----	----	----	----
Lead	7439-92-1	0.001	mg/L		**0.001**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.074**	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**1.60**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH15_030320	----	----	----	----
				Client sampling date / time	03-Mar-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2003567-006	--------	--------	--------	--------
					Result	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**2.2**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**2.2**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.12**	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**79.4**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**77.8**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**1.00**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC01_030320	----	----	----	----
				Client sampling date / time	03-Mar-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2003567-007	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.44**	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**2**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		**1**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**3**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**3**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		<1	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	----	----	----	----
Magnesium	7439-95-4	1	mg/L		<1	----	----	----	----
Sodium	7440-23-5	1	mg/L		<1	----	----	----	----
Potassium	7440-09-7	1	mg/L		<1	----	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC01_030320	----	----	----	----
				Client sampling date / time	03-Mar-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2003567-007	--------	--------	--------	--------
					Result	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		<0.1	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**0.06**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		<0.01	----	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2003567**	Page	: 1 of 9
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12517812	Date Samples Received	: 04-Mar-2020
Order number	: ----	Date Analysis Commenced	: 04-Mar-2020
C-O-C number	: ----	Issue Date	: 11-Mar-2020
Sampler	: MM		
Site	:		
Quote number	: EN/005/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
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. 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*
[redacted]	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
[redacted]	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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

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	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 2895455)									
EM2003508-010	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.19	8.07	1.48	0% - 20%
EM2003567-003	BH23_020320	EA005-P: pH Value	----	0.01	pH Unit	8.06	8.08	0.248	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2895451)									
EM2003508-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	31300	31900	1.90	0% - 20%
EM2003112-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	12900	12900	0.155	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2895459)									
EM2003573-004	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1	1	0.00	No Limit
EM2003567-003	BH23_020320	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	6460	6590	1.99	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2895457)									
EM2003522-020	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	709	706	0.464	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	709	706	0.464	0% - 20%
EM2003567-003	BH23_020320	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	542	537	0.827	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	542	537	0.827	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2895460)									
EM2003567-006	BH15_030320	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1360	1360	0.512	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1360	1360	0.512	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2893970)									
EM2003561-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	367	369	0.358	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2893970) - continued									
EM2003567-002	BH24_020320	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	446	445	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2894971)									
EM2003546-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	36	36	0.00	No Limit
EM2003546-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1800	1800	0.127	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2894974)									
EM2003567-007	QC01_030320	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	1	0.00	No Limit
EM2003571-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	95	96	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2893971)									
EM2003561-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1550	1560	0.620	0% - 20%
EM2003567-002	BH24_020320	ED045G: Chloride	16887-00-6	1	mg/L	1460	1470	0.896	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2894972)									
EM2003567-007	QC01_030320	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.00	No Limit
EM2003571-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3	3	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 2893631)									
EM2003349-018	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EM2003539-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	268	268	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	318	318	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1140	1140	0.108	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	36	36	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2894858)									
EM2003112-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	1680	1670	0.470	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	43	43	0.00	0% - 20%
EM2003599-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	6	5	19.7	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	10	10	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2893629)									
EM2003539-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.017	0.017	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.035	0.036	4.75	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.094	0.096	1.25	0% - 50%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2893629) - continued									
EM2003349-014	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 2894863)									
EM2003512-005	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0005	<0.0005	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.013	0.012	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.015	0.014	8.13	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.026	<0.026	0.00	No Limit
EM2003539-003	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.006	0.005	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.011	0.011	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.011	0.011	0.00	0% - 50%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.112	0.108	3.44	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.159	0.153	3.82	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 2893628)									
EM2003539-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2003349-014	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2893828)									
EM2003547-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2893735)									
EM2003499-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.72	0.72	0.00	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2893969)									
EM2003561-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.08	0.08	0.00	No Limit
EM2003567-002	BH24_020320	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2894973)									
EM2003567-007	QC01_030320	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EM2003571-004	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2893734)									
EM2003459-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.23	1.25	1.20	0% - 20%
EM2003459-010	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.35	0.36	0.00	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2894063)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2894063) - continued									
EM2003561-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.8	0.8	0.00	No Limit
EM2003565-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.8	40.5	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2894064)									
EM2003570-008	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.4	0.00	No Limit
EM2003567-006	BH15_030320	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.2	2.2	0.00	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2894062)									
EM2003567-006	BH15_030320	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.12	0.12	0.00	0% - 50%
EM2003565-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.16	0.15	6.94	0% - 50%

Method Blank (MB) and Laboratory Control Spike (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 Spike (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 Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 2895451)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.1	85.0	119
EA010P: Conductivity by PC Titrator (QCLot: 2895459)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.8	85.0	119
ED037P: Alkalinity by PC Titrator (QCLot: 2895457)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	102	88.0	112
ED037P: Alkalinity by PC Titrator (QCLot: 2895460)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	105	88.0	112
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2893970)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	85.8	117
				<1	100 mg/L	99.8	85.8	117
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2894971)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	85.8	117
				<1	100 mg/L	99.4	85.8	117
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2894974)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	85.8	117
				<1	100 mg/L	98.0	85.8	117
ED045G: Chloride by Discrete Analyser (QCLot: 2893971)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	95.4	85.0	122
				<1	1000 mg/L	99.0	85.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 2894972)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	94.4	85.0	122
				<1	1000 mg/L	97.1	85.0	122
ED093F: Dissolved Major Cations (QCLot: 2893631)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	104	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	104	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	104	86.7	111
ED093F: Dissolved Major Cations (QCLot: 2893632)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	103	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	103	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	104	86.7	111
ED093F: Dissolved Major Cations (QCLot: 2894858)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 2894858) - continued								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	99.2	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	101	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	86.7	111
EG020F: Dissolved Metals by ICP-MS (QCLot: 2893629)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	88.5	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	103	83.5	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.6	83.2	105
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.1	83.1	106
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.2	84.6	107
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	100	84.3	108
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	109	86.3	111
EG020T: Total Metals by ICP-MS (QCLot: 2894863)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	89.2	113
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	86.4	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.3	86.9	110
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	101	86.9	109
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.6	88.3	110
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	103	87.9	111
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	109	86.7	114
EG035F: Dissolved Mercury by FIMS (QCLot: 2893628)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	87.5	71.1	112
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2893828)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.8	72.6	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2893735)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	114	88.0	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2893969)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	106	90.9	112
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2894973)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	108	90.9	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2893734)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	108	90.0	117
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2894063)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	106	70.0	117
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2894064)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	106	70.0	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2894062)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2894062) - continued								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	104	71.9	114

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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2893970)							
EM2003561-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# 63.9	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2894971)							
EM2003546-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2894974)							
EM2003571-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	92.1	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 2893971)							
EM2003561-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 2894972)							
EM2003571-001	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	103	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2893629)							
EM2003349-014	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	90 8	85.0	131
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	96 8	81.0	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	90.4	71.0	135
		EG020A-F: Copper	7440-50-8	0.2 mg/L	88.7	76.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	88.1	75.0	133
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	91.6	73.0	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	83 8	75.0	131
EG020T: Total Metals by ICP-MS (QCLot: 2894863)							
EM2003512-005	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	114	82.0	118
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	104	75.0	129
		EG020A-T: Chromium	7440-47-3	1 mg/L	94 0	80.0	118
		EG020A-T: Copper	7440-50-8	1 mg/L	97.4	81.0	115
		EG020A-T: Lead	7439-92-1	1 mg/L	91.4	83.0	121
		EG020A-T: Nickel	7440-02-0	1 mg/L	101	80.0	118
		EG020A-T: Zinc	7440-66-6	1 mg/L	101	74.0	116

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG035F: Dissolved Mercury by FIMS (QCLot: 2893628)							
EM2003349-018	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	84 2	70.0	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2893828)							
EM2003560-058	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	97 2	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2893735)							
EM2003567-001	BH32_020320	EK055G: Ammonia as N	7664-41-7	1 mg/L	85 2	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2893969)							
EM2003561-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	99.6	80.0	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2894973)							
EM2003571-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	96.7	80.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2893734)							
EM2003459-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	98 2	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2894063)							
EM2003539-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	# Not Determined	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2894064)							
EM2003567-007	QC01_030320	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	98 2	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2894062)							
EM2003522-021	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	93 3	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2003567**	Page	: 1 of 9
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 12517812	Date Samples Received	: 04-Mar-2020
Site	:	Issue Date	: 11-Mar-2020
Sampler	: MM	No. of samples received	: 7
Order number	: ----	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.**
- **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

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample D	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EM2003561--002	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	63.9 %	70.0-130%	**Recovery less than lower data quality objective**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EM2003546--002	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	EM2003539--001	Anonymous	**Total Kjeldahl Nitrogen as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample D(s)		Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH32_020320, BH23_020320	BH24_020320,	----	----	----	05-Mar-2020	02-Mar-2020	**3**
Clear Plastic Bottle - Natural							
BH49_030320, BH15_030320,	BH27_030320, QC01_030320	----	----	----	05-Mar-2020	03-Mar-2020	**2**

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; o hers 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: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
BH32_020320, BH23_020320	BH24_020320,	**02-Mar-2020**	**----**	----	----	**05-Mar-2020**	02-Mar-2020	×
Clear Plastic Bottle - Natural (EA005-P)								
BH49_030320, BH15_030320,	BH27_030320, QC01_030320	**03-Mar-2020**	**----**	----	----	**05-Mar-2020**	03-Mar-2020	×

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
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
BH32_020320, BH24_020320, BH23_020320	**02-Mar-2020**	**----**	----	----	**05-Mar-2020**	30-Mar-2020	✓
Clear Plastic Bottle - Natural (EA010-P)							
BH49_030320, BH27_030320, BH15_030320, QC01_030320	**03-Mar-2020**	**----**	----	----	**05-Mar-2020**	31-Mar-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
BH32_020320, BH24_020320, BH23_020320	**02-Mar-2020**	**----**	----	----	**05-Mar-2020**	16-Mar-2020	✓
Clear Plastic Bottle - Natural (ED037-P)							
BH49_030320, BH27_030320, BH15_030320, QC01_030320	**03-Mar-2020**	**----**	----	----	**05-Mar-2020**	17-Mar-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
BH32_020320, BH24_020320, BH23_020320	**02-Mar-2020**	**----**	----	----	**05-Mar-2020**	30-Mar-2020	✓
Clear Plastic Bottle - Natural (ED041G)							
BH49_030320, BH27_030320, BH15_030320, QC01_030320	**03-Mar-2020**	**----**	----	----	**05-Mar-2020**	31-Mar-2020	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
BH32_020320, BH24_020320, BH23_020320	**02-Mar-2020**	**----**	----	----	**05-Mar-2020**	30-Mar-2020	✓
Clear Plastic Bottle - Natural (ED045G)							
BH49_030320, BH27_030320, BH15_030320, QC01_030320	**03-Mar-2020**	**----**	----	----	**05-Mar-2020**	31-Mar-2020	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH32_020320, BH24_020320, BH23_020320	**02-Mar-2020**	**----**	----	----	**05-Mar-2020**	30-Mar-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH49_030320, BH27_030320, BH15_030320	**03-Mar-2020**	**----**	----	----	**05-Mar-2020**	31-Mar-2020	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (ED093F)							
QC01_030320	**03-Mar-2020**	**----**	----	----	**05-Mar-2020**	10-Mar-2020	✓

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 - Nitric Acid; Filtered (EG020A-F)							
BH32_020320, BH24_020320, BH23_020320	**02-Mar-2020**	**----**	----	----	**04-Mar-2020**	29-Aug-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH49_030320, BH27_030320, BH15_030320	**03-Mar-2020**	**----**	----	----	**04-Mar-2020**	30-Aug-2020	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
QC01_030320	**03-Mar-2020**	**05-Mar-2020**	30-Aug-2020	✓	**05-Mar-2020**	30-Aug-2020	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH32_020320, BH24_020320, BH23_020320	**02-Mar-2020**	**----**	----	----	**04-Mar-2020**	30-Mar-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH49_030320, BH27_030320, BH15_030320	**03-Mar-2020**	**----**	----	----	**04-Mar-2020**	31-Mar-2020	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)							
QC01_030320	**03-Mar-2020**	**----**	----	----	**04-Mar-2020**	31-Mar-2020	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH32_020320, BH24_020320, BH23_020320	**02-Mar-2020**	**----**	----	----	**05-Mar-2020**	30-Mar-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH49_030320, BH27_030320, BH15_030320, QC01_030320	**03-Mar-2020**	**----**	----	----	**05-Mar-2020**	31-Mar-2020	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH32_020320, BH24_020320, BH23_020320	**02-Mar-2020**	**----**	----	----	**04-Mar-2020**	04-Mar-2020	✓
Clear Plastic Bottle - Natural (EK057G)							
BH49_030320, BH27_030320, BH15_030320, QC01_030320	**03-Mar-2020**	**----**	----	----	**05-Mar-2020**	05-Mar-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH32_020320, BH24_020320, BH23_020320	**02-Mar-2020**	**----**	----	----	**05-Mar-2020**	30-Mar-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH49_030320, BH27_030320, BH15_030320, QC01_030320	**03-Mar-2020**	**----**	----	----	**05-Mar-2020**	31-Mar-2020	✓

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
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G)								
BH32_020320, BH23_020320	BH24_020320,	**02-Mar-2020**	**05-Mar-2020**	30-Mar-2020	✓	**05-Mar-2020**	30-Mar-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)								
BH49_030320, BH15_030320,	BH27_030320, QC01_030320	**03-Mar-2020**	**05-Mar-2020**	31-Mar-2020	✓	**05-Mar-2020**	31-Mar-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
BH32_020320, BH23_020320	BH24_020320,	**02-Mar-2020**	**05-Mar-2020**	30-Mar-2020	✓	**05-Mar-2020**	30-Mar-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
BH49_030320, BH15_030320,	BH27_030320, QC01_030320	**03-Mar-2020**	**05-Mar-2020**	31-Mar-2020	✓	**05-Mar-2020**	31-Mar-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within he 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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	3	28	**10.71**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	31	**12.90**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	6	49	**12.24**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	3	36	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	6	49	**12.24**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Major Ca ions - Dissolved	ED093F	3	36	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	49	**6.12**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	49	**6.12**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC 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 (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) 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 (2013) 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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
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 (2013) 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 (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) 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.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. 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.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, 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 (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered 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 (2013) 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 (2013) Schedule B(3)
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 (2013) 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 seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) 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 (2013) 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 (2013) 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 (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). 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 (2013) 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 (2013) 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 (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM2003567**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Facsimile	: [redacted]	Facsimile	: [redacted]
Project	: 12517812	Page	: 1 of 3
Order number	: ----	Quote number	: ES2018GHDSER0025 (EN/005/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	: MM		

Dates

Date Samples Received	: 04-Mar-2020 10:10	Issue Date	: 04-Mar-2020
Client Requested Due Date	: 11-Mar-2020	Scheduled Reporting Date	: **10-Mar-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 1.0°C - Ice present
Receipt Detail	: HARD ESKY	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Major Cations - Dissolved : ED093F		
QC01_030320	- Clear Plastic Bottle - Nitric Acid; Unfiltered	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

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

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005P pH (PCT)	WATER - EA016 Calculated TDS (from Electrical Conductivity)	WATER - EK067G Total Phosphorus as P By Discrete Analyser	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - NT-07 Total Nitrogen + NO2 + NO3 + NH3	WATER - W-02 8 Metals	WATER - W-02T 8 metals (Total)
EM2003567-001	02-Mar-2020 00:00	BH32_020320	✓	✓	✓	✓	✓	✓	
EM2003567-002	02-Mar-2020 00:00	BH24_020320	✓	✓	✓	✓	✓	✓	
EM2003567-003	02-Mar-2020 00:00	BH23_020320	✓	✓	✓	✓	✓	✓	
EM2003567-004	03-Mar-2020 00:00	BH49_030320	✓	✓	✓	✓	✓	✓	
EM2003567-005	03-Mar-2020 00:00	BH27_030320	✓	✓	✓	✓	✓	✓	
EM2003567-006	03-Mar-2020 00:00	BH15_030320	✓	✓	✓	✓	✓	✓	
EM2003567-007	03-Mar-2020 00:00	QC01_030320	✓	✓	✓	✓	✓		✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

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

Method Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
BH15_030320	Clear Plastic Bottle - Natural	----	03-Mar-2020	04-Mar-2020	×	----	----
BH23_020320	Clear Plastic Bottle - Natural	----	02-Mar-2020	04-Mar-2020	×	----	----
BH24_020320	Clear Plastic Bottle - Natural	----	02-Mar-2020	04-Mar-2020	×	----	----
BH27_030320	Clear Plastic Bottle - Natural	----	03-Mar-2020	04-Mar-2020	×	----	----
BH32_020320	Clear Plastic Bottle - Natural	----	02-Mar-2020	04-Mar-2020	×	----	----
BH49_030320	Clear Plastic Bottle - Natural	----	03-Mar-2020	04-Mar-2020	×	----	----
QC01_030320	Clear Plastic Bottle - Natural	----	03-Mar-2020	04-Mar-2020	×	----	----

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	[redacted]

GHD LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)	Email	ghdlabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ghdlabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ghdlabreports@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ghdlabreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ghdlabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ghdlabreports@ghd.com

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	[redacted]

CHAIN OF CUSTODY RECORD

GHD Melbourne
180 Lonsdale Street, Melbourne VIC 3000
Telephone: 613 8687 8000 Facsimile: 613 8687 8111
Email: vic_enviro_labreports@ghd.com.au

Job Number	GHD Office
12517812	Melbourne

Project: APA WORM Hydro. Study

GHD Project Manager: [redacted]

GHD Contact: [redacted]

Requested Completion Date: Standard TAT

Quote No.:

Laboratory: ALS

Address: 2 - 4 Westall Road, Springvale VIC 3171

Laboratory Contact: [redacted]

	Sample I.D.	Date	Sample Matrix (Soil, Solid, Sludge, Water, Air, Gas, Groundwater)	Preservative	Container: Number of Containers	Container: Container Type (Bag, Vial, Glass bottle, Plastic bottle)	Analyses Required: Salinity (measured as mg/L TDS), EC, pH	Major Ions	Heavy Metals (filtered)	Speciated Nitrogen	Total N	Total P	HOLD	Remarks
1	BH32_020320	02.03.2020	GW		3	P	X	X	X	X	X	X		
2	BH24_020320	02.03.2020	GW		3	P	X	X	X	X	X	X		
3	BH23_020320	02.03.2020	GW		3	P	X	X	X	X	X	X		
4	BH49_030320	03.03.2020	GW		3	P	X	X	X	X	X	X		
5	BH27_030320	03.03.2020	GW		3	P	X	X	X	X	X	X		
6	BH15_030320	03.03.2020	GW		3	P	X	X	X	X	X	X		
7	QC01_030320	03.03.2020	RB		3	P	X	X	X	X	X	X		

PLEASE NOTE:

Sign white copy on receipt and release of samples.

Samples are to be **delivered** to the Laboratory Address.

On receipt of samples, the **laboratory contact** to sign **white copy** and fax/email to GHD Contact.

On completion of analyses please **return white copy with results.**

E-mail results to the **e-mail address** of the relevant GHD office and cc **GHD Project Manager** and **GHD Contact** with the **GHD Job Number** in the e-mail subject line.

Results to be provided in ESDAT compatible format

Environmental Division
Melbourne
Work Order Reference
EM2003567

Telephone : + 61-3-8549 9600

as 4/3

Sampled by:	MM	Date/Time	02 and 03.03.2020	Relinquished by:	MM	Date/Time:	04.03.2020, 9:00 am
Received by:		Date/Time		Relinquished by:		Date/Time	
Received by Courier:		Date/Time		Relinquished by:		Date/Time	
Received by Lab:	[signature]	Date/Time	4/3, 10:10				
Remarks:							

WORKORDER NO: EM

SAMPLE RECEIPT INFORMATION & BOTTLE MAP

To Be completed by Sample Log In Clerk

WO Log in Details	DATE/TIME	INITIAL
Sorting Commenced:		
Prelogged:		
Logged:		
Time placed in fridge:		
Total Time:		

TURNAROUND APPROVED FOR:

24Hrs **48Hrs** **3Days** **4Days** Std

Approved By:

Miscellaneous Bottle(s):

Plastic Tin Glass

Specify Preservative:

Specify Volume: mL

ALS Colour:

Non-ALS Container? (to be highlighted on bottle map)	YES
F on lid for Red/Green bottle(s):	YES
Sampling date not on sample(s):	YES
Soil bags frozen on receipt:	YES
Samples located in contamination box (please list samples)	YES
PO Number Requested:	YES
Temperature Sent:	YES

Receipt Conditions		Packaging		Carrier Details	
Cooler Temp	1.7°C	Foam Esky		Company:	TNT / AaE / TOLL
Chilling Process	**Cooler Seal**	Hard Esky	1		TasFast AusPost
Ice: In Bag / Frozen / Melted	Intact	By Hand		Client delivery	
Ice Bricks: Frozen / Thawed	Broken	Box / Bag		Courier	✓
Not Chilled	None	Con-note Number:			

Work Order Creation BP ONLY Completed		Committal BP ONLY Completed	
DATE	*TIME*	*DATE*	*TIME*
INITIALS		*INITIALS*	

Sample Receipt Advice Comments – To be Completed by Sorting Staff

Sample Receipt

All client communication to be written on the COC

0.6 - 1.5

Metals bottle received unspecified - appears (circle)

Filtered Unfiltered Indiscernible

19

Split batch of EM_____

Due to _____

Hold batch created in LIMS / Angel by:_____ date:_____

Login/Committal

Samples Received Without Paperwork on ____/____/____@____:

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2013650**	Page	: 1 of 18
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 06-Aug-2020 17:10
Order number	: ----	Date Analysis Commenced	: 10-Aug-2020
C-O-C number	: ----	Issue Date	: 13-Aug-2020 17:55
Sampler	: ----		
Site	:		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 16		
No. of samples analysed	: 11		

ilac-MRA NATA
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. 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.

Signatories	*Position*	*Accreditation Category*
[redacted]	Non-Metals Team Leader	Me bourne Inorganics, Springvale, VIC
[redacted]	Senior Inorganic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Me bourne Organics, Springvale, VIC

General Comments

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

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

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

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

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

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

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

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of he 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.
- EP074-UT: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH12_0.1	BH12_0.5	BH12_1.0	BH05_0.1	BH05_0.5
			Client sampling date / time	03-Aug-2020 00:00	03-Aug-2020 00:00	03-Aug-2020 00:00	04-Aug-2020 00:00	04-Aug-2020 00:00
Compound	CAS Number	LOR	Unit	EM2013650-001	EM2013650-002	EM2013650-003	EM2013650-004	EM2013650-005
				Result	Result	Result	Result	Result
EA001: pH in soil using 0.01M CaCl extract								
pH (CaCl2)	----	0.1	pH Unit	7.5	7.7	----	4.4	6.1
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	7.8	8.3	7.8	----	----
ø pH (Fox)	----	0.1	pH Unit	7.2	6.8	7.7	----	----
ø Reaction Rate	----	1	-	4	4	4	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	25.5	25.2	----	19.1	21.0
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	<1	<1
Copper	7440-50-8	5	mg/kg	11	10	----	5	<5
Lead	7439-92-1	5	mg/kg	9	7	----	13	12
Molybdenum	7439-98-7	2	mg/kg	<2	<2	----	<2	<2
Nickel	7440-02-0	2	mg/kg	34	16	----	10	16
Selenium	7782-49-2	5	mg/kg	<5	<5	----	<5	<5
Silver	7440-22-4	2	mg/kg	<2	<2	----	<2	<2
Tin	7440-31-5	5	mg/kg	<5	<5	----	<5	<5
Zinc	7440-66-6	5	mg/kg	18	16	----	8	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	<0.1	<0.1
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	----	<1	<1
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	130	160	----	150	170
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	----	<0.1	<0.1
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<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
Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH12_0.1	BH12_0.5	BH12_1.0	BH05_0.1	BH05_0.5
				Client sampling date / time	03-Aug-2020 00:00	03-Aug-2020 00:00	03-Aug-2020 00:00	04-Aug-2020 00:00	04-Aug-2020 00:00
Compound	CAS Number	LOR	Unit		EM2013650-001	EM2013650-002	EM2013650-003	EM2013650-004	EM2013650-005
					Result	Result	Result	Result	Result
EP074A: Monocyclic Aromatic Hydrocarbons - Continued									
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
^ Sum of monocyclic aromatic hydrocarbons	----	0.2	mg/kg		<0.2	<0.2	----	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
EP074H: Naphthalene									
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	<1	<1
EP074I: Volatile Halogenated Compounds									
Vinyl chloride	75-01-4	0.02	mg/kg		<0.02	<0.02	----	<0.02	<0.02
1.1-Dichloroethene	75-35-4	0.01	mg/kg		<0.01	<0.01	----	<0.01	<0.01
Methylene chloride	75-09-2	0.4	mg/kg		<0.4	<0.4	----	<0.4	<0.4
trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg		<0.02	<0.02	----	<0.02	<0.02
cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg		<0.01	<0.01	----	<0.01	<0.01
Chloroform	67-66-3	0.02	mg/kg		<0.02	<0.02	----	<0.02	<0.02
1.1.1-Trichloroethane	71-55-6	0.01	mg/kg		<0.01	<0.01	----	<0.01	<0.01
Carbon Tetrachloride	56-23-5	0.01	mg/kg		<0.01	<0.01	----	<0.01	<0.01
1.2-Dichloroethane	107-06-2	0.02	mg/kg		<0.02	<0.02	----	<0.02	<0.02
Trichloroethene	79-01-6	0.02	mg/kg		<0.02	<0.02	----	<0.02	<0.02
1.1.2-Trichloroethane	79-00-5	0.04	mg/kg		<0.04	<0.04	----	<0.04	<0.04
Tetrachloroethene	127-18-4	0.02	mg/kg		<0.02	<0.02	----	<0.02	<0.02
1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg		<0.01	<0.01	----	<0.01	<0.01
1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg		<0.02	<0.02	----	<0.02	<0.02
Hexachlorobutadiene	87-68-3	0.02	mg/kg		<0.02	<0.02	----	<0.02	<0.02
Chlorobenzene	108-90-7	0.02	mg/kg		<0.02	<0.02	----	<0.02	<0.02
1.4-Dichlorobenzene	106-46-7	0.02	mg/kg		<0.02	<0.02	----	<0.02	<0.02
1.2-Dichlorobenzene	95-50-1	0.02	mg/kg		<0.02	<0.02	----	<0.02	<0.02
1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg		<0.01	<0.01	----	<0.01	<0.01
^ Sum of volatile chlorinated hydrocarbons	----	0.01	mg/kg		<0.01	<0.01	----	<0.01	<0.01
^ Sum of other chlorinated hydrocarbons	----	0.01	mg/kg		<0.01	<0.01	----	<0.01	<0.01
EP075A: Phenolic Compounds (Halogenated)									
2-Chlorophenol	95-57-8	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
2.4-Dichlorophenol	120-83-2	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
2.6-Dichlorophenol	87-65-0	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg		<0.05	<0.05	----	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH12_0.1	BH12_0.5	BH12_1.0	BH05_0.1	BH05_0.5
				Client sampling date / time	03-Aug-2020 00:00	03-Aug-2020 00:00	03-Aug-2020 00:00	04-Aug-2020 00:00	04-Aug-2020 00:00
Compound	CAS Number	LOR	Unit		EM2013650-001	EM2013650-002	EM2013650-003	EM2013650-004	EM2013650-005
					Result	Result	Result	Result	Result
EP075A: Phenolic Compounds (Halogenated) - Continued									
2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg		<0.05	<0.05	----	<0.05	<0.05
2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg		<0.05	<0.05	----	<0.05	<0.05
Pentachlorophenol	87-86-5	0.2	mg/kg		<0.2	<0.2	----	<0.2	<0.2
^ Sum of Phenols (halogenated)	----	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
EP075A: Phenolic Compounds (Non-halogenated)									
Phenol	108-95-2	1	mg/kg		<1	<1	----	<1	<1
2-Methylphenol	95-48-7	1	mg/kg		<1	<1	----	<1	<1
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	----	<1	<1
2-Nitrophenol	88-75-5	1	mg/kg		<1	<1	----	<1	<1
2.4-Dimethylphenol	105-67-9	1	mg/kg		<1	<1	----	<1	<1
2.4-Dinitrophenol	51-28-5	5	mg/kg		<5	<5	----	<5	<5
4-Nitrophenol	100-02-7	5	mg/kg		<5	<5	----	<5	<5
2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg		<5	<5	----	<5	<5
Dinoseb	88-85-7	5	mg/kg		<5	<5	----	<5	<5
2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg		<5	<5	----	<5	<5
^ Sum of Phenols (non-halogenated)	----	1	mg/kg		<1	<1	----	<1	<1
EP075B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<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
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg		<1.0	<1.0	----	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<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
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH12_0.1	BH12_0.5	BH12_1.0	BH05_0.1	BH05_0.5
				Client sampling date / time	03-Aug-2020 00:00	03-Aug-2020 00:00	03-Aug-2020 00:00	04-Aug-2020 00:00	04-Aug-2020 00:00
Compound	CAS Number	LOR	Unit		EM2013650-001	EM2013650-002	EM2013650-003	EM2013650-004	EM2013650-005
					Result	Result	Result	Result	Result
EP075B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<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
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**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**
EP075I: Organochlorine Pesticides									
alpha-BHC	319-84-6	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
beta-BHC	319-85-7	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
gamma-BHC	58-89-9	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
delta-BHC	319-86-8	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
Heptachlor	76-44-8	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
Aldrin	309-00-2	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
Heptachlor epoxide	1024-57-3	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
cis-Chlordane	5103-71-9	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
trans-Chlordane	5103-74-2	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
Endosulfan 1	959-98-8	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	----	<0.05	<0.05
Dieldrin	60-57-1	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
Endrin aldehyde	7421-93-4	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
Endrin	72-20-8	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
Endosulfan 2	33213-65-9	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	----	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
4.4`-DDT	50-29-3	0.05	mg/kg		<0.05	<0.05	----	<0.05	<0.05
Methoxychlor	72-43-5	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
^ Sum of organochlorine pesticides	----	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	----	<0.05	<0.05
^ Chlordane	57-74-9	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
^ Sum of other organochlorine pesticides	----	0.03	mg/kg		<0.03	<0.03	----	<0.03	<0.03
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	<50	<50
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH12_0.1	BH12_0.5	BH12_1.0	BH05_0.1	BH05_0.5
				Client sampling date / time	03-Aug-2020 00:00	03-Aug-2020 00:00	03-Aug-2020 00:00	04-Aug-2020 00:00	04-Aug-2020 00:00
Compound	CAS Number	LOR	Unit		EM2013650-001	EM2013650-002	EM2013650-003	EM2013650-004	EM2013650-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	----	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	----	<50	<50
>C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	<50	<50
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	<10	<10
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		103	98.0	----	112	95.2
EP074S: VOC Surrogates (Ultra-Trace)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		79.4	97.9	----	95.5	104
Toluene-D8	2037-26-5	0.1	%		72.1	93.1	----	89.3	95.5
4-Bromofluorobenzene	460-00-4	0.1	%		79.5	99.0	----	96.2	104
EP075S: Acid Extractable Surrogates (Waste Classification)									
Phenol-d6	13127-88-3	0.025	%		112	106	----	115	106
2-Chlorophenol-D4	93951-73-6	0.025	%		98.4	94.9	----	102	90.9
2.4.6-Tribromophenol	118-79-6	0.025	%		107	98.1	----	113	92.8
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)									
Nitrobenzene-D5	4165-60-0	0.025	%		101	103	----	108	93.7
1.2-Dichlorobenzene-D4	2199-69-1	0.025	%		94.5	91.6	----	99.4	89.6
2-Fluorobiphenyl	321-60-8	0.025	%		110	106	----	115	104
Anthracene-d10	1719-06-8	0.025	%		98.5	96.0	----	105	94.0
4-Terphenyl-d14	1718-51-0	0.025	%		92.1	92.4	----	99.6	89.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH16_0.1	BH16_0.5	BH06_0.1	BH06_0.5	BH14_0.1
			Client sampling date / time	05-Aug-2020 00:00	05-Aug-2020 00:00	05-Aug-2020 00:00	05-Aug-2020 00:00	06-Aug-2020 00:00
Compound	CAS Number	LOR	Unit	EM2013650-008	EM2013650-009	EM2013650-010	EM2013650-011	EM2013650-014
				Result	Result	Result	Result	Result
EA001: pH in soil using 0.01M CaCl extract								
pH (CaCl2)	----	0.1	pH Unit	7.4	6.9	5.2	4.9	5.2
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	21.4	25.2	16.0	17.9	34.8
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
Copper	7440-50-8	5	mg/kg	12	12	<5	<5	9
Lead	7439-92-1	5	mg/kg	9	14	9	9	15
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg	30	20	5	8	19
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Silver	7440-22-4	2	mg/kg	<2	<2	<2	<2	<2
Tin	7440-31-5	5	mg/kg	<5	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg	30	16	<5	6	16
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	<1	<1	1
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	120	100	90	180	100
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP074A: Monocyclic Aromatic Hydrocarbons								
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
Styrene	100-42-5	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 monocyclic aromatic hydrocarbons	----	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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH16_0.1	BH16_0.5	BH06_0.1	BH06_0.5	BH14_0.1
				Client sampling date / time	05-Aug-2020 00:00	05-Aug-2020 00:00	05-Aug-2020 00:00	05-Aug-2020 00:00	06-Aug-2020 00:00
Compound	CAS Number	LOR	Unit		EM2013650-008	EM2013650-009	EM2013650-010	EM2013650-011	EM2013650-014
					Result	Result	Result	Result	Result
EP074H: Naphthalene									
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP074I: Volatile Halogenated Compounds									
Vinyl chloride	75-01-4	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	<0.02
1.1-Dichloroethene	75-35-4	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01
Methylene chloride	75-09-2	0.4	mg/kg		<0.4	<0.4	<0.4	<0.4	<0.4
trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	<0.02
cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	67-66-3	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	<0.02
1.1.1-Trichloroethane	71-55-6	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01
Carbon Tetrachloride	56-23-5	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01
1.2-Dichloroethane	107-06-2	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	<0.02
Trichloroethene	79-01-6	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	<0.02
1.1.2-Trichloroethane	79-00-5	0.04	mg/kg		<0.04	<0.04	<0.04	<0.04	<0.04
Tetrachloroethene	127-18-4	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	<0.02
1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01
1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	<0.02
Hexachlorobutadiene	87-68-3	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	<0.02
Chlorobenzene	108-90-7	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	<0.02
1.4-Dichlorobenzene	106-46-7	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	<0.02
1.2-Dichlorobenzene	95-50-1	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	<0.02
1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01
^ Sum of volatile chlorinated hydrocarbons	----	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01
^ Sum of other chlorinated hydrocarbons	----	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01
EP075A: Phenolic Compounds (Halogenated)									
2-Chlorophenol	95-57-8	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
2.4-Dichlorophenol	120-83-2	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
2.6-Dichlorophenol	87-65-0	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Pentachlorophenol	87-86-5	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Phenols (halogenated)	----	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH16_0.1	BH16_0.5	BH06_0.1	BH06_0.5	BH14_0.1
				Client sampling date / time	05-Aug-2020 00:00	05-Aug-2020 00:00	05-Aug-2020 00:00	05-Aug-2020 00:00	06-Aug-2020 00:00
Compound	CAS Number	LOR	Unit		EM2013650-008	EM2013650-009	EM2013650-010	EM2013650-011	EM2013650-014
					Result	Result	Result	Result	Result
EP075A: Phenolic Compounds (Halogenated) - Continued									
EP075A: Phenolic Compounds (Non-halogenated)									
Phenol	108-95-2	1	mg/kg		<1	<1	<1	<1	<1
2-Methylphenol	95-48-7	1	mg/kg		<1	<1	<1	<1	<1
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	1	mg/kg		<1	<1	<1	<1	<1
2.4-Dimethylphenol	105-67-9	1	mg/kg		<1	<1	<1	<1	<1
2.4-Dinitrophenol	51-28-5	5	mg/kg		<5	<5	<5	<5	<5
4-Nitrophenol	100-02-7	5	mg/kg		<5	<5	<5	<5	<5
2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg		<5	<5	<5	<5	<5
Dinoseb	88-85-7	5	mg/kg		<5	<5	<5	<5	<5
2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg		<5	<5	<5	<5	<5
^ **Sum of Phenols (non-halogenated)**	----	1	mg/kg		<1	<1	<1	<1	<1
EP075B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	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
Acenaphthylene	208-96-8	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) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
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**
EP075I: Organochlorine Pesticides									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH16_0.1	BH16_0.5	BH06_0.1	BH06_0.5	BH14_0.1
				Client sampling date / time	05-Aug-2020 00:00	05-Aug-2020 00:00	05-Aug-2020 00:00	05-Aug-2020 00:00	06-Aug-2020 00:00
Compound	CAS Number	LOR	Unit		EM2013650-008	EM2013650-009	EM2013650-010	EM2013650-011	EM2013650-014
					Result	Result	Result	Result	Result
EP075l: Organochlorine Pesticides - Continued									
alpha-BHC	319-84-6	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
beta-BHC	319-85-7	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
gamma-BHC	58-89-9	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
delta-BHC	319-86-8	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
Heptachlor	76-44-8	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
Aldrin	309-00-2	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
Heptachlor epoxide	1024-57-3	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
cis-Chlordane	5103-71-9	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
trans-Chlordane	5103-74-2	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
Endosulfan 1	959-98-8	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
Endrin aldehyde	7421-93-4	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
Endrin	72-20-8	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
Endosulfan 2	33213-65-9	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
4.4`-DDT	50-29-3	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
^ Sum of organochlorine pesticides	----	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ Chlordane	57-74-9	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
^ Sum of other organochlorine pesticides	----	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	<0.03
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
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	**120**
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	**120**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH16_0.1	BH16_0.5	BH06_0.1	BH06_0.5	BH14_0.1
				Client sampling date / time	05-Aug-2020 00:00	05-Aug-2020 00:00	05-Aug-2020 00:00	05-Aug-2020 00:00	06-Aug-2020 00:00
Compound	CAS Number	LOR	Unit		EM2013650-008	EM2013650-009	EM2013650-010	EM2013650-011	EM2013650-014
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	**140**
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	**140**
>C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**89.6**	**99.3**	**62.1**	**87.9**	**88.0**
EP074S: VOC Surrogates (Ultra-Trace)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**99.3**	**98.0**	**104**	**111**	**92.6**
Toluene-D8	2037-26-5	0.1	%		**94.5**	**96.0**	**93.0**	**99.0**	**84.5**
4-Bromofluorobenzene	460-00-4	0.1	%		**101**	**102**	**102**	**110**	**92.9**
EP075S: Acid Extractable Surrogates (Waste Classification)									
Phenol-d6	13127-88-3	0.025	%		**108**	**102**	**61.1**	**108**	**94.7**
2-Chlorophenol-D4	93951-73-6	0.025	%		**91.7**	**90.9**	**54.7**	**94.4**	**84.5**
2.4.6-Tribromophenol	118-79-6	0.025	%		**96.0**	**97.3**	**57.5**	**95.2**	**96.2**
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)									
Nitrobenzene-D5	4165-60-0	0.025	%		**95.2**	**98.1**	**57.2**	**94.0**	**89.4**
1.2-Dichlorobenzene-D4	2199-69-1	0.025	%		**88.7**	**88.0**	**52.9**	**89.8**	**84.3**
2-Fluorobiphenyl	321-60-8	0.025	%		**102**	**104**	**62.4**	**105**	**97.1**
Anthracene-d10	1719-06-8	0.025	%		**92.9**	**94.4**	**57.1**	**94.7**	**86.4**
4-Terphenyl-d14	1718-51-0	0.025	%		**89.0**	**88.8**	**61.0**	**93.0**	**83.7**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH14_0.5	----	----	----	----
			Client sampling date / time	06-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2013650-015	--------	--------	--------	--------
				Result	----	----	----	----
EA001: pH in soil using 0.01M CaCl extract								
pH (CaCl2)	----	0.1	pH Unit	**6.6**	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**24.1**	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Copper	7440-50-8	5	mg/kg	**8**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**8**	----	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**26**	----	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
Silver	7440-22-4	2	mg/kg	<2	----	----	----	----
Tin	7440-31-5	5	mg/kg	<5	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**10**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	----	----	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	----	----	----	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	**120**	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
Styrene	100-42-5	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ **Sum of monocyclic aromatic hydrocarbons**	----	0.2	mg/kg	<0.2	----	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH14_0.5	----	----	----	----
				Client sampling date / time	06-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2013650-015	--------	--------	--------	--------
					Result	----	----	----	----
EP074H: Naphthalene									
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP074I: Volatile Halogenated Compounds									
Vinyl chloride	75-01-4	0.02	mg/kg		<0.02	----	----	----	----
1.1-Dichloroethene	75-35-4	0.01	mg/kg		<0.01	----	----	----	----
Methylene chloride	75-09-2	0.4	mg/kg		<0.4	----	----	----	----
trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg		<0.02	----	----	----	----
cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg		<0.01	----	----	----	----
Chloroform	67-66-3	0.02	mg/kg		<0.02	----	----	----	----
1.1.1-Trichloroethane	71-55-6	0.01	mg/kg		<0.01	----	----	----	----
Carbon Tetrachloride	56-23-5	0.01	mg/kg		<0.01	----	----	----	----
1.2-Dichloroethane	107-06-2	0.02	mg/kg		<0.02	----	----	----	----
Trichloroethene	79-01-6	0.02	mg/kg		<0.02	----	----	----	----
1.1.2-Trichloroethane	79-00-5	0.04	mg/kg		<0.04	----	----	----	----
Tetrachloroethene	127-18-4	0.02	mg/kg		<0.02	----	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg		<0.01	----	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg		<0.02	----	----	----	----
Hexachlorobutadiene	87-68-3	0.02	mg/kg		<0.02	----	----	----	----
Chlorobenzene	108-90-7	0.02	mg/kg		<0.02	----	----	----	----
1.4-Dichlorobenzene	106-46-7	0.02	mg/kg		<0.02	----	----	----	----
1.2-Dichlorobenzene	95-50-1	0.02	mg/kg		<0.02	----	----	----	----
1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg		<0.01	----	----	----	----
^ Sum of volatile chlorinated hydrocarbons	----	0.01	mg/kg		<0.01	----	----	----	----
^ Sum of other chlorinated hydrocarbons	----	0.01	mg/kg		<0.01	----	----	----	----
EP075A: Phenolic Compounds (Halogenated)									
2-Chlorophenol	95-57-8	0.03	mg/kg		<0.03	----	----	----	----
2.4-Dichlorophenol	120-83-2	0.03	mg/kg		<0.03	----	----	----	----
2.6-Dichlorophenol	87-65-0	0.03	mg/kg		<0.03	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg		<0.03	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg		<0.05	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg		<0.05	----	----	----	----
2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg		<0.03	----	----	----	----
2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg		<0.05	----	----	----	----
Pentachlorophenol	87-86-5	0.2	mg/kg		<0.2	----	----	----	----
^ Sum of Phenols (halogenated)	----	0.03	mg/kg		<0.03	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH14_0.5	----	----	----	----
				Client sampling date / time	06-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2013650-015	--------	--------	--------	--------
					Result	----	----	----	----
EP075A: Phenolic Compounds (Halogenated) - Continued									
EP075A: Phenolic Compounds (Non-halogenated)									
Phenol	108-95-2	1	mg/kg		<1	----	----	----	----
2-Methylphenol	95-48-7	1	mg/kg		<1	----	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	----	----	----	----
2-Nitrophenol	88-75-5	1	mg/kg		<1	----	----	----	----
2.4-Dimethylphenol	105-67-9	1	mg/kg		<1	----	----	----	----
2.4-Dinitrophenol	51-28-5	5	mg/kg		<5	----	----	----	----
4-Nitrophenol	100-02-7	5	mg/kg		<5	----	----	----	----
2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg		<5	----	----	----	----
Dinoseb	88-85-7	5	mg/kg		<5	----	----	----	----
2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg		<5	----	----	----	----
^ Sum of Phenols (non-halogenated)	----	1	mg/kg		<1	----	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg		<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	----	----	----	----
EP075I: Organochlorine Pesticides									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH14_0.5	----	----	----	----
				Client sampling date / time	06-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2013650-015	--------	--------	--------	--------
					Result	----	----	----	----
EP075l: Organochlorine Pesticides - Continued									
alpha-BHC	319-84-6	0.03	mg/kg		<0.03	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg		<0.03	----	----	----	----
beta-BHC	319-85-7	0.03	mg/kg		<0.03	----	----	----	----
gamma-BHC	58-89-9	0.03	mg/kg		<0.03	----	----	----	----
delta-BHC	319-86-8	0.03	mg/kg		<0.03	----	----	----	----
Heptachlor	76-44-8	0.03	mg/kg		<0.03	----	----	----	----
Aldrin	309-00-2	0.03	mg/kg		<0.03	----	----	----	----
Heptachlor epoxide	1024-57-3	0.03	mg/kg		<0.03	----	----	----	----
cis-Chlordane	5103-71-9	0.03	mg/kg		<0.03	----	----	----	----
trans-Chlordane	5103-74-2	0.03	mg/kg		<0.03	----	----	----	----
Endosulfan 1	959-98-8	0.03	mg/kg		<0.03	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	----	----	----	----
Dieldrin	60-57-1	0.03	mg/kg		<0.03	----	----	----	----
Endrin aldehyde	7421-93-4	0.03	mg/kg		<0.03	----	----	----	----
Endrin	72-20-8	0.03	mg/kg		<0.03	----	----	----	----
Endosulfan 2	33213-65-9	0.03	mg/kg		<0.03	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.03	mg/kg		<0.03	----	----	----	----
4.4`-DDT	50-29-3	0.05	mg/kg		<0.05	----	----	----	----
Methoxychlor	72-43-5	0.03	mg/kg		<0.03	----	----	----	----
^ Sum of organochlorine pesticides	----	0.03	mg/kg		<0.03	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.03	mg/kg		<0.03	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	----	----	----	----
^ Chlordane	57-74-9	0.03	mg/kg		<0.03	----	----	----	----
^ Sum of other organochlorine pesticides	----	0.03	mg/kg		<0.03	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	----	----
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	50	mg/kg		<50	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH14_0.5	----	----	----	----
				Client sampling date / time	06-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2013650-015	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C16 - C34 Fraction	----	100	mg/kg		<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	----	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	----	----	----	----
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	----	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		95.9	----	----	----	----
EP074S: VOC Surrogates (Ultra-Trace)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		86.6	----	----	----	----
Toluene-D8	2037-26-5	0.1	%		81.3	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		86.4	----	----	----	----
EP075S: Acid Extractable Surrogates (Waste Classification)									
Phenol-d6	13127-88-3	0.025	%		111	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.025	%		96.4	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.025	%		97.6	----	----	----	----
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)									
Nitrobenzene-D5	4165-60-0	0.025	%		97.6	----	----	----	----
1.2-Dichlorobenzene-D4	2199-69-1	0.025	%		93.0	----	----	----	----
2-Fluorobiphenyl	321-60-8	0.025	%		108	----	----	----	----
Anthracene-d10	1719-06-8	0.025	%		96.6	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.025	%		91.2	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	41	122
EP074S: VOC Surrogates (Ultra-Trace)			
1.2-Dichloroethane-D4	17060-07-0	59	119
Toluene-D8	2037-26-5	55	117
4-Bromofluorobenzene	460-00-4	59	123
EP075S: Acid Extractable Surrogates (Waste Classification)			
Phenol-d6	13127-88-3	28	134
2-Chlorophenol-D4	93951-73-6	27	123
2.4.6-Tribromophenol	118-79-6	25	149
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)			
Nitrobenzene-D5	4165-60-0	29	125
1.2-Dichlorobenzene-D4	2199-69-1	31	117
2-Fluorobiphenyl	321-60-8	44	136
Anthracene-d10	1719-06-8	53	133
4-Terphenyl-d14	1718-51-0	59	141

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2013650**	Page	: 1 of 14
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 06-Aug-2020
Order number	: ----	Date Analysis Commenced	: 10-Aug-2020
C-O-C number	: ----	Issue Date	: 13-Aug-2020
Sampler	: ----		
Site	:		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 16		
No. of samples analysed	: 11		

ilac-MRA NATA
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. 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*
[redacted]	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
[redacted]	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

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

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	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3188888)									
EM2013650-001	BH12_0.1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	34	23	37.2	0% - 50%
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	11	11	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	9	8	0.00	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	18	19	7.02	No Limit
EM2013650-015	BH14_0.5	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	26	23	13.1	0% - 50%
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	8	8	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	8	9	0.00	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	10	10	0.00	No Limit
EA001: pH in soil using 0.01M CaCl extract (QC Lot: 3188314)									
EM2013437-003	Anonymous	EA001: pH (CaCl2)	----	0.1	pH Unit	7.1	7.1	0.00	0% - 20%
EM2013696-001	Anonymous	EA001: pH (CaCl2)	----	0.1	pH Unit	8.0	8.0	0.00	0% - 20%
EA001: pH in soil using 0.01M CaCl extract (QC Lot: 3189833)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA001: pH in soil using 0.01M CaCl extract (QC Lot: 3189833) - continued									
EM2013650-004	BH05_0.1	EA001: pH (CaCl2)	----	0.1	pH Unit	4.4	4.4	0.00	0% - 20%
EM2013706-005	Anonymous	EA001: pH (CaCl2)	----	0.1	pH Unit	7.8	7.8	0.00	0% - 20%
EA001: pH in soil using 0.01M CaCl extract (QC Lot: 3190967)									
EM2013600-004	Anonymous	EA001: pH (CaCl2)	----	0.1	pH Unit	5.9	5.9	0.00	0% - 20%
EM2013773-001	Anonymous	EA001: pH (CaCl2)	----	0.1	pH Unit	7.9	7.9	0.00	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3191054)									
EM2013600-005	Anonymous	EA037: Reaction Rate	----	1	-	1	1	0.00	No Limit
		EA037: pH (F)	----	0.1	pH Unit	7.1	7.0	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.4	5.5	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3188945)									
EM2013648-002	Anonymous	EA055: Moisture Content	----	0.1	%	18.9	18.6	1.98	0% - 20%
EM2013648-013	Anonymous	EA055: Moisture Content	----	0.1	%	27.1	27.4	1.01	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3188946)									
EM2013650-005	BH05_0.5	EA055: Moisture Content	----	0.1	%	21.0	19.8	5.93	0% - 20%
EM2013741-002	Anonymous	EA055: Moisture Content	----	0.1	%	13.0	11.7	11.0	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3188887)									
EM2013650-001	BH12_0.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM2013650-015	BH14_0.5	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 3188899)									
EM2013437-003	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM2013626-013	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 3188900)									
EM2013650-015	BH14_0.5	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM2013715-002	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 3192140)									
EM2013508-001	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EM2013653-001	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EK040T: Fluoride Total (QC Lot: 3188879)									
EM2013650-001	BH12_0.1	EK040T: Fluoride	16984-48-8	40	mg/kg	130	130	0.00	No Limit
EM2013650-015	BH14_0.5	EK040T: Fluoride	16984-48-8	40	mg/kg	120	120	0.00	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3188866)									
EM2013650-001	BH12_0.1	EP066-EM: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM2013741-003	Anonymous	EP066-EM: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 3188266)									
EM2013650-001	BH12_0.1	EP074-UT: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP074-UT: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 3188266) - continued									
EM2013650-001	BH12_0.1	EP074-UT: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM2013741-003	Anonymous	EP074-UT: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP074-UT: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074H: Naphthalene (QC Lot: 3188266)									
EM2013650-001	BH12_0.1	EP074-UT: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM2013741-003	Anonymous	EP074-UT: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP074I: Volatile Halogenated Compounds (QC Lot: 3188266)									
EM2013650-001	BH12_0.1	EP074-UT: 1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chloroform	67-66-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Trichloroethene	79-01-6	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	<0.04	0.00	No Limit
		EP074-UT: Methylene chloride	75-09-2	0.4	mg/kg	<0.4	<0.4	0.00	No Limit
EM2013741-003	Anonymous	EP074-UT: 1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074I: Volatile Halogenated Compounds (QC Lot: 3188266) - continued									
EM2013741-003	Anonymous	EP074-UT: Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chloroform	67-66-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Trichloroethene	79-01-6	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	<0.04	0.00	No Limit
		EP074-UT: Methylene chloride	75-09-2	0.4	mg/kg	<0.4	<0.4	0.00	No Limit
EP075A: Phenolic Compounds (Halogenated) (QC Lot: 3188864)									
EM2013650-001	BH12_0.1	EP075-EM: 2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EM2013741-003	Anonymous	EP075-EM: 2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP075A: Phenolic Compounds (Non-halogenated) (QC Lot: 3188864)									
EM2013650-001	BH12_0.1	EP075-EM: Phenol	108-95-2	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Methylphenol	95-48-7	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Nitrophenol	88-75-5	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dimethylphenol	105-67-9	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075A: Phenolic Compounds (Non-halogenated) (QC Lot: 3188864) - continued									
EM2013650-001	BH12_0.1	EP075-EM: 2.4-Dinitrophenol	51-28-5	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 4-Nitrophenol	100-02-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: Dinoseb	88-85-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg	<5	<5	0.00	No Limit
EM2013741-003	Anonymous	EP075-EM: Phenol	108-95-2	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Methylphenol	95-48-7	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Nitrophenol	88-75-5	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dimethylphenol	105-67-9	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dinitrophenol	51-28-5	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 4-Nitrophenol	100-02-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: Dinoseb	88-85-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg	<5	<5	0.00	No Limit
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3188864)									
EM2013650-001	BH12_0.1	EP075-EM: Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1.0	<1.0	0.00	No Limit
EM2013741-003	Anonymous	EP075-EM: Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3188864) - continued									
EM2013741-003	Anonymous	EP075-EM: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1.0	<1.0	0.00	No Limit
EP075I: Organochlorine Pesticides (QC Lot: 3188864)									
EM2013650-001	BH12_0.1	EP075-EM: alpha-BHC	319-84-6	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: beta-BHC	319-85-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: gamma-BHC	58-89-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: delta-BHC	319-86-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor	76-44-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Aldrin	309-00-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Dieldrin	60-57-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin	72-20-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Methoxychlor	72-43-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
EM2013741-003	Anonymous	EP075-EM: alpha-BHC	319-84-6	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: beta-BHC	319-85-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: gamma-BHC	58-89-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: delta-BHC	319-86-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor	76-44-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Aldrin	309-00-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075I: Organochlorine Pesticides (QC Lot: 3188864) - continued									
EM2013741-003	Anonymous	EP075-EM: Dieldrin	60-57-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin	72-20-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Methoxychlor	72-43-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3188266)									
EM2013650-001	BH12_0.1	EP074-UT: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM2013741-003	Anonymous	EP074-UT: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3188865)									
EM2013650-001	BH12_0.1	EP071-EM: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EM2013741-003	Anonymous	EP071-EM: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3188266)									
EM2013650-001	BH12_0.1	EP074-UT: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
		EP074-UT: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	0.00	No Limit
EM2013741-003	Anonymous	EP074-UT: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
		EP074-UT: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3188865)									
EM2013650-001	BH12_0.1	EP071-EM: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EM2013741-003	Anonymous	EP071-EM: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (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 Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3188888)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	99.4	78.5	107
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	102	76.2	108
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	93.6	78.1	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	99.0	78.4	106
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	7.9 mg/kg	101	78.0	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	92.9	79.9	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	101	92.0	110
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.1 mg/kg	85.1	80.0	108
EG005T: Tin	7440-31-5	5	mg/kg	<5	5.2 mg/kg	106	78.4	117
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	105	79.1	110
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3188887)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	103	76.9	110
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3188899)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	20 mg/kg	80.4	70.0	130
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3188900)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	20 mg/kg	77.8	70.0	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 3192140)								
EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	20 mg/kg	99.0	70.0	130
EK040T: Fluoride Total (QCLot: 3188879)								
EK040T: Fluoride	16984-48-8	40	mg/kg	<40	400 mg/kg	90.8	75.2	110
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3188866)								
EP066-EM: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	95.8	70.8	136
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3188266)								
EP074-UT: Benzene	71-43-2	0.2	mg/kg	<0.2	2.1 mg/kg	95.6	69.2	116
EP074-UT: Toluene	108-88-3	0.5	mg/kg	<0.5	2.1 mg/kg	94.4	67.7	116
EP074-UT: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2.1 mg/kg	92.0	66.6	115
EP074-UT: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4.2 mg/kg	90.2	65.2	112
EP074-UT: Styrene	100-42-5	0.5	mg/kg	<0.5	2.1 mg/kg	94.6	69.4	111
EP074-UT: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2.1 mg/kg	90.5	68.4	110
EP074H: Naphthalene (QCLot: 3188266)								
EP074-UT: Naphthalene	91-20-3	1	mg/kg	<1	0.6 mg/kg	93.2	72.3	114
EP074I: Volatile Halogenated Compounds (QCLot: 3188266)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074I: Volatile Halogenated Compounds (QCLot: 3188266) - continued								
EP074-UT: Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	0.1 mg/kg	79.6	47.0	138
EP074-UT: 1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	0.1 mg/kg	94.0	57.6	125
EP074-UT: Methylene chloride	75-09-2	0.4	mg/kg	<0.4	2.1 mg/kg	97.8	72.3	115
EP074-UT: trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	0.1 mg/kg	98.0	60.5	122
EP074-UT: cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	0.1 mg/kg	97.3	70.3	112
EP074-UT: Chloroform	67-66-3	0.02	mg/kg	<0.02	0.1 mg/kg	98.2	66.6	115
EP074-UT: 1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	0.1 mg/kg	94.0	64.4	122
EP074-UT: Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	0.1 mg/kg	89.8	58.4	127
EP074-UT: 1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	0.1 mg/kg	107	72.9	114
EP074-UT: Trichloroethene	79-01-6	0.02	mg/kg	<0.02	0.1 mg/kg	93.8	64.7	115
EP074-UT: 1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	0.1 mg/kg	104	72.6	116
EP074-UT: Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	0.1 mg/kg	92.2	60.0	119
EP074-UT: 1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	0.1 mg/kg	93.1	71.8	116
EP074-UT: 1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	0.1 mg/kg	104	66.1	116
EP074-UT: Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	0.1 mg/kg	61.6	39.8	128
EP074-UT: Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	0.1 mg/kg	96.2	70.3	113
EP074-UT: 1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	0.1 mg/kg	87.6	62.6	113
EP074-UT: 1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	0.1 mg/kg	92.6	70.8	110
EP074-UT: 1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	0.1 mg/kg	73.4	48.4	120
EP075A: Phenolic Compounds (Halogenated) (QCLot: 3188864)								
EP075-EM: 2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	2 mg/kg	112	71.4	123
EP075-EM: 2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	2 mg/kg	104	73.1	132
EP075-EM: 2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	2 mg/kg	106	72.2	132
EP075-EM: 4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	2 mg/kg	107	70.8	128
EP075-EM: 2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	2 mg/kg	103	70.9	134
EP075-EM: 2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	2 mg/kg	106	70.9	126
EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	2 mg/kg	103	61.9	126
EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/5 8-90-2	0.05	mg/kg	<0.05	4 mg/kg	106	47.2	128
EP075-EM: Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	4 mg/kg	89.0	44.0	135
EP075A: Phenolic Compounds (Non-halogenated) (QCLot: 3188864)								
EP075-EM: Phenol	108-95-2	1	mg/kg	<1	2 mg/kg	119	71.5	127
EP075-EM: 2-Methylphenol	95-48-7	1	mg/kg	<1	2 mg/kg	121	70.2	129
EP075-EM: 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	4 mg/kg	110	74.0	130
EP075-EM: 2-Nitrophenol	88-75-5	1	mg/kg	<1	2 mg/kg	104	70.9	133
EP075-EM: 2.4-Dimethylphenol	105-67-9	1	mg/kg	<1	2 mg/kg	102	64.8	132
EP075-EM: 2.4-Dinitrophenol	51-28-5	5	mg/kg	<5	10 mg/kg	60.8	41.0	156
EP075-EM: 4-Nitrophenol	100-02-7	5	mg/kg	<5	10 mg/kg	114	52.6	128
EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg	<5	10 mg/kg	85.8	42.6	125

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075A: Phenolic Compounds (Non-halogenated) (QCLot: 3188864) - continued								
EP075-EM: Dinoseb	88-85-7	5	mg/kg	<5	10 mg/kg	89.0	47.3	128
EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg	<5	1 mg/kg	62.1	34.5	137
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3188864)								
EP075-EM: Naphthalene	91-20-3	0.5	mg/kg	<0.5	2 mg/kg	111	73.0	131
EP075-EM: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	2 mg/kg	108	70.8	130
EP075-EM: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	2 mg/kg	109	72.0	135
EP075-EM: Fluorene	86-73-7	0.5	mg/kg	<0.5	2 mg/kg	110	74.4	131
EP075-EM: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	2 mg/kg	109	73.3	130
EP075-EM: Anthracene	120-12-7	0.5	mg/kg	<0.5	2 mg/kg	109	59.4	127
EP075-EM: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	2 mg/kg	112	75.3	132
EP075-EM: Pyrene	129-00-0	0.5	mg/kg	<0.5	2 mg/kg	114	75.4	130
EP075-EM: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	2 mg/kg	113	69.6	133
EP075-EM: Chrysene	218-01-9	0.5	mg/kg	<0.5	2 mg/kg	119	75.0	133
EP075-EM: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1.0	4 mg/kg	110	75.8	133
EP075-EM: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	2 mg/kg	110	65.1	130
EP075-EM: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	2 mg/kg	108	72.1	134
EP075-EM: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	2 mg/kg	110	72.9	135
EP075-EM: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	2 mg/kg	111	71.3	134
EP075I: Organochlorine Pesticides (QCLot: 3188864)								
EP075-EM: alpha-BHC	319-84-6	0.03	mg/kg	<0.03	2 mg/kg	107	71.0	129
EP075-EM: Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	2 mg/kg	106	65.9	125
EP075-EM: beta-BHC	319-85-7	0.03	mg/kg	<0.03	2 mg/kg	107	66.2	130
EP075-EM: gamma-BHC	58-89-9	0.03	mg/kg	<0.03	2 mg/kg	110	70.8	130
EP075-EM: delta-BHC	319-86-8	0.03	mg/kg	<0.03	2 mg/kg	110	68.7	134
EP075-EM: Heptachlor	76-44-8	0.03	mg/kg	<0.03	2 mg/kg	109	67.2	131
EP075-EM: Aldrin	309-00-2	0.03	mg/kg	<0.03	2 mg/kg	109	70.2	130
EP075-EM: Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	2 mg/kg	109	65.6	130
EP075-EM: cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	2 mg/kg	111	65.3	133
EP075-EM: trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	2 mg/kg	110	66.7	131
EP075-EM: Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	2 mg/kg	90.1	67.9	135
EP075-EM: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	2 mg/kg	105	70.9	132
EP075-EM: Dieldrin	60-57-1	0.03	mg/kg	<0.03	2 mg/kg	110	70.0	133
EP075-EM: Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	2 mg/kg	110	49.6	157
EP075-EM: Endrin	72-20-8	0.03	mg/kg	<0.03	2 mg/kg	118	55.4	148
EP075-EM: Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	2 mg/kg	112	71.4	135
EP075-EM: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	2 mg/kg	115	74.8	134
EP075-EM: Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	2 mg/kg	127	70.2	135
EP075-EM: 4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	2 mg/kg	111	67.1	133

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075I: Organochlorine Pesticides (QCLot: 3188864) - continued								
EP075-EM: Methoxychlor	72-43-5	0.03	mg/kg	<0.03	2 mg/kg	118	63.6	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3188266)								
EP074-UT: C6 - C9 Fraction	----	10	mg/kg	<10	39.6 mg/kg	100	61.1	119
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3188865)								
EP071-EM: C10 - C14 Fraction	----	50	mg/kg	<50	900 mg/kg	102	69.9	128
EP071-EM: C15 - C28 Fraction	----	100	mg/kg	<100	3030 mg/kg	103	83.0	124
EP071-EM: C29 - C36 Fraction	----	100	mg/kg	<100	1520 mg/kg	97.8	76.9	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3188266)								
EP074-UT: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	48.9 mg/kg	100	59.9	119
EP074-UT: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3188865)								
EP071-EM: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	100	70.2	126
EP071-EM: >C16 - C34 Fraction	----	100	mg/kg	<100	4020 mg/kg	99.4	81.4	120
EP071-EM: >C34 - C40 Fraction	----	100	mg/kg	<100	280 mg/kg	115	53.4	129

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	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3188888)							
EM2013650-002	BH12_0.5	EG005T: Arsenic	7440-38-2	50 mg/kg	94.7	78.0	124
		EG005T: Cadmium	7440-43-9	50 mg/kg	106	84.0	116
		EG005T: Copper	7440-50-8	250 mg/kg	98 8	80.0	120
		EG005T: Lead	7439-92-1	250 mg/kg	104	80.0	120
		EG005T: Nickel	7440-02-0	50 mg/kg	106	78.0	120
		EG005T: Zinc	7440-66-6	250 mg/kg	103	80.0	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3188887)							
EM2013650-002	BH12_0.5	EG035T: Mercury	7439-97-6	0.5 mg/kg	115	76.0	116
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3188899)							
EM2013437-008	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	60.1	58.0	114
EM2013437-008	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	63 0	58.0	114
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3188900)							
EM2013672-001	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	72 8	58.0	114

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3188900) - continued							
EM2013672-001	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	88 8	58.0	114
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 3192140)							
EM2013596-012	Anonymous	EK026SF: Total Cyanide	57-12-5	20 mg/kg	93.6	70.0	130
EK040T: Fluoride Total (QCLot: 3188879)							
EM2013650-002	BH12_0.5	EK040T: Fluoride	16984-48-8	400 mg/kg	101	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3188866)							
EM2013650-005	BH05_0.5	EP066-EM: Total Polychlorinated biphenyls	----	1 mg/kg	93 2	36.0	152
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3188266)							
EM2013650-002	BH12_0.5	EP074-UT: Benzene	71-43-2	2 mg/kg	95 8	50.0	138
		EP074-UT: Toluene	108-88-3	2 mg/kg	102	56.0	134
EP074I: Volatile Halogenated Compounds (QCLot: 3188266)							
EM2013650-002	BH12_0.5	EP074-UT: 1.1-Dichloroethene	75-35-4	2 mg/kg	86 8	26.0	141
		EP074-UT: Trichloroethene	79-01-6	2 mg/kg	98 3	50.0	134
		EP074-UT: Chlorobenzene	108-90-7	2 mg/kg	114	28.0	134
EP075A: Phenolic Compounds (Halogenated) (QCLot: 3188864)							
EM2013650-002	BH12_0.5	EP075-EM: 2-Chlorophenol	95-57-8	3 mg/kg	102	34.0	118
		EP075-EM: 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	97.6	41.0	139
		EP075-EM: Pentachlorophenol	87-86-5	3 mg/kg	56 9	10.0	144
EP075A: Phenolic Compounds (Non-halogenated) (QCLot: 3188864)							
EM2013650-002	BH12_0.5	EP075-EM: Phenol	108-95-2	3 mg/kg	108	31.5	134
		EP075-EM: 2-Nitrophenol	88-75-5	3 mg/kg	102	13.0	129
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3188864)							
EM2013650-002	BH12_0.5	EP075-EM: Acenaphthene	83-32-9	3 mg/kg	97.1	46.0	138
		EP075-EM: Pyrene	129-00-0	3 mg/kg	104	26.5	169
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3188266)							
EM2013650-002	BH12_0.5	EP074-UT: C6 - C9 Fraction	----	28 mg/kg	101	43.0	111
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3188865)							
EM2013650-004	BH05_0.1	EP071-EM: C10 - C14 Fraction	----	900 mg/kg	96 9	53.0	123
		EP071-EM: C15 - C28 Fraction	----	3030 mg/kg	99 2	70.0	124
		EP071-EM: C29 - C36 Fraction	----	1520 mg/kg	93 8	64.0	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3188266)							
EM2013650-002	BH12_0.5	EP074-UT: C6 - C10 Fraction	C6_C10	33 mg/kg	97 8	42.0	106
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3188865)							
EM2013650-004	BH05_0.1	EP071-EM: >C10 - C16 Fraction	----	1160 mg/kg	95 9	65.0	123
		EP071-EM: >C16 - C34 Fraction	----	4020 mg/kg	95.6	67.0	121

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3188865) - continued							
EM2013650-004	BH05_0.1	EP071-EM: >C34 - C40 Fraction	----	280 mg/kg	110	44.0	126

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2013650**	Page	: 1 of 10
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 06-Aug-2020
Site	:	Issue Date	: 13-Aug-2020
Sampler	: ----	No. of samples received	: 16
Order number	: ----	No. of samples analysed	: 11

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
EA001: pH in soil using 0.01M CaCl extract								
Soil Glass Jar - Unpreserved (EA001)								
BH12_0.1,	BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	10-Aug-2020	✓	**10-Aug-2020**	10-Aug-2020	✓
Soil Glass Jar - Unpreserved (EA001)								
BH05_0.1,	BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	11-Aug-2020	✓	**10-Aug-2020**	10-Aug-2020	✓
Soil Glass Jar - Unpreserved (EA001)								
BH16_0.1, BH06_0.1,	BH16_0.5, BH06_0.5	**05-Aug-2020**	**11-Aug-2020**	12-Aug-2020	✓	**11-Aug-2020**	11-Aug-2020	✓
Soil Glass Jar - Unpreserved (EA001)								
BH14_0.1,	BH14_0.5	**06-Aug-2020**	**11-Aug-2020**	13-Aug-2020	✓	**11-Aug-2020**	11-Aug-2020	✓
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen on receipt at ALS (EA037)								
BH12_0.1, BH12_1.0	BH12_0.5,	**03-Aug-2020**	**11-Aug-2020**	30-Jan-2021	✓	**11-Aug-2020**	30-Jan-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH12_0.1,	BH12_0.5	**03-Aug-2020**	**----**	----	----	**10-Aug-2020**	17-Aug-2020	✓
Soil Glass Jar - Unpreserved (EA055)								
BH05_0.1,	BH05_0.5	**04-Aug-2020**	**----**	----	----	**10-Aug-2020**	18-Aug-2020	✓
Soil Glass Jar - Unpreserved (EA055)								
BH16_0.1, BH06_0.1,	BH16_0.5, BH06_0.5	**05-Aug-2020**	**----**	----	----	**10-Aug-2020**	19-Aug-2020	✓
Soil Glass Jar - Unpreserved (EA055)								
BH14_0.1,	BH14_0.5	**06-Aug-2020**	**----**	----	----	**10-Aug-2020**	20-Aug-2020	✓
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH12_0.1,	BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	30-Jan-2021	✓	**10-Aug-2020**	30-Jan-2021	✓
Soil Glass Jar - Unpreserved (EG005T)								
BH05_0.1,	BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	31-Jan-2021	✓	**10-Aug-2020**	31-Jan-2021	✓
Soil Glass Jar - Unpreserved (EG005T)								
BH16_0.1, BH06_0.1,	BH16_0.5, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	01-Feb-2021	✓	**10-Aug-2020**	01-Feb-2021	✓
Soil Glass Jar - Unpreserved (EG005T)								
BH14_0.1,	BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	02-Feb-2021	✓	**10-Aug-2020**	02-Feb-2021	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
BH12_0.1, BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	31-Aug-2020	✓	**10-Aug-2020**	31-Aug-2020	✓
Soil Glass Jar - Unpreserved (EG035T)							
BH05_0.1, BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	01-Sep-2020	✓	**10-Aug-2020**	01-Sep-2020	✓
Soil Glass Jar - Unpreserved (EG035T)							
BH16_0.1, BH16_0.5, BH06_0.1, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	02-Sep-2020	✓	**10-Aug-2020**	02-Sep-2020	✓
Soil Glass Jar - Unpreserved (EG035T)							
BH14_0.1, BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	03-Sep-2020	✓	**10-Aug-2020**	03-Sep-2020	✓
EG048: Hexavalent Chromium (Alkaline Digest)							
Soil Glass Jar - Unpreserved (EG048G)							
BH12_0.1, BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	31-Aug-2020	✓	**11-Aug-2020**	17-Aug-2020	✓
Soil Glass Jar - Unpreserved (EG048G)							
BH05_0.1, BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	01-Sep-2020	✓	**11-Aug-2020**	17-Aug-2020	✓
Soil Glass Jar - Unpreserved (EG048G)							
BH16_0.1, BH16_0.5, BH06_0.1, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	02-Sep-2020	✓	**11-Aug-2020**	17-Aug-2020	✓
Soil Glass Jar - Unpreserved (EG048G)							
BH14_0.1, BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	03-Sep-2020	✓	**11-Aug-2020**	17-Aug-2020	✓
EK026SF: Total CN by Segmented Flow Analyser							
Soil Glass Jar - Unpreserved (EK026SF)							
BH12_0.1, BH12_0.5	**03-Aug-2020**	**11-Aug-2020**	17-Aug-2020	✓	**12-Aug-2020**	25-Aug-2020	✓
Soil Glass Jar - Unpreserved (EK026SF)							
BH05_0.1, BH05_0.5	**04-Aug-2020**	**11-Aug-2020**	18-Aug-2020	✓	**12-Aug-2020**	25-Aug-2020	✓
Soil Glass Jar - Unpreserved (EK026SF)							
BH16_0.1, BH16_0.5, BH06_0.1, BH06_0.5	**05-Aug-2020**	**11-Aug-2020**	19-Aug-2020	✓	**12-Aug-2020**	25-Aug-2020	✓
Soil Glass Jar - Unpreserved (EK026SF)							
BH14_0.1, BH14_0.5	**06-Aug-2020**	**11-Aug-2020**	20-Aug-2020	✓	**12-Aug-2020**	25-Aug-2020	✓
EK040T: Fluoride Total							
Soil Glass Jar - Unpreserved (EK040T)							
BH12_0.1, BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	31-Aug-2020	✓	**12-Aug-2020**	31-Aug-2020	✓
Soil Glass Jar - Unpreserved (EK040T)							
BH05_0.1, BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	01-Sep-2020	✓	**12-Aug-2020**	01-Sep-2020	✓
Soil Glass Jar - Unpreserved (EK040T)							
BH16_0.1, BH16_0.5, BH06_0.1, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	02-Sep-2020	✓	**12-Aug-2020**	02-Sep-2020	✓
Soil Glass Jar - Unpreserved (EK040T)							
BH14_0.1, BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	03-Sep-2020	✓	**12-Aug-2020**	03-Sep-2020	✓

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
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066-EM)								
BH12_0.1,	BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	17-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP066-EM)								
BH05_0.1,	BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	18-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP066-EM)								
BH16_0.1, BH06_0.1,	BH16_0.5, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	19-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP066-EM)								
BH14_0.1,	BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	20-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
EP074A: Monocyclic Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP074-UT)								
BH12_0.1,	BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	10-Aug-2020	✓	**10-Aug-2020**	10-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH05_0.1,	BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	11-Aug-2020	✓	**10-Aug-2020**	11-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH16_0.1, BH06_0.1,	BH16_0.5, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	12-Aug-2020	✓	**10-Aug-2020**	12-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH14_0.1,	BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	13-Aug-2020	✓	**10-Aug-2020**	13-Aug-2020	✓
EP074H: Naphthalene								
Soil Glass Jar - Unpreserved (EP074-UT)								
BH12_0.1,	BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	10-Aug-2020	✓	**10-Aug-2020**	10-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH05_0.1,	BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	11-Aug-2020	✓	**10-Aug-2020**	11-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH16_0.1, BH06_0.1,	BH16_0.5, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	12-Aug-2020	✓	**10-Aug-2020**	12-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH14_0.1,	BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	13-Aug-2020	✓	**10-Aug-2020**	13-Aug-2020	✓
EP074I: Volatile Halogenated Compounds								
Soil Glass Jar - Unpreserved (EP074-UT)								
BH12_0.1,	BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	10-Aug-2020	✓	**10-Aug-2020**	10-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH05_0.1,	BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	11-Aug-2020	✓	**10-Aug-2020**	11-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH16_0.1, BH06_0.1,	BH16_0.5, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	12-Aug-2020	✓	**10-Aug-2020**	12-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH14_0.1,	BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	13-Aug-2020	✓	**10-Aug-2020**	13-Aug-2020	✓

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
EP075A: Phenolic Compounds (Halogenated)								
Soil Glass Jar - Unpreserved (EP075-EM)								
BH12_0.1,	BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	17-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH05_0.1,	BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	18-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH16_0.1, BH06_0.1,	BH16_0.5, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	19-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH14_0.1,	BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	20-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
EP075A: Phenolic Compounds (Non-halogenated)								
Soil Glass Jar - Unpreserved (EP075-EM)								
BH12_0.1,	BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	17-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH05_0.1,	BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	18-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH16_0.1, BH06_0.1,	BH16_0.5, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	19-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH14_0.1,	BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	20-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
EP075B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075-EM)								
BH12_0.1,	BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	17-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH05_0.1,	BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	18-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH16_0.1, BH06_0.1,	BH16_0.5, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	19-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH14_0.1,	BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	20-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
EP075I: Organochlorine Pesticides								
Soil Glass Jar - Unpreserved (EP075-EM)								
BH12_0.1,	BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	17-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH05_0.1,	BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	18-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH16_0.1, BH06_0.1,	BH16_0.5, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	19-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH14_0.1,	BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	20-Aug-2020	✓	**10-Aug-2020**	19-Sep-2020	✓

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 (EP074-UT) BH12_0.1, BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	10-Aug-2020	✓	**10-Aug-2020**	10-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT) BH05_0.1, BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	11-Aug-2020	✓	**10-Aug-2020**	11-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT) BH16_0.1, BH16_0.5, BH06_0.1, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	12-Aug-2020	✓	**10-Aug-2020**	12-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT) BH14_0.1, BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	13-Aug-2020	✓	**10-Aug-2020**	13-Aug-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP074-UT) BH12_0.1, BH12_0.5	**03-Aug-2020**	**10-Aug-2020**	10-Aug-2020	✓	**10-Aug-2020**	10-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT) BH05_0.1, BH05_0.5	**04-Aug-2020**	**10-Aug-2020**	11-Aug-2020	✓	**10-Aug-2020**	11-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT) BH16_0.1, BH16_0.5, BH06_0.1, BH06_0.5	**05-Aug-2020**	**10-Aug-2020**	12-Aug-2020	✓	**10-Aug-2020**	12-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT) BH14_0.1, BH14_0.5	**06-Aug-2020**	**10-Aug-2020**	13-Aug-2020	✓	**10-Aug-2020**	13-Aug-2020	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH in soil using a 0.01M CaCl2 extract	EA001	6	51	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	11	**9.09**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	19	**5.26**	**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 in soil using a 0.01M CaCl2 extract	EA001	SOIL	In house: Referenced to Rayment and Lyons 4B3 (mod.) or 4B4 (mod.) 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
ASS Field Screening Analysis	* EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.
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 AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (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 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)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3)
Total Cyanide by Segmented Flow Analyser	EK026SF	SOIL	In house: Referenced to APHA 4500-CN C / ASTM D7511. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM Schedule B(3).
Total Fluoride	EK040T	SOIL	(In-house) Total fluoride is determined by ion specific electrode (ISE) in a solution obtained after a Sodium Carbonate / Potassium Carbonate fusion dissolution.
PCB - VIC EPA 448.3 Screen	EP066-EM	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 method is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071-EM	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against a kane standards over the range C10 - C40.

Analytical Methods	Method	Matrix	Method Descriptions
Volatile Organic Compounds - Ultra-trace	EP074-UT	SOIL	In house: Referenced to USEPA SW 846 - 8260 Extracts are analysed by Purge and Trap, Capillary GC/MS in partial SIM/Scan mode. Quantification is by comparison against an established multi-point calibration curves. This method is compliant with NEPM Schedule B(3).
Volatile Organic Compounds - Ultra-trace - Summations	EP074-UT-SUM	SOIL	Summation of MAHs and VHCs
Semivolatile Organic Compounds - Waste Classification	EP075-EM	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).
SVOC - Waste Classification (Sums)	EP075-EM-SUM	SOIL	Summations for EP075 (EM variation)

Preparation Methods	Method	Matrix	Method Descriptions
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
pH in soil using a 0.01M CaCl2 extract	EA001-PR	SOIL	In house: Referenced to Rayment and Higginson 4B1, 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
Total Fluoride	EK040T-PR	SOIL	In house: Samples are fused with Sodium Carbonate / Potassium Carbonate flux.
Drying only	* EN020D	SOIL	In house
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).
Methanolic Extraction of Soils - Ultra-trace.	ORG16-UT	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 - VIC EPA Screen	ORG17-EM	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

GHD

GHD Melbourne
180 Lonsdale Street, Melbourne 3000
Telephone: 613 8687 8000 Facsimile: 613 8687 8111

Environmental Division
Melbourne
Work Order Reference
EM2013650

Telephone : +61-3-8549 9600

Job Number: 12529997	GHD Office: Melbourne	Laboratory:	ALS Springvale
Project: WORM		Address:	2 - 4 Westall Rd, Springvale
GHD Contact: [redacted]	Contact Email: [redacted]	Lab Contact:	[redacted]
TAT: Five days	Quote No./GHD Reference		

PLEASE NOTE:
- Sign white copy on receipt and release of samples.
- Samples are to be delivered to the Laboratory Address.
- On receipt of samples, the laboratory contact to sign white copy and fax/email to GHD Contact.
- On completion of analyses please return white copy with results. Pink copy is returned to the sampler once the courier has signed for the samples.
- E-mail results to the GHD Contact with the GHD Job Number in the e-mail subject line.

Results to be provided in ESDAT compatible format

	Sample I.D.	Date	Time	Composite Sample	Grab Sample	Preservative	Container Type	Container No.	Container	HOLD	Analysis Required	Comments
1	BH12_0.1	3.8.2020	AM		S	N/A	J,B	2		X		1 jar, 1 ASS bag
2	BH12_0.5	↓	↓		↓		J,B	2		↓		↓
3	BH12_1.0	↓	↓		↓		J,B	2		↓		↓
4	BH05_0.1	4.8.2020	↓		↓		J	1		↓		1 jar
5	BH05_0.5	↓	↓		↓		↓	↓		↓		↓
6	BH05_1.0	↓	↓		↓		↓	↓		↓		↓
7	BH05_2.0	↓	↓		↓		↓	↓		↓		↓
8	BH16_0.1	5.8.2020	↓		↓		↓	↓		↓		↓
9	BH16_0.5	5.8.2020	↓		↓		↓	↓		↓		↓

Received: [redacted] 6/8/20 Carrier: @ 5 w/p
COnote:
Temp: 2.2 °C Seal: Y/N
Ice / Icebricks / NA

ALS

NOTES:

Sampled by:	MM	Date/Time:	3-5.8.20	Relinquished by:	MM	Date/Time:	5.8.2020, 16:15
Received by:		Date/Time:		Relinquished by:		Date/Time:	
Received by Courier:		Date/Time:		Relinquished by:		Date/Time:	
Received by Lab:		Date/Time:					
Remarks:							

CHAIN OF CUSTODY

GHD

GHD Melbourne
180 Lonsdale Street, Melbourne 3000
Telephone: 613 8687 8000 Facsimile: 613 8687 8111

Job Number 12529997	**GHD Office** Melbourne	**Laboratory:**	ALS Springvale
Project WORM		**Address:**	2 - 4 Westall Rd, Springvale
GHD Contact [redacted]	**Contact Email** [redacted]	**Lab Contact:**	[redacted]
TAT: Five days	**Quote No./GHD Reference**		

PLEASE NOTE:
- Sign white copy on receipt and release of samples.
- Samples are to be delivered to the Laboratory Address.
- On receipt of samples, the laboratory contact to sign white copy and fax/email to GHD Contact.
- On completion of analyses please return white copy with results. Pink copy is returned to the sampler once the courier has signed for the samples.
- E-mail results to the GHD Contact with the GHD Job Number in the e-mail subject line.

Results to be provided in ESDAT compatible format

	Sample I.D.	Date	Time	Composite Samples	Container: Number	Container: Type	Container: Preservative	Container: Size	Container: Filtered	Analyses Required: HOLD	Remarks
10	BH06-0.1	5.8.2020	PM		5	N/A	J	1		X	1 jar, [redacted]
11	BH06-0.5	↓	↓		↓		↓	↓		↓	
12	BH06-1.0										
13	BH06-2.0										
14	BH14-0.1	6.8.2020	PM								
15	BH14-0.5	↓	↓		↓		↓	↓		↓	
16	BH14-1.0										

Received: ~~[redacted]~~ 6/8/20 5:00pm
Carrier:
Quote:
Temp: 2.2 °C Seal (Y)Y N
Ice / Icebricks / NA

NOTES:

Sampled by:	MM	**Date/Time:**	6.8.20	**Relinquished by:**	MM	**Date/Time:**	6.8.20, 16:15
Received by:		**Date/Time:**		**Relinquished by:**		**Date/Time:**	
Received by Courier:		**Date/Time:**		**Relinquished by:**		**Date/Time:**	
Received by Lab:		**Date/Time:**					
Remarks:							

[redacted]

From: [redacted]
Sent: Friday, 7 August 2020 10:43 AM
To: [redacted]
Cc: [redacted]
Subject: [EXTERNAL] - RE: ON HOLD-EM2013650-GHD-12529997

Follow Up Flag: Follow up
Flag Status: Flagged

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 [redacted]

Please see the analysis below for work order EM2013650, Quote GHD (EN/005/18).

Can you please copy me into the results?

	Sample ID	IWRG (P-16)	S-26	Hold
1	BH12_0.1	X		
2	BH12_0.5	X		
3	BH12_1.0			X
4	BH05_0.1	X		
5	BH05_0.5	X		
6	BH05_1.0			X
7	BH05_2.0			X
8	BH16_0.1	X		
9	BH16_0.5	X		
10	BH06_0.1	X		
11	BH06_0.5	X		
12	BH06_1.0			X
13	BH06_2.0			X
14	BH14_0.1	X		

15	BH14_0.5	X		
16	BH14_1.0			X

Thanks

[redacted]
Senior Environmental Engineer
Contamination Assessment & Remediation

Working days: Monday, Tuesday, Thursday & Friday

GHD
Proudly employee owned
[redacted]
180 Lonsdale Street Melbourne Victoria 3000 Australia | www.ghd.com

Connect

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY& BUILDINGS | TRANSPORTATION

Please consider our environment before printing this email

From: [redacted]
Sent: Friday, 7 August 2020 8:53 AM
To: [redacted]
Subject: FW: ON HOLD-EM2013650-GHD-12529997

Fyi

Regards, [redacted]

(Currently out of the office - [redacted]

[redacted]

From: [redacted]
Sent: Friday, 7 August 2020 10:53 AM
To: [redacted]
Subject: [EXTERNAL] - RE: ON HOLD-EM2013650-GHD-12529997

Follow Up Flag: Follow up
Flag Status: Flagged

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 [redacted]

The bag samples should be analysed for the ASS field screen. [redacted] has advised RE jars.

Regards, [redacted]

(Currently out of the office - [redacted]

-------- Original message --------
From: [redacted]
Date: 7/8/20 07:41 (GMT+10:00)
To: [redacted]
Subject: FW: ON HOLD-EM2013650-GHD-12529997

Hi [redacted] & [redacted]

Please let me know the analysis required for yesterday's samples, when you get a chance.

Thanks

[redacted]

[redacted]
Client Services Coordinator - Springvale
Environmental

[redacted]
2-4 Westall Rd
Springvale Vic 3171
Australia
EnviroMailT 124 - PFOS Analysis to Freshwater Species Protection Lvl 99%
EnviroMailT 125 - ALS Now Provides Testing capabilities for TOF
EnviroMailT 126 - TOF for Compliance with Guideline ERA 60
EnviroMailT 00 - All EnviroMailsT in one convenient library.

-------- Original message --------
From: [redacted]
Date: 7/8/20 07:41 (GMT+10:00)
To: [redacted]
Subject: FW: ON HOLD-EM2013650-GHD-12529997

Hi [redacted]

Please let me know the analysis required for yesterday's samples, when you get a chance.

Thanks

[redacted]

[redacted]
Client Services Coordinator - Springvale
Environmental

[redacted]
2-4 Westall Rd
Springvale Vic 3171
Australia
EnviroMailT 124 - PFOS Analysis to Freshwater Species Protection Lvl 99%
EnviroMailT 125 - ALS Now Provides Testing capabilities for TOF
EnviroMailT 126 - TOF for Compliance with Guideline ERA 60
EnviroMailT 00 - All EnviroMailsT in one convenient library.

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-----Original Message-----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2013826**	Page	: 1 of 8
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 10-Aug-2020 14:10
Order number	: 12529997	Date Analysis Commenced	: 12-Aug-2020
C-O-C number	: ----	Issue Date	: 14-Aug-2020 10:55
Sampler	: ADW		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 5		
No. of samples analysed	: 2		

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. 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.

Signatories	*Position*	*Accreditation Category*
[redacted]	Senior Inorganic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	Senior Organic Chemist	Me bourne Organics, Springvale, VIC

General Comments

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

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

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

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

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

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

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

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of he 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.
- EP074-UT: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH03_0.1	BH03_0.5	----	----	----
			Client sampling date / time	07-Aug-2020 00:00	07-Aug-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2013826-003	EM2013826-004	--------	--------	--------
				Result	Result	----	----	----
EA001: pH in soil using 0.01M CaCl extract								
pH (CaCl2)	----	0.1	pH Unit	**5.0**	**6.9**	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**21.2**	**17.4**	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Copper	7440-50-8	5	mg/kg	**10**	**8**	----	----	----
Lead	7439-92-1	5	mg/kg	**10**	**8**	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	<2	----	----	----
Nickel	7440-02-0	2	mg/kg	**25**	**18**	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	<5	----	----	----
Silver	7440-22-4	2	mg/kg	<2	<2	----	----	----
Tin	7440-31-5	5	mg/kg	<5	<5	----	----	----
Zinc	7440-66-6	5	mg/kg	**10**	**10**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	----	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	----	----	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	**170**	**190**	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Sum of monocyclic aromatic hydrocarbons	----	0.2	mg/kg	<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH03_0.1	BH03_0.5	----	----	----
			Client sampling date / time	07-Aug-2020 00:00	07-Aug-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2013826-003	EM2013826-004	--------	--------	--------
				Result	Result	----	----	----
EP074H: Naphthalene								
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	----	----
EP074I: Volatile Halogenated Compounds								
Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	<0.02	----	----	----
1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	<0.01	----	----	----
Methylene chloride	75-09-2	0.4	mg/kg	<0.4	<0.4	----	----	----
trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	<0.02	----	----	----
cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	<0.01	----	----	----
Chloroform	67-66-3	0.02	mg/kg	<0.02	<0.02	----	----	----
1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	<0.01	----	----	----
Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	<0.01	----	----	----
1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	<0.02	----	----	----
Trichloroethene	79-01-6	0.02	mg/kg	<0.02	<0.02	----	----	----
1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	<0.04	----	----	----
Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	<0.02	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	<0.01	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	<0.02	----	----	----
Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	<0.02	----	----	----
Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	<0.02	----	----	----
1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	<0.02	----	----	----
1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	<0.02	----	----	----
1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	<0.01	----	----	----
^ Sum of volatile chlorinated hydrocarbons	----	0.01	mg/kg	<0.01	<0.01	----	----	----
^ Sum of other chlorinated hydrocarbons	----	0.01	mg/kg	<0.01	<0.01	----	----	----
EP075A: Phenolic Compounds (Halogenated)								
2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	<0.03	----	----	----
2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	<0.03	----	----	----
2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	<0.03	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	<0.03	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	<0.05	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	<0.05	----	----	----
2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	<0.03	----	----	----
2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg	<0.05	<0.05	----	----	----
Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	<0.2	----	----	----
^ Sum of Phenols (halogenated)	----	0.03	mg/kg	<0.03	<0.03	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH03_0.1	BH03_0.5	----	----	----
				Client sampling date / time	07-Aug-2020 00:00	07-Aug-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2013826-003	EM2013826-004	--------	--------	--------
					Result	Result	----	----	----
EP075A: Phenolic Compounds (Halogenated) - Continued									
EP075A: Phenolic Compounds (Non-halogenated)									
Phenol	108-95-2	1	mg/kg		<1	<1	----	----	----
2-Methylphenol	95-48-7	1	mg/kg		<1	<1	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	----	----	----
2-Nitrophenol	88-75-5	1	mg/kg		<1	<1	----	----	----
2.4-Dimethylphenol	105-67-9	1	mg/kg		<1	<1	----	----	----
2.4-Dinitrophenol	51-28-5	5	mg/kg		<5	<5	----	----	----
4-Nitrophenol	100-02-7	5	mg/kg		<5	<5	----	----	----
2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg		<5	<5	----	----	----
Dinoseb	88-85-7	5	mg/kg		<5	<5	----	----	----
2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg		<5	<5	----	----	----
^ **Sum of Phenols (non-halogenated)**	----	1	mg/kg		<1	<1	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg		<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	----	----	----
EP075I: Organochlorine Pesticides									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH03_0.1	BH03_0.5	----	----	----
			Client sampling date / time	07-Aug-2020 00:00	07-Aug-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2013826-003	EM2013826-004	--------	--------	--------
				Result	Result	----	----	----
EP075l: Organochlorine Pesticides - Continued								
alpha-BHC	319-84-6	0.03	mg/kg	<0.03	<0.03	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	<0.03	----	----	----
beta-BHC	319-85-7	0.03	mg/kg	<0.03	<0.03	----	----	----
gamma-BHC	58-89-9	0.03	mg/kg	<0.03	<0.03	----	----	----
delta-BHC	319-86-8	0.03	mg/kg	<0.03	<0.03	----	----	----
Heptachlor	76-44-8	0.03	mg/kg	<0.03	<0.03	----	----	----
Aldrin	309-00-2	0.03	mg/kg	<0.03	<0.03	----	----	----
Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	<0.03	----	----	----
cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	<0.03	----	----	----
trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	<0.03	----	----	----
Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	<0.03	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	----	----	----
Dieldrin	60-57-1	0.03	mg/kg	<0.03	<0.03	----	----	----
Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	<0.03	----	----	----
Endrin	72-20-8	0.03	mg/kg	<0.03	<0.03	----	----	----
Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	<0.03	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	<0.03	----	----	----
4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	<0.05	----	----	----
Methoxychlor	72-43-5	0.03	mg/kg	<0.03	<0.03	----	----	----
^ Sum of organochlorine pesticides	----	0.03	mg/kg	<0.03	<0.03	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.03	mg/kg	<0.03	<0.03	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	----	----	----
^ Chlordane	57-74-9	0.03	mg/kg	<0.03	<0.03	----	----	----
^ Sum of other organochlorine pesticides	----	0.03	mg/kg	<0.03	<0.03	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	----	----
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH03_0.1	BH03_0.5	----	----	----
				Client sampling date / time	07-Aug-2020 00:00	07-Aug-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2013826-003	EM2013826-004	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	----	----
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**98.0**	**101**	----	----	----
EP074S: VOC Surrogates (Ultra-Trace)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**85.6**	**98.4**	----	----	----
Toluene-D8	2037-26-5	0.1	%		**83.7**	**90.9**	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		**91.5**	**104**	----	----	----
EP075S: Acid Extractable Surrogates (Waste Classification)									
Phenol-d6	13127-88-3	0.025	%		**98.7**	**106**	----	----	----
2-Chlorophenol-D4	93951-73-6	0.025	%		**86.2**	**91.8**	----	----	----
2.4.6-Tribromophenol	118-79-6	0.025	%		**90.9**	**94.6**	----	----	----
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)									
Nitrobenzene-D5	4165-60-0	0.025	%		**104**	**114**	----	----	----
1.2-Dichlorobenzene-D4	2199-69-1	0.025	%		**88.7**	**93.9**	----	----	----
2-Fluorobiphenyl	321-60-8	0.025	%		**95.8**	**101**	----	----	----
Anthracene-d10	1719-06-8	0.025	%		**94.3**	**98.2**	----	----	----
4-Terphenyl-d14	1718-51-0	0.025	%		**86.1**	**89.3**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	41	122
EP074S: VOC Surrogates (Ultra-Trace)			
1.2-Dichloroethane-D4	17060-07-0	59	119
Toluene-D8	2037-26-5	55	117
4-Bromofluorobenzene	460-00-4	59	123
EP075S: Acid Extractable Surrogates (Waste Classification)			
Phenol-d6	13127-88-3	28	134
2-Chlorophenol-D4	93951-73-6	27	123
2.4.6-Tribromophenol	118-79-6	25	149
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)			
Nitrobenzene-D5	4165-60-0	29	125
1.2-Dichlorobenzene-D4	2199-69-1	31	117
2-Fluorobiphenyl	321-60-8	44	136
Anthracene-d10	1719-06-8	53	133
4-Terphenyl-d14	1718-51-0	59	141

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2013826**	Page	: 1 of 10
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 10-Aug-2020
Order number	: 12529997	Date Analysis Commenced	: 12-Aug-2020
C-O-C number	: ----	Issue Date	: 14-Aug-2020
Sampler	: ADW		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 5		
No. of samples analysed	: 2		

ilac-MRA NATA
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. 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*
[redacted]	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

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

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	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3194072)									
EM2013875-003	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	6	6	0.00	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	17	23	26.8	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	6	6	0.00	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	7	8	19.0	No Limit
EM2013826-003	BH03_0.1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	25	23	8.12	0% - 50%
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	10	10	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	9	0.00	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	10	11	12.8	No Limit
EA001: pH in soil using 0.01M CaCl extract (QC Lot: 3194109)									
EM2013826-003	BH03_0.1	EA001: pH (CaCl2)	----	0.1	pH Unit	5.0	5.0	0.00	0% - 20%
EM2013877-009	Anonymous	EA001: pH (CaCl2)	----	0.1	pH Unit	8.5	8.4	1.66	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3196694)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3196694) - continued									
EM2013826-003	BH03_0.1	EA055: Moisture Content	----	0.1	%	21.2	20.2	5.00	0% - 20%
EM2013871-009	Anonymous	EA055: Moisture Content	----	0.1	%	24.8	26.0	4.70	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3194071)									
EM2013826-003	BH03_0.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM2013871-010	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 3194113)									
EM2013826-003	BH03_0.1	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM2013877-007	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 3194820)									
EM2013826-003	BH03_0.1	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EM2013877-009	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EK040T: Fluoride Total (QC Lot: 3194077)									
EM2013826-003	BH03_0.1	EK040T: Fluoride	16984-48-8	40	mg/kg	170	190	13.9	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3194066)									
EM2013826-003	BH03_0.1	EP066-EM: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 3194063)									
EM2013826-003	BH03_0.1	EP074-UT: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP074-UT: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074H: Naphthalene (QC Lot: 3194063)									
EM2013826-003	BH03_0.1	EP074-UT: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP074I: Volatile Halogenated Compounds (QC Lot: 3194063)									
EM2013826-003	BH03_0.1	EP074-UT: 1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chloroform	67-66-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Trichloroethene	79-01-6	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074I: Volatile Halogenated Compounds (QC Lot: 3194063) - continued									
EM2013826-003	BH03_0.1	EP074-UT: Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	<0.04	0.00	No Limit
		EP074-UT: Methylene chloride	75-09-2	0.4	mg/kg	<0.4	<0.4	0.00	No Limit
EP075A: Phenolic Compounds (Halogenated) (QC Lot: 3194064)									
EM2013826-003	BH03_0.1	EP075-EM: 2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP075A: Phenolic Compounds (Non-halogenated) (QC Lot: 3194064)									
EM2013826-003	BH03_0.1	EP075-EM: Phenol	108-95-2	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Methylphenol	95-48-7	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Nitrophenol	88-75-5	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dimethylphenol	105-67-9	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dinitrophenol	51-28-5	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 4-Nitrophenol	100-02-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: Dinoseb	88-85-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg	<5	<5	0.00	No Limit
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3194064)									
EM2013826-003	BH03_0.1	EP075-EM: Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3194064) - continued									
EM2013826-003	BH03_0.1	EP075-EM: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1.0	<1.0	0.00	No Limit
EP075I: Organochlorine Pesticides (QC Lot: 3194064)									
EM2013826-003	BH03_0.1	EP075-EM: alpha-BHC	319-84-6	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: beta-BHC	319-85-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: gamma-BHC	58-89-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: delta-BHC	319-86-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor	76-44-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Aldrin	309-00-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Dieldrin	60-57-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin	72-20-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Methoxychlor	72-43-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3194063)									
EM2013826-003	BH03_0.1	EP074-UT: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3194065)									
EM2013826-003	BH03_0.1	EP071-EM: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3194063)									
EM2013826-003	BH03_0.1	EP074-UT: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
		EP074-UT: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3194065)									
EM2013826-003	BH03_0.1	EP071-EM: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (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 Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3194072)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	101	78.5	107
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	94.2	76.2	108
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	106	78.1	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	95.4	78.4	106
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	7.9 mg/kg	98.2	78.0	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	101	79.9	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	103	92.0	110
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.1 mg/kg	90.2	80.0	108
EG005T: Tin	7440-31-5	5	mg/kg	<5	5.2 mg/kg	90.4	78.4	117
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	102	79.1	110
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3194071)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	97.8	76.9	110
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3194113)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	20 mg/kg	77.0	70.0	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 3194820)								
EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	20 mg/kg	94.8	70.0	130
EK040T: Fluoride Total (QCLot: 3194077)								
EK040T: Fluoride	16984-48-8	40	mg/kg	<40	400 mg/kg	93.0	75.2	110
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3194066)								
EP066-EM: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	102	70.8	136
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3194063)								
EP074-UT: Benzene	71-43-2	0.2	mg/kg	<0.2	2.1 mg/kg	89.2	69.2	116
EP074-UT: Toluene	108-88-3	0.5	mg/kg	<0.5	2.1 mg/kg	92.8	67.7	116
EP074-UT: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2.1 mg/kg	88.5	66.6	115
EP074-UT: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4.2 mg/kg	86.9	65.2	112
EP074-UT: Styrene	100-42-5	0.5	mg/kg	<0.5	2.1 mg/kg	89.8	69.4	111
EP074-UT: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2.1 mg/kg	86.1	68.4	110
EP074H: Naphthalene (QCLot: 3194063)								
EP074-UT: Naphthalene	91-20-3	1	mg/kg	<1	0.6 mg/kg	90.3	72.3	114
EP074I: Volatile Halogenated Compounds (QCLot: 3194063)								
EP074-UT: Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	0.1 mg/kg	71.2	47.0	138
EP074-UT: 1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	0.1 mg/kg	77.2	57.6	125

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074I: Volatile Halogenated Compounds (QCLot: 3194063) - continued								
EP074-UT: Methylene chloride	75-09-2	0.4	mg/kg	<0.4	2.1 mg/kg	89.2	72.3	115
EP074-UT: trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	0.1 mg/kg	77.8	60.5	122
EP074-UT: cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	0.1 mg/kg	85.8	70.3	112
EP074-UT: Chloroform	67-66-3	0.02	mg/kg	<0.02	0.1 mg/kg	87.5	66.6	115
EP074-UT: 1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	0.1 mg/kg	79.8	64.4	122
EP074-UT: Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	0.1 mg/kg	82.4	58.4	127
EP074-UT: 1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	0.1 mg/kg	92.0	72.9	114
EP074-UT: Trichloroethene	79-01-6	0.02	mg/kg	<0.02	0.1 mg/kg	84.8	64.7	115
EP074-UT: 1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	0.1 mg/kg	90.6	72.6	116
EP074-UT: Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	0.1 mg/kg	81.6	60.0	119
EP074-UT: 1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	0.1 mg/kg	87.2	71.8	116
EP074-UT: 1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	0.1 mg/kg	85.5	66.1	116
EP074-UT: Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	0.1 mg/kg	71.2	39.8	128
EP074-UT: Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	0.1 mg/kg	86.6	70.3	113
EP074-UT: 1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	0.1 mg/kg	80.4	62.6	113
EP074-UT: 1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	0.1 mg/kg	84.7	70.8	110
EP074-UT: 1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	0.1 mg/kg	77.4	48.4	120
EP075A: Phenolic Compounds (Halogenated) (QCLot: 3194064)								
EP075-EM: 2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	2 mg/kg	98.1	71.4	123
EP075-EM: 2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	2 mg/kg	102	73.1	132
EP075-EM: 2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	2 mg/kg	97.7	72.2	132
EP075-EM: 4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	2 mg/kg	100	70.8	128
EP075-EM: 2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	2 mg/kg	97.8	70.9	134
EP075-EM: 2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	2 mg/kg	96.7	70.9	126
EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	2 mg/kg	94.8	61.9	126
EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/5 8-90-2	0.05	mg/kg	<0.05	4 mg/kg	99.3	47.2	128
EP075-EM: Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	4 mg/kg	92.4	44.0	135
EP075A: Phenolic Compounds (Non-halogenated) (QCLot: 3194064)								
EP075-EM: Phenol	108-95-2	1	mg/kg	<1	2 mg/kg	101	71.5	127
EP075-EM: 2-Methylphenol	95-48-7	1	mg/kg	<1	2 mg/kg	102	70.2	129
EP075-EM: 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	4 mg/kg	104	74.0	130
EP075-EM: 2-Nitrophenol	88-75-5	1	mg/kg	<1	2 mg/kg	97.2	70.9	133
EP075-EM: 2.4-Dimethylphenol	105-67-9	1	mg/kg	<1	2 mg/kg	103	64.8	132
EP075-EM: 2.4-Dinitrophenol	51-28-5	5	mg/kg	<5	10 mg/kg	72.6	41.0	156
EP075-EM: 4-Nitrophenol	100-02-7	5	mg/kg	<5	10 mg/kg	96.5	52.6	128
EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg	<5	10 mg/kg	86.4	42.6	125
EP075-EM: Dinoseb	88-85-7	5	mg/kg	<5	10 mg/kg	86.5	47.3	128
EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg	<5	1 mg/kg	109	34.5	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3194064)								
EP075-EM: Naphthalene	91-20-3	0.5	mg/kg	<0.5	2 mg/kg	102	73.0	131
EP075-EM: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	2 mg/kg	98.8	70.8	130
EP075-EM: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	2 mg/kg	99.2	72.0	135
EP075-EM: Fluorene	86-73-7	0.5	mg/kg	<0.5	2 mg/kg	103	74.4	131
EP075-EM: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	2 mg/kg	100	73.3	130
EP075-EM: Anthracene	120-12-7	0.5	mg/kg	<0.5	2 mg/kg	100	59.4	127
EP075-EM: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	2 mg/kg	102	75.3	132
EP075-EM: Pyrene	129-00-0	0.5	mg/kg	<0.5	2 mg/kg	102	75.4	130
EP075-EM: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	2 mg/kg	102	69.6	133
EP075-EM: Chrysene	218-01-9	0.5	mg/kg	<0.5	2 mg/kg	104	75.0	133
EP075-EM: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1.0	4 mg/kg	106	75.8	133
EP075-EM: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	2 mg/kg	105	65.1	130
EP075-EM: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	2 mg/kg	101	72.1	134
EP075-EM: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	2 mg/kg	101	72.9	135
EP075-EM: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	2 mg/kg	103	71.3	134
EP075I: Organochlorine Pesticides (QCLot: 3194064)								
EP075-EM: alpha-BHC	319-84-6	0.03	mg/kg	<0.03	2 mg/kg	104	71.0	129
EP075-EM: Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	2 mg/kg	100	65.9	125
EP075-EM: beta-BHC	319-85-7	0.03	mg/kg	<0.03	2 mg/kg	104	66.2	130
EP075-EM: gamma-BHC	58-89-9	0.03	mg/kg	<0.03	2 mg/kg	104	70.8	130
EP075-EM: delta-BHC	319-86-8	0.03	mg/kg	<0.03	2 mg/kg	99.9	68.7	134
EP075-EM: Heptachlor	76-44-8	0.03	mg/kg	<0.03	2 mg/kg	96.6	67.2	131
EP075-EM: Aldrin	309-00-2	0.03	mg/kg	<0.03	2 mg/kg	98.1	70.2	130
EP075-EM: Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	2 mg/kg	94.7	65.6	130
EP075-EM: cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	2 mg/kg	93.0	65.3	133
EP075-EM: trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	2 mg/kg	94.2	66.7	131
EP075-EM: Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	2 mg/kg	105	67.9	135
EP075-EM: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	2 mg/kg	93.9	70.9	132
EP075-EM: Dieldrin	60-57-1	0.03	mg/kg	<0.03	2 mg/kg	101	70.0	133
EP075-EM: Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	2 mg/kg	106	49.6	157
EP075-EM: Endrin	72-20-8	0.03	mg/kg	<0.03	2 mg/kg	91.4	55.4	148
EP075-EM: Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	2 mg/kg	103	71.4	135
EP075-EM: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	2 mg/kg	104	74.8	134
EP075-EM: Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	2 mg/kg	101	70.2	135
EP075-EM: 4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	2 mg/kg	103	67.1	133
EP075-EM: Methoxychlor	72-43-5	0.03	mg/kg	<0.03	2 mg/kg	106	63.6	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3194063)								
EP074-UT: C6 - C9 Fraction	----	10	mg/kg	<10	39.6 mg/kg	98.3	61.1	119

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3194065)								
EP071-EM: C10 - C14 Fraction	----	50	mg/kg	<50	900 mg/kg	96.9	69.9	128
EP071-EM: C15 - C28 Fraction	----	100	mg/kg	<100	3030 mg/kg	104	83.0	124
EP071-EM: C29 - C36 Fraction	----	100	mg/kg	<100	1520 mg/kg	99.2	76.9	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3194063)								
EP074-UT: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	48.9 mg/kg	97.6	59.9	119
EP074-UT: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3194065)								
EP071-EM: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	94.8	70.2	126
EP071-EM: >C16 - C34 Fraction	----	100	mg/kg	<100	4020 mg/kg	97.4	81.4	120
EP071-EM: >C34 - C40 Fraction	----	100	mg/kg	<100	280 mg/kg	110	53.4	129

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	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3194072)							
EM2013826-004	BH03_0.5	EG005T: Arsenic	7440-38-2	50 mg/kg	86 3	78.0	124
		EG005T: Cadmium	7440-43-9	50 mg/kg	92 0	84.0	116
		EG005T: Copper	7440-50-8	250 mg/kg	93 8	80.0	120
		EG005T: Lead	7439-92-1	250 mg/kg	93.7	80.0	120
		EG005T: Nickel	7440-02-0	50 mg/kg	118	78.0	120
		EG005T: Zinc	7440-66-6	250 mg/kg	91 3	80.0	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3194071)							
EM2013826-004	BH03_0.5	EG035T: Mercury	7439-97-6	0.5 mg/kg	104	76.0	116
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3194113)							
EM2013826-004	BH03_0.5	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	59.6	58.0	114
EM2013826-004	BH03_0.5	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	77.1	58.0	114
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 3194820)							
EM2013826-004	BH03_0.5	EK026SF: Total Cyanide	57-12-5	20 mg/kg	91.1	70.0	130
EK040T: Fluoride Total (QCLot: 3194077)							
EM2013826-004	BH03_0.5	EK040T: Fluoride	16984-48-8	400 mg/kg	96 2	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3194066)							
EM2013900-002	Anonymous	EP066-EM: Total Polychlorinated biphenyls	----	1 mg/kg	108	36.0	152

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3194063)							
EM2013826-004	BH03_0.5	EP074-UT: Benzene	71-43-2	2 mg/kg	87.1	50.0	138
		EP074-UT: Toluene	108-88-3	2 mg/kg	85.7	56.0	134
EP074I: Volatile Halogenated Compounds (QCLot: 3194063)							
EM2013826-004	BH03_0.5	EP074-UT: 1.1-Dichloroethene	75-35-4	2 mg/kg	88.1	26.0	141
		EP074-UT: Trichloroethene	79-01-6	2 mg/kg	85 3	50.0	134
		EP074-UT: Chlorobenzene	108-90-7	2 mg/kg	84.7	28.0	134
EP075A: Phenolic Compounds (Halogenated) (QCLot: 3194064)							
EM2013826-004	BH03_0.5	EP075-EM: 2-Chlorophenol	95-57-8	3 mg/kg	102	34.0	118
		EP075-EM: 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	99 9	41.0	139
		EP075-EM: Pentachlorophenol	87-86-5	3 mg/kg	91.4	10.0	144
EP075A: Phenolic Compounds (Non-halogenated) (QCLot: 3194064)							
EM2013826-004	BH03_0.5	EP075-EM: Phenol	108-95-2	3 mg/kg	109	31.5	134
		EP075-EM: 2-Nitrophenol	88-75-5	3 mg/kg	97.7	13.0	129
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3194064)							
EM2013826-004	BH03_0.5	EP075-EM: Acenaphthene	83-32-9	3 mg/kg	88 0	46.0	138
		EP075-EM: Pyrene	129-00-0	3 mg/kg	102	26.5	169
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3194063)							
EM2013826-004	BH03_0.5	EP074-UT: C6 - C9 Fraction	----	28 mg/kg	49 9	43.0	111
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3194065)							
EM2013900-001	Anonymous	EP071-EM: C10 - C14 Fraction	----	900 mg/kg	80 0	53.0	123
		EP071-EM: C15 - C28 Fraction	----	3030 mg/kg	80 2	70.0	124
		EP071-EM: C29 - C36 Fraction	----	1520 mg/kg	90 9	64.0	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3194063)							
EM2013826-004	BH03_0.5	EP074-UT: C6 - C10 Fraction	C6_C10	33 mg/kg	49 8	42.0	106
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3194065)							
EM2013900-001	Anonymous	EP071-EM: >C10 - C16 Fraction	----	1160 mg/kg	70.6	65.0	123
		EP071-EM: >C16 - C34 Fraction	----	4020 mg/kg	81.6	67.0	121
		EP071-EM: >C34 - C40 Fraction	----	280 mg/kg	90.6	44.0	126

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2013826**	Page	: 1 of 7
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 10-Aug-2020
Site	: ----	Issue Date	: 14-Aug-2020
Sampler	: ADW	No. of samples received	: 5
Order number	: 12529997	No. of samples analysed	: 2

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
EA001: pH in soil using 0.01M CaCl extract							
Soil Glass Jar - Unpreserved (EA001)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**13-Aug-2020**	14-Aug-2020	✓	**13-Aug-2020**	13-Aug-2020	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**----**	----	----	**13-Aug-2020**	21-Aug-2020	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	03-Feb-2021	✓	**12-Aug-2020**	03-Feb-2021	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	04-Sep-2020	✓	**12-Aug-2020**	04-Sep-2020	✓
EG048: Hexavalent Chromium (Alkaline Digest)							
Soil Glass Jar - Unpreserved (EG048G)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	04-Sep-2020	✓	**13-Aug-2020**	19-Aug-2020	✓
EK026SF: Total CN by Segmented Flow Analyser							
Soil Glass Jar - Unpreserved (EK026SF)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	21-Aug-2020	✓	**13-Aug-2020**	26-Aug-2020	✓
EK040T: Fluoride Total							
Soil Glass Jar - Unpreserved (EK040T)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	04-Sep-2020	✓	**13-Aug-2020**	04-Sep-2020	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066-EM)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	21-Aug-2020	✓	**12-Aug-2020**	21-Sep-2020	✓
EP074A: Monocyclic Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP074-UT)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	14-Aug-2020	✓	**12-Aug-2020**	14-Aug-2020	✓
EP074H: Naphthalene							
Soil Glass Jar - Unpreserved (EP074-UT)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	14-Aug-2020	✓	**12-Aug-2020**	14-Aug-2020	✓

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
EP074I: Volatile Halogenated Compounds							
Soil Glass Jar - Unpreserved (EP074-UT)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	14-Aug-2020	✓	**12-Aug-2020**	14-Aug-2020	✓
EP075A: Phenolic Compounds (Halogenated)							
Soil Glass Jar - Unpreserved (EP075-EM)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	21-Aug-2020	✓	**12-Aug-2020**	21-Sep-2020	✓
EP075A: Phenolic Compounds (Non-halogenated)							
Soil Glass Jar - Unpreserved (EP075-EM)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	21-Aug-2020	✓	**12-Aug-2020**	21-Sep-2020	✓
EP075B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075-EM)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	21-Aug-2020	✓	**12-Aug-2020**	21-Sep-2020	✓
EP075I: Organochlorine Pesticides							
Soil Glass Jar - Unpreserved (EP075-EM)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	21-Aug-2020	✓	**12-Aug-2020**	21-Sep-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP074-UT)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	14-Aug-2020	✓	**12-Aug-2020**	14-Aug-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP074-UT)							
BH03_0.1, BH03_0.5	**07-Aug-2020**	**12-Aug-2020**	14-Aug-2020	✓	**12-Aug-2020**	14-Aug-2020	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH in soil using a 0.01M CaCl2 extract	EA001	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Fluoride	EK040T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	5	**20.00**	**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.

Analytical Methods	Method	Matrix	Method Descriptions
pH in soil using a 0.01M CaCl2 extract	EA001	SOIL	In house: Referenced to Rayment and Lyons 4B3 (mod.) or 4B4 (mod.) 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
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 AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (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 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)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3)
Total Cyanide by Segmented Flow Analyser	EK026SF	SOIL	In house: Referenced to APHA 4500-CN C / ASTM D7511. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM Schedule B(3).
Total Fluoride	EK040T	SOIL	(In-house) Total fluoride is determined by ion specific electrode (ISE) in a solution obtained after a Sodium Carbonate / Potassium Carbonate fusion dissolution.
PCB - VIC EPA 448.3 Screen	EP066-EM	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 method is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071-EM	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against a kane standards over the range C10 - C40.
Volatile Organic Compounds - Ultra-trace	EP074-UT	SOIL	In house: Referenced to USEPA SW 846 - 8260 Extracts are analysed by Purge and Trap, Capillary GC/MS in partial SIM/Scan mode. Quantification is by comparison against an established multi-point calibration curves. This method is compliant with NEPM Schedule B(3).

Analytical Methods	Method	Matrix	Method Descriptions
Volatile Organic Compounds - Ultra-trace - Summations	EP074-UT-SUM	SOIL	Summation of MAHs and VHCs
Semivolatile Organic Compounds - Waste Classification	EP075-EM	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).
SVOC - Waste Classification (Sums)	EP075-EM-SUM	SOIL	Summations for EP075 (EM variation)

Preparation Methods	Method	Matrix	Method Descriptions
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
pH in soil using a 0.01M CaCl2 extract	EA001-PR	SOIL	In house: Referenced to Rayment and Higginson 4B1, 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
Total Fluoride	EK040T-PR	SOIL	In house: Samples are fused with Sodium Carbonate / Potassium Carbonate flux.
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).
Methanolic Extraction of Soils - Ultra-trace.	ORG16-UT	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 - VIC EPA Screen	ORG17-EM	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.

Analysis received 10/08/2020 @ 20:15

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

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WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT:	GHD	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☑ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	Melbourne	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
PROJECT:	12529997 - APA EES		
ORDER NUMBER:	12529997		
PROJECT MANAGER:	[redacted]	CONTACT PH: [redacted]	
SAMPLER:	ADW	SAMPLER MOBILE: [redacted]	RELINQUISHED BY: ADW — DATE/TIME: 10/8/2020
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default): ESdat	RECEIVED BY: [redacted] — DATE/TIME: 10/8/2020 14:10
Email Reports to (will default to PM if no other addresses are listed):		[redacted]	RELINQUISHED BY: — DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed):			RECEIVED BY: — 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 the right) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (filtered bottle required)
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	Hold
1	BH14 - 1.5	7/08/2020	Soil			✓
2	BH14 - 2	— " —				✓
3	BH03 - 0.1					✓
4	BH03 - 0.5					✓
5	BH03 - 0.9					✓

Water Container Codes: P = Unpreserved Plastic; E = [illegible]
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium [illegible]
Z = Zinc Acetate Preserved Bottle; E = EDTA [illegible]

Environmental Division
Melbourne
Work Order Reference
EM2013826

Telephone : + 61-3-8549 9600

[redacted]

From: [redacted]
Sent: Monday, 10 August 2020 8:15 PM
To: [redacted]
Subject: [EXTERNAL] - Analysis for EM2013826

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

Hi [redacted]

Can you please arrange the following analysis Quote GHD (EN/005/18):

- IWRG (P-16) – BH03_0.1 and BH03_0.5 003 004

All others to remain on hold.

Thanks

[redacted]
Senior Environmental Engineer
Contamination Assessment & Remediation

Working days: Monday, Tuesday, Thursday & Friday

GHD
Proudly employee owned
[redacted]
180 Lonsdale Street Melbourne Victoria 3000 Australia | www.ghd.com

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ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2014137**	Page	: 1 of 10
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 14-Aug-2020 09:15
Order number	: ----	Date Analysis Commenced	: 15-Aug-2020
C-O-C number	: ----	Issue Date	: 20-Aug-2020 13:51
Sampler	: MM		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 7		
No. of samples analysed	: 5		

ilac-MRA NATA
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. 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.

Signatories	*Position*	*Accreditation Category*
[redacted]	Senior Inorganic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Me bourne Organics, Springvale, VIC
[redacted]	Senior Organic Chemist	Me bourne Organics, Springvale, VIC

General Comments

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

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

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

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

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

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

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

- EG048G: EM2014107 #18, poor matrix spike recovery for hexavalent chromium due to sample matrix. confirmed by re-analysis.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of he 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.
- EP074-UT: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EG035T: EM2014107 #13 Poor matrix spike recovery for total mercury due to sample matrix. Confirmed by re-extraction and re-analysis.
- EG020-F : EM2013977 #1 Poor matrix spike recovery for dissolved metal due to sample matrix. Confirmed by re-digestion and re-analysis.
- Sample BH04 was filtered through a 0.45um filter prior to the dissolved metals analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- 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: SOIL (Matrix: SOIL)			Client sample ID	BH01_0.1	BH01_0.5	BH11_0.1	BH11_0.5	----
			Client sampling date / time	10-Aug-2020 00:00	10-Aug-2020 00:00	13-Aug-2020 00:00	13-Aug-2020 00:00	----
Compound	CAS Number	LOR	Unit	EM2014137-001	EM2014137-002	EM2014137-003	EM2014137-004	--------
				Result	Result	Result	Result	----
EA001: pH in soil using 0.01M CaCl extract								
pH (CaCl2)	----	0.1	pH Unit	**5.2**	**7.7**	**4.6**	**5.6**	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**32.4**	**31.7**	**23.5**	**25.6**	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**6**	<5	<5	<5	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	----
Copper	7440-50-8	5	mg/kg	**14**	**10**	**15**	**23**	----
Lead	7439-92-1	5	mg/kg	**19**	**11**	**12**	**10**	----
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	----
Nickel	7440-02-0	2	mg/kg	**24**	**45**	**30**	**40**	----
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	----
Silver	7440-22-4	2	mg/kg	<2	<2	<2	<2	----
Tin	7440-31-5	5	mg/kg	<5	<5	<5	<5	----
Zinc	7440-66-6	5	mg/kg	**21**	**17**	**13**	**19**	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	<1	<1	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	**180**	**210**	**140**	**190**	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg	<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	----
Styrene	100-42-5	0.5	mg/kg	<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	----
^ Sum of monocyclic aromatic hydrocarbons	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01_0.1	BH01_0.5	BH11_0.1	BH11_0.5	----
				Client sampling date / time	10-Aug-2020 00:00	10-Aug-2020 00:00	13-Aug-2020 00:00	13-Aug-2020 00:00	----
Compound	CAS Number	LOR	Unit		EM2014137-001	EM2014137-002	EM2014137-003	EM2014137-004	--------
					Result	Result	Result	Result	----
EP074H: Naphthalene									
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	----
EP074I: Volatile Halogenated Compounds									
Vinyl chloride	75-01-4	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	----
1.1-Dichloroethene	75-35-4	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	----
Methylene chloride	75-09-2	0.4	mg/kg		<0.4	<0.4	<0.4	<0.4	----
trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	----
cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	----
Chloroform	67-66-3	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	----
1.1.1-Trichloroethane	71-55-6	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	----
Carbon Tetrachloride	56-23-5	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	----
1.2-Dichloroethane	107-06-2	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	----
Trichloroethene	79-01-6	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	----
1.1.2-Trichloroethane	79-00-5	0.04	mg/kg		<0.04	<0.04	<0.04	<0.04	----
Tetrachloroethene	127-18-4	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	----
1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	----
1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	----
Hexachlorobutadiene	87-68-3	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	----
Chlorobenzene	108-90-7	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	----
1.4-Dichlorobenzene	106-46-7	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	----
1.2-Dichlorobenzene	95-50-1	0.02	mg/kg		<0.02	<0.02	<0.02	<0.02	----
1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	----
^ Sum of volatile chlorinated hydrocarbons	----	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	----
^ Sum of other chlorinated hydrocarbons	----	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	----
EP075A: Phenolic Compounds (Halogenated)									
2-Chlorophenol	95-57-8	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
2.4-Dichlorophenol	120-83-2	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
2.6-Dichlorophenol	87-65-0	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Pentachlorophenol	87-86-5	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
^ Sum of Phenols (halogenated)	----	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01_0.1	BH01_0.5	BH11_0.1	BH11_0.5	----
				Client sampling date / time	10-Aug-2020 00:00	10-Aug-2020 00:00	13-Aug-2020 00:00	13-Aug-2020 00:00	----
Compound	CAS Number	LOR	Unit		EM2014137-001	EM2014137-002	EM2014137-003	EM2014137-004	--------
					Result	Result	Result	Result	----
EP075A: Phenolic Compounds (Halogenated) - Continued									
EP075A: Phenolic Compounds (Non-halogenated)									
Phenol	108-95-2	1	mg/kg		<1	<1	<1	<1	----
2-Methylphenol	95-48-7	1	mg/kg		<1	<1	<1	<1	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	<1	<1	----
2-Nitrophenol	88-75-5	1	mg/kg		<1	<1	<1	<1	----
2.4-Dimethylphenol	105-67-9	1	mg/kg		<1	<1	<1	<1	----
2.4-Dinitrophenol	51-28-5	5	mg/kg		<5	<5	<5	<5	----
4-Nitrophenol	100-02-7	5	mg/kg		<5	<5	<5	<5	----
2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg		<5	<5	<5	<5	----
Dinoseb	88-85-7	5	mg/kg		<5	<5	<5	<5	----
2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg		<5	<5	<5	<5	----
^ Sum of Phenols (non-halogenated)	----	1	mg/kg		<1	<1	<1	<1	----
EP075B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Pyrene	129-00-0	0.5	mg/kg		<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	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<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	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<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	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<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	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**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**	----
EP075I: Organochlorine Pesticides									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01_0.1	BH01_0.5	BH11_0.1	BH11_0.5	----
				Client sampling date / time	10-Aug-2020 00:00	10-Aug-2020 00:00	13-Aug-2020 00:00	13-Aug-2020 00:00	----
Compound	CAS Number	LOR	Unit		EM2014137-001	EM2014137-002	EM2014137-003	EM2014137-004	--------
					Result	Result	Result	Result	----
EP075(I): Organochlorine Pesticides - Continued									
alpha-BHC	319-84-6	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
beta-BHC	319-85-7	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
gamma-BHC	58-89-9	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
delta-BHC	319-86-8	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
Heptachlor	76-44-8	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
Aldrin	309-00-2	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
Heptachlor epoxide	1024-57-3	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
cis-Chlordane	5103-71-9	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
trans-Chlordane	5103-74-2	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
Endosulfan 1	959-98-8	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Dieldrin	60-57-1	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
Endrin aldehyde	7421-93-4	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
Endrin	72-20-8	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
Endosulfan 2	33213-65-9	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Endosulfan sulfate	1031-07-8	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
4.4`-DDT	50-29-3	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Methoxychlor	72-43-5	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
^ Sum of organochlorine pesticides	----	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
^ Chlordane	57-74-9	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
^ Sum of other organochlorine pesticides	----	0.03	mg/kg		<0.03	<0.03	<0.03	<0.03	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01_0.1	BH01_0.5	BH11_0.1	BH11_0.5	----
				Client sampling date / time	10-Aug-2020 00:00	10-Aug-2020 00:00	13-Aug-2020 00:00	13-Aug-2020 00:00	----
Compound	CAS Number	LOR	Unit		EM2014137-001	EM2014137-002	EM2014137-003	EM2014137-004	--------
					Result	Result	Result	Result	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	----
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**108**	**102**	**97.0**	**101**	----
EP074S: VOC Surrogates (Ultra-Trace)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**78.6**	**71.6**	**81.3**	**86.8**	----
Toluene-D8	2037-26-5	0.1	%		**74.2**	**68.0**	**78.8**	**80.6**	----
4-Bromofluorobenzene	460-00-4	0.1	%		**84.5**	**79.1**	**90.6**	**95.1**	----
EP075S: Acid Extractable Surrogates (Waste Classification)									
Phenol-d6	13127-88-3	0.025	%		**95.8**	**88.5**	**96.9**	**98.2**	----
2-Chlorophenol-D4	93951-73-6	0.025	%		**88.2**	**81.8**	**88.3**	**92.9**	----
2.4.6-Tribromophenol	118-79-6	0.025	%		**97.7**	**86.9**	**98.8**	**102**	----
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)									
Nitrobenzene-D5	4165-60-0	0.025	%		**89.5**	**82.8**	**92.3**	**98.1**	----
1.2-Dichlorobenzene-D4	2199-69-1	0.025	%		**86.4**	**77.4**	**87.4**	**91.0**	----
2-Fluorobiphenyl	321-60-8	0.025	%		**100**	**93.0**	**102**	**106**	----
Anthracene-d10	1719-06-8	0.025	%		**91.5**	**86.4**	**94.0**	**97.8**	----
4-Terphenyl-d14	1718-51-0	0.025	%		**88.6**	**82.1**	**89.9**	**93.8**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH04	----	----	----	----
				Client sampling date / time	13-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2014137-007	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.86**	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**4840**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		**3150**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**916**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**916**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**7**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**1190**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**88**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**178**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**587**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**32**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**0.004**	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		**0.001**	----	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.001**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.009**	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.010**	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**1.40**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH04	----	----	----	----
				Client sampling date / time	13-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2014137-007	--------	--------	--------	--------
					Result	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.19**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.19**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.4**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**1.6**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.04**	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**52.0**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**45.4**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**6.80**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	41	122
EP074S: VOC Surrogates (Ultra-Trace)			
1.2-Dichloroethane-D4	17060-07-0	59	119
Toluene-D8	2037-26-5	55	117
4-Bromofluorobenzene	460-00-4	59	123
EP075S: Acid Extractable Surrogates (Waste Classification)			
Phenol-d6	13127-88-3	28	134
2-Chlorophenol-D4	93951-73-6	27	123
2.4.6-Tribromophenol	118-79-6	25	149
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)			
Nitrobenzene-D5	4165-60-0	29	125
1.2-Dichlorobenzene-D4	2199-69-1	31	117
2-Fluorobiphenyl	321-60-8	44	136
Anthracene-d10	1719-06-8	53	133
4-Terphenyl-d14	1718-51-0	59	141

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2014137**	Page	: 1 of 14
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 14-Aug-2020
Order number	: ----	Date Analysis Commenced	: 15-Aug-2020
C-O-C number	: ----	Issue Date	: 20-Aug-2020
Sampler	: MM		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 7		
No. of samples analysed	: 5		

ilac-MRA NATA
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. 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*
[redacted]	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
[redacted]	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

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

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	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3200860)									
EM2014107-012	Anonymous	EG005T: Nickel	7440-02-0	2	mg/kg	23	26	11.2	0% - 50%
EM2014107-012	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	74	77	3.68	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	44	40	9.17	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	<5	5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	54	64	15.9	0% - 50%
EM2014160-013	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	2	2	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	13	17	23.2	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	9	31.4	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	90	110	19.4	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	172	142	19.3	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	23	16	37.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	601	694	14.3	0% - 20%
EA001: pH in soil using 0.01M CaCl extract (QC Lot: 3201426)									
EM2014004-001	Anonymous	EA001: pH (CaCl2)	----	0.1	pH Unit	7.7	7.7	0.00	0% - 20%
EM2014172-023	Anonymous	EA001: pH (CaCl2)	----	0.1	pH Unit	7.0	6.9	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3201015)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3201015) - continued									
EM2014107-021	Anonymous	EA055: Moisture Content	----	0.1	%	23.2	23.8	2.47	0% - 20%
EM2014144-007	Anonymous	EA055: Moisture Content	----	0.1	%	22.7	22.9	0.698	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3200859)									
EM2014107-012	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM2014160-013	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	0.3	0.00	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 3200915)									
EM2014107-017	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM2014160-007	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 3205445)									
EM2014137-001	BH01_0.1	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EM2014160-007	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	2	2	0.00	No Limit
EK040T: Fluoride Total (QC Lot: 3200916)									
EM2014107-002	Anonymous	EK040T: Fluoride	16984-48-8	40	mg/kg	140	180	26.9	No Limit
EM2014107-018	Anonymous	EK040T: Fluoride	16984-48-8	40	mg/kg	130	160	19.4	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3201367)									
EM2014137-001	BH01_0.1	EP066-EM: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 3200877)									
EM2014137-001	BH01_0.1	EP074-UT: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP074-UT: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074H: Naphthalene (QC Lot: 3200877)									
EM2014137-001	BH01_0.1	EP074-UT: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP074I: Volatile Halogenated Compounds (QC Lot: 3200877)									
EM2014137-001	BH01_0.1	EP074-UT: 1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chloroform	67-66-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Trichloroethene	79-01-6	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074I: Volatile Halogenated Compounds (QC Lot: 3200877) - continued									
EM2014137-001	BH01_0.1	EP074-UT: 1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	<0.04	0.00	No Limit
		EP074-UT: Methylene chloride	75-09-2	0.4	mg/kg	<0.4	<0.4	0.00	No Limit
EP075A: Phenolic Compounds (Halogenated) (QC Lot: 3201365)									
EM2014137-001	BH01_0.1	EP075-EM: 2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP075A: Phenolic Compounds (Non-halogenated) (QC Lot: 3201365)									
EM2014137-001	BH01_0.1	EP075-EM: Phenol	108-95-2	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Methylphenol	95-48-7	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Nitrophenol	88-75-5	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dimethylphenol	105-67-9	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dinitrophenol	51-28-5	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 4-Nitrophenol	100-02-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: Dinoseb	88-85-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg	<5	<5	0.00	No Limit
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3201365)									
EM2014137-001	BH01_0.1	EP075-EM: Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3201365) - continued									
EM2014137-001	BH01_0.1	EP075-EM: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1.0	<1.0	0.00	No Limit
EP075I: Organochlorine Pesticides (QC Lot: 3201365)									
EM2014137-001	BH01_0.1	EP075-EM: alpha-BHC	319-84-6	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: beta-BHC	319-85-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: gamma-BHC	58-89-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: delta-BHC	319-86-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor	76-44-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Aldrin	309-00-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Dieldrin	60-57-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin	72-20-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Methoxychlor	72-43-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3200877)									
EM2014137-001	BH01_0.1	EP074-UT: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3201366)									
EM2014137-001	BH01_0.1	EP071-EM: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3200877)									
EM2014137-001	BH01_0.1	EP074-UT: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
		EP074-UT: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3201366)									
EM2014137-001	BH01_0.1	EP071-EM: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3201366) - continued									
EM2014137-001	BH01_0.1	EP071-EM: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3204675)									
EM2014211-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.51	7.51	0.00	0% - 20%
EM2014219-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.63	7.62	0.131	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3204674)									
EM2014137-007	BH04	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4840	4890	1.01	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3204676)									
EM2014209-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	29	29	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	29	29	0.00	0% - 20%
EM2014137-007	BH04	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	916	928	1.23	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	916	928	1.23	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3204116)									
EM2014209-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13100	13300	1.25	0% - 20%
EM2014209-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4720	4670	1.12	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3204117)									
EM2014209-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	9660	9830	1.76	0% - 20%
EM2014209-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	24300	24600	0.945	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3203567)									
EM2013977-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	22	22	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	109	109	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1230	1230	0.359	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	237	236	0.00	0% - 20%
EM2013977-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	63	62	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	202	201	0.689	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1500	1570	4.56	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	181	180	0.587	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3203565)									
EM2013977-010	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.390	0.420	7.34	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.024	0.025	7.24	0% - 20%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.103	0.112	8.23	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3203565) - continued									
EM2013977-010	Anonymous	EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.038	0.038	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 3203564)									
EM2013977-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2013977-010	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3204960)									
EM2014209-004	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.74	1.64	6.29	0% - 20%
EM2014137-007	BH04	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.40	1.40	0.00	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3204118)									
EM2014209-003	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EM2014209-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3204961)									
EM2014209-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	<0.01	0.00	No Limit
EM2014137-007	BH04	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.19	0.19	0.00	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3203137)									
EM2013977-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	526	558	5.76	0% - 20%
EM2013977-010	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	282	283	0.360	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3203136)									
EM2013977-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	4.70	4.62	1.75	0% - 20%
EM2013977-010	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	2.31	2.24	3.06	0% - 20%

Method Blank (MB) and Laboratory Control Spike (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 Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3200860)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	98.3	78.5	107
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	95.0	76.2	108
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	96.8	78.1	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	96.8	78.4	106
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	7.9 mg/kg	78.0	78.0	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	104	79.9	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	101	92.0	110
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.1 mg/kg	85.2	80.0	108
EG005T: Tin	7440-31-5	5	mg/kg	<5	5.2 mg/kg	81.2	78.4	117
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	104	79.1	110
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3200859)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	94.6	76.9	110
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3200915)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	20 mg/kg	91.0	70.0	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 3205445)								
EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	20 mg/kg	84.6	70.0	130
EK040T: Fluoride Total (QCLot: 3200916)								
EK040T: Fluoride	16984-48-8	40	mg/kg	<40	400 mg/kg	86.5	75.2	110
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3201367)								
EP066-EM: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	110	70.8	136
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3200877)								
EP074-UT: Benzene	71-43-2	0.2	mg/kg	<0.2	2.1 mg/kg	90.8	69.2	116
EP074-UT: Toluene	108-88-3	0.5	mg/kg	<0.5	2.1 mg/kg	88.8	67.7	116
EP074-UT: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2.1 mg/kg	87.6	66.6	115
EP074-UT: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4.2 mg/kg	86.1	65.2	112
EP074-UT: Styrene	100-42-5	0.5	mg/kg	<0.5	2.1 mg/kg	89.4	69.4	111
EP074-UT: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2.1 mg/kg	85.4	68.4	110
EP074H: Naphthalene (QCLot: 3200877)								
EP074-UT: Naphthalene	91-20-3	1	mg/kg	<1	0.6 mg/kg	94.6	72.3	114
EP074I: Volatile Halogenated Compounds (QCLot: 3200877)								
EP074-UT: Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	0.1 mg/kg	82.9	47.0	138
EP074-UT: 1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	0.1 mg/kg	84.0	57.6	125

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074I: Volatile Halogenated Compounds (QCLot: 3200877) - continued								
EP074-UT: Methylene chloride	75-09-2	0.4	mg/kg	<0.4	2.1 mg/kg	92.3	72.3	115
EP074-UT: trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	0.1 mg/kg	81.9	60.5	122
EP074-UT: cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	0.1 mg/kg	87.9	70.3	112
EP074-UT: Chloroform	67-66-3	0.02	mg/kg	<0.02	0.1 mg/kg	88.0	66.6	115
EP074-UT: 1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	0.1 mg/kg	84.8	64.4	122
EP074-UT: Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	0.1 mg/kg	89.2	58.4	127
EP074-UT: 1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	0.1 mg/kg	89.8	72.9	114
EP074-UT: Trichloroethene	79-01-6	0.02	mg/kg	<0.02	0.1 mg/kg	86.2	64.7	115
EP074-UT: 1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	0.1 mg/kg	87.0	72.6	116
EP074-UT: Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	0.1 mg/kg	81.8	60.0	119
EP074-UT: 1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	0.1 mg/kg	87.9	71.8	116
EP074-UT: 1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	0.1 mg/kg	88.4	66.1	116
EP074-UT: Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	0.1 mg/kg	105	39.8	128
EP074-UT: Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	0.1 mg/kg	86.4	70.3	113
EP074-UT: 1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	0.1 mg/kg	85.8	62.6	113
EP074-UT: 1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	0.1 mg/kg	87.6	70.8	110
EP074-UT: 1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	0.1 mg/kg	103	48.4	120
EP075A: Phenolic Compounds (Halogenated) (QCLot: 3201365)								
EP075-EM: 2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	2 mg/kg	88.2	71.4	123
EP075-EM: 2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	2 mg/kg	90.3	73.1	132
EP075-EM: 2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	2 mg/kg	92.5	72.2	132
EP075-EM: 4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	2 mg/kg	92.2	70.8	128
EP075-EM: 2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	2 mg/kg	89.2	70.9	134
EP075-EM: 2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	2 mg/kg	93.2	70.9	126
EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	2 mg/kg	86.4	61.9	126
EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/5 8-90-2	0.05	mg/kg	<0.05	4 mg/kg	84.5	47.2	128
EP075-EM: Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	4 mg/kg	71.6	44.0	135
EP075A: Phenolic Compounds (Non-halogenated) (QCLot: 3201365)								
EP075-EM: Phenol	108-95-2	1	mg/kg	<1	2 mg/kg	90.4	71.5	127
EP075-EM: 2-Methylphenol	95-48-7	1	mg/kg	<1	2 mg/kg	93.2	70.2	129
EP075-EM: 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	4 mg/kg	91.9	74.0	130
EP075-EM: 2-Nitrophenol	88-75-5	1	mg/kg	<1	2 mg/kg	88.4	70.9	133
EP075-EM: 2.4-Dimethylphenol	105-67-9	1	mg/kg	<1	2 mg/kg	87.5	64.8	132
EP075-EM: 2.4-Dinitrophenol	51-28-5	5	mg/kg	<5	10 mg/kg	78.6	41.0	156
EP075-EM: 4-Nitrophenol	100-02-7	5	mg/kg	<5	10 mg/kg	89.1	52.6	128
EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg	<5	10 mg/kg	77.5	42.6	125
EP075-EM: Dinoseb	88-85-7	5	mg/kg	<5	10 mg/kg	81.1	47.3	128
EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg	<5	1 mg/kg	64.0	34.5	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3201365)								
EP075-EM: Naphthalene	91-20-3	0.5	mg/kg	<0.5	2 mg/kg	91.3	73.0	131
EP075-EM: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	2 mg/kg	93.3	70.8	130
EP075-EM: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	2 mg/kg	91.4	72.0	135
EP075-EM: Fluorene	86-73-7	0.5	mg/kg	<0.5	2 mg/kg	92.5	74.4	131
EP075-EM: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	2 mg/kg	93.4	73.3	130
EP075-EM: Anthracene	120-12-7	0.5	mg/kg	<0.5	2 mg/kg	93.0	59.4	127
EP075-EM: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	2 mg/kg	93.8	75.3	132
EP075-EM: Pyrene	129-00-0	0.5	mg/kg	<0.5	2 mg/kg	95.3	75.4	130
EP075-EM: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	2 mg/kg	95.1	69.6	133
EP075-EM: Chrysene	218-01-9	0.5	mg/kg	<0.5	2 mg/kg	95.6	75.0	133
EP075-EM: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1.0	4 mg/kg	97.1	75.8	133
EP075-EM: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	2 mg/kg	98.6	65.1	130
EP075-EM: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	2 mg/kg	94.5	72.1	134
EP075-EM: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	2 mg/kg	94.4	72.9	135
EP075-EM: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	2 mg/kg	95.6	71.3	134
EP075I: Organochlorine Pesticides (QCLot: 3201365)								
EP075-EM: alpha-BHC	319-84-6	0.03	mg/kg	<0.03	2 mg/kg	92.6	71.0	129
EP075-EM: Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	2 mg/kg	90.7	65.9	125
EP075-EM: beta-BHC	319-85-7	0.03	mg/kg	<0.03	2 mg/kg	93.2	66.2	130
EP075-EM: gamma-BHC	58-89-9	0.03	mg/kg	<0.03	2 mg/kg	95.2	70.8	130
EP075-EM: delta-BHC	319-86-8	0.03	mg/kg	<0.03	2 mg/kg	96.0	68.7	134
EP075-EM: Heptachlor	76-44-8	0.03	mg/kg	<0.03	2 mg/kg	84.5	67.2	131
EP075-EM: Aldrin	309-00-2	0.03	mg/kg	<0.03	2 mg/kg	89.7	70.2	130
EP075-EM: Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	2 mg/kg	89.6	65.6	130
EP075-EM: cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	2 mg/kg	90.9	65.3	133
EP075-EM: trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	2 mg/kg	91.0	66.7	131
EP075-EM: Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	2 mg/kg	95.7	67.9	135
EP075-EM: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	2 mg/kg	89.1	70.9	132
EP075-EM: Dieldrin	60-57-1	0.03	mg/kg	<0.03	2 mg/kg	92.2	70.0	133
EP075-EM: Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	2 mg/kg	93.2	49.6	157
EP075-EM: Endrin	72-20-8	0.03	mg/kg	<0.03	2 mg/kg	86.4	55.4	148
EP075-EM: Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	2 mg/kg	98.8	71.4	135
EP075-EM: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	2 mg/kg	97.9	74.8	134
EP075-EM: Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	2 mg/kg	85.0	70.2	135
EP075-EM: 4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	2 mg/kg	92.8	67.1	133
EP075-EM: Methoxychlor	72-43-5	0.03	mg/kg	<0.03	2 mg/kg	93.4	63.6	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3200877)								
EP074-UT: C6 - C9 Fraction	----	10	mg/kg	<10	39.6 mg/kg	96.8	61.1	119

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3201366)								
EP071-EM: C10 - C14 Fraction	----	50	mg/kg	<50	900 mg/kg	112	69.9	128
EP071-EM: C15 - C28 Fraction	----	100	mg/kg	<100	3030 mg/kg	113	83.0	124
EP071-EM: C29 - C36 Fraction	----	100	mg/kg	<100	1520 mg/kg	114	76.9	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3200877)								
EP074-UT: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	48.9 mg/kg	99.0	59.9	119
EP074-UT: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3201366)								
EP071-EM: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	116	70.2	126
EP071-EM: >C16 - C34 Fraction	----	100	mg/kg	<100	4020 mg/kg	110	81.4	120
EP071-EM: >C34 - C40 Fraction	----	100	mg/kg	<100	280 mg/kg	121	53.4	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EA010P: Conductivity by PC Titrator (QCLot: 3204674)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	101	85.0	119
ED037P: Alkalinity by PC Titrator (QCLot: 3204676)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	103	88.0	112
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3204116)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	107	85.8	117
				<1	100 mg/L	100	85.8	117
ED045G: Chloride by Discrete Analyser (QCLot: 3204117)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	85.0	122
				<1	1000 mg/L	102	85.0	122
ED093F: Dissolved Major Cations (QCLot: 3203567)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	106	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	99.5	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	104	86.7	111
EG020F: Dissolved Metals by ICP-MS (QCLot: 3203565)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88.5	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.9	83.5	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.0	83.2	105
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	103	83.1	106
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.8	84.6	107
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	103	84.3	108
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	86.3	111

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG035F: Dissolved Mercury by FIMS (QCLot: 3203564)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	81.4	71.1	112
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3204960)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	95.8	88.0	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3204118)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	107	90.9	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3204961)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	102	90.0	117
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3203137)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	114	70.0	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3203136)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	99.2	71.9	114

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	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3200860)							
EM2014107-013	Anonymous	EG005T: Lead	7439-92-1	250 mg/kg	90 9	80.0	120
EM2014107-013	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	108	78.0	124
		EG005T: Cadmium	7440-43-9	50 mg/kg	102	84.0	116
		EG005T: Copper	7440-50-8	250 mg/kg	108	80.0	120
		EG005T: Nickel	7440-02-0	50 mg/kg	100	78.0	120
		EG005T: Zinc	7440-66-6	250 mg/kg	98.6	80.0	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3200859)							
EM2014107-013	Anonymous	EG035T: Mercury	7439-97-6	0.5 mg/kg	# 138	76.0	116
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3200915)							
EM2014107-018	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	# 33.2	58.0	114
EM2014107-018	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	# 15.0	58.0	114
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 3205445)							
EM2014137-002	BH01_0.5	EK026SF: Total Cyanide	57-12-5	20 mg/kg	98 0	70.0	130
EK040T: Fluoride Total (QCLot: 3200916)							
EM2014107-004	Anonymous	EK040T: Fluoride	16984-48-8	400 mg/kg	100	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3201367)							

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3201367) - continued							
EM2014137-004	BH11_0.5	EP066-EM: Total Polychlorinated biphenyls	----	1 mg/kg	104	36.0	152
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3200877)							
EM2014137-002	BH01_0.5	EP074-UT: Benzene	71-43-2	2 mg/kg	88.1	50.0	138
		EP074-UT: Toluene	108-88-3	2 mg/kg	89.4	56.0	134
EP074I: Volatile Halogenated Compounds (QCLot: 3200877)							
EM2014137-002	BH01_0.5	EP074-UT: 1.1-Dichloroethene	75-35-4	2 mg/kg	85 9	26.0	141
		EP074-UT: Trichloroethene	79-01-6	2 mg/kg	83.6	50.0	134
		EP074-UT: Chlorobenzene	108-90-7	2 mg/kg	89.7	28.0	134
EP075A: Phenolic Compounds (Halogenated) (QCLot: 3201365)							
EM2014137-002	BH01_0.5	EP075-EM: 2-Chlorophenol	95-57-8	3 mg/kg	97.1	34.0	118
		EP075-EM: 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	94.7	41.0	139
		EP075-EM: Pentachlorophenol	87-86-5	3 mg/kg	44.6	10.0	144
EP075A: Phenolic Compounds (Non-halogenated) (QCLot: 3201365)							
EM2014137-002	BH01_0.5	EP075-EM: Phenol	108-95-2	3 mg/kg	99 8	31.5	134
		EP075-EM: 2-Nitrophenol	88-75-5	3 mg/kg	96.7	13.0	129
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3201365)							
EM2014137-002	BH01_0.5	EP075-EM: Acenaphthene	83-32-9	3 mg/kg	91 8	46.0	138
		EP075-EM: Pyrene	129-00-0	3 mg/kg	96 3	26.5	169
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3200877)							
EM2014137-002	BH01_0.5	EP074-UT: C6 - C9 Fraction	----	28 mg/kg	94 5	43.0	111
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3201366)							
EM2014137-003	BH11_0.1	EP071-EM: C10 - C14 Fraction	----	900 mg/kg	99.6	53.0	123
		EP071-EM: C15 - C28 Fraction	----	3030 mg/kg	102	70.0	124
		EP071-EM: C29 - C36 Fraction	----	1520 mg/kg	102	64.0	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3200877)							
EM2014137-002	BH01_0.5	EP074-UT: C6 - C10 Fraction	C6_C10	33 mg/kg	94.6	42.0	106
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3201366)							
EM2014137-003	BH11_0.1	EP071-EM: >C10 - C16 Fraction	----	1160 mg/kg	104	65.0	123
		EP071-EM: >C16 - C34 Fraction	----	4020 mg/kg	98 5	67.0	121
		EP071-EM: >C34 - C40 Fraction	----	280 mg/kg	113	44.0	126

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3204116)							
EM2014157-002	Anonymous						

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3204116) - continued							
EM2014157-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3204117)							
EM2014157-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3203565)							
EM2013977-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	98 0	85.0	131
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	# 37.0	81.0	133
		EG020A-F: Chromium	7440-47-3	1 mg/L	88.4	71.0	135
		EG020A-F: Copper	7440-50-8	1 mg/L	# 68.3	76.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	83.7	75.0	133
		EG020A-F: Nickel	7440-02-0	1 mg/L	# 67.0	73.0	131
		EG020A-F: Zinc	7440-66-6	1 mg/L	# 45.5	75.0	131
EG035F: Dissolved Mercury by FIMS (QCLot: 3203564)							
EM2013977-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	# 63.2	70.0	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3204960)							
EM2014157-002	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	113	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3204118)							
EM2014209-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	94 2	80.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3204961)							
EM2014157-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	91.1	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3203137)							
EM2013977-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	# Not Determined	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3203136)							
EM2013977-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	75 8	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2014137**	Page	: 1 of 12
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 14-Aug-2020
Site	: ----	Issue Date	: 20-Aug-2020
Sampler	: MM	No. of samples received	: 7
Order number	: ----	No. of samples analysed	: 5

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.**
- **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: **SOIL**

Compound Group Name	Laboratory Sample D	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG035T: Total Recoverable Mercury by FIMS	EM2014107--013	Anonymous	**Mercury**	7439-97-6	138 %	76.0-116%	**Recovery greater than upper data quality objective**
EG048: Hexavalent Chromium (Alkaline Digest)	EM2014107--018	Anonymous	**Hexavalent Chromium**	18540-29-9	33.2 %	58.0-114%	**Recovery less than lower data quality objective**
EG048: Hexavalent Chromium (Alkaline Digest)	EM2014107--018	Anonymous	**Hexavalent Chromium**	18540-29-9	15.0 %	58.0-114%	**Recovery less than lower data quality objective**

Matrix: **WATER**

Compound Group Name	Laboratory Sample D	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EM2014157--002	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EM2014157--002	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	EM2013977--001	Anonymous	**Cadmium**	7440-43-9	37.0 %	81.0-133%	**Recovery less than lower data quality objective**
EG020F: Dissolved Metals by ICP-MS	EM2013977--001	Anonymous	**Copper**	7440-50-8	68.3 %	76.0-130%	**Recovery less than lower data quality objective**
EG020F: Dissolved Metals by ICP-MS	EM2013977--001	Anonymous	**Nickel**	7440-02-0	67.0 %	73.0-131%	**Recovery less than lower data quality objective**
EG020F: Dissolved Metals by ICP-MS	EM2013977--001	Anonymous	**Zinc**	7440-66-6	45.5 %	75.0-131%	**Recovery less than lower data quality objective**
EG035F: Dissolved Mercury by FIMS	EM2013977--002	Anonymous	**Mercury**	7439-97-6	63.2 %	70.0-120%	**Recovery less than lower data quality objective**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	EM2013977--002	Anonymous	**Total Kjeldahl Nitrogen as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / **Container** / Client Sample D(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						
BH04	----	----	----	18-Aug-2020	13-Aug-2020	**5**
EK057G: Nitrite as N by Discrete Analyser						

Matrix: **WATER**

Method / Container / Client Sample D(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EK057G: Nitrite as N by Discrete Analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural						
BH04	----	----	----	18-Aug-2020	15-Aug-2020	**3**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Dissolved Metals by ICP-MS - Suite A	1	17	5.88	10.00	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 / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA001: pH in soil using 0.01M CaCl extract								
Soil Glass Jar - Unpreserved (EA001)								
BH01_0.1,	BH01_0.5	**10-Aug-2020**	**17-Aug-2020**	17-Aug-2020	✓	**17-Aug-2020**	17-Aug-2020	✓
Soil Glass Jar - Unpreserved (EA001)								
BH11_0.1,	BH11_0.5	**13-Aug-2020**	**17-Aug-2020**	20-Aug-2020	✓	**17-Aug-2020**	17-Aug-2020	✓
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH01_0.1,	BH01_0.5	**10-Aug-2020**	**----**	----	----	**15-Aug-2020**	24-Aug-2020	✓
Soil Glass Jar - Unpreserved (EA055)								
BH11_0.1,	BH11_0.5	**13-Aug-2020**	**----**	----	----	**15-Aug-2020**	27-Aug-2020	✓
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH01_0.1,	BH01_0.5	**10-Aug-2020**	**15-Aug-2020**	06-Feb-2021	✓	**15-Aug-2020**	06-Feb-2021	✓
Soil Glass Jar - Unpreserved (EG005T)								
BH11_0.1,	BH11_0.5	**13-Aug-2020**	**15-Aug-2020**	09-Feb-2021	✓	**15-Aug-2020**	09-Feb-2021	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH01_0.1,	BH01_0.5	**10-Aug-2020**	**15-Aug-2020**	07-Sep-2020	✓	**17-Aug-2020**	07-Sep-2020	✓
Soil Glass Jar - Unpreserved (EG035T)								
BH11_0.1,	BH11_0.5	**13-Aug-2020**	**15-Aug-2020**	10-Sep-2020	✓	**17-Aug-2020**	10-Sep-2020	✓

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
EG048: Hexavalent Chromium (Alkaline Digest)								
Soil Glass Jar - Unpreserved (EG048G)								
BH01_0.1,	BH01_0.5	**10-Aug-2020**	**15-Aug-2020**	07-Sep-2020	✓	**17-Aug-2020**	22-Aug-2020	✓
Soil Glass Jar - Unpreserved (EG048G)								
BH11_0.1,	BH11_0.5	**13-Aug-2020**	**15-Aug-2020**	10-Sep-2020	✓	**17-Aug-2020**	22-Aug-2020	✓
EK026SF: Total CN by Segmented Flow Analyser								
Soil Glass Jar - Unpreserved (EK026SF)								
BH01_0.1,	BH01_0.5	**10-Aug-2020**	**18-Aug-2020**	24-Aug-2020	✓	**19-Aug-2020**	01-Sep-2020	✓
Soil Glass Jar - Unpreserved (EK026SF)								
BH11_0.1,	BH11_0.5	**13-Aug-2020**	**18-Aug-2020**	27-Aug-2020	✓	**19-Aug-2020**	01-Sep-2020	✓
EK040T: Fluoride Total								
Soil Glass Jar - Unpreserved (EK040T)								
BH01_0.1,	BH01_0.5	**10-Aug-2020**	**15-Aug-2020**	07-Sep-2020	✓	**18-Aug-2020**	07-Sep-2020	✓
Soil Glass Jar - Unpreserved (EK040T)								
BH11_0.1,	BH11_0.5	**13-Aug-2020**	**15-Aug-2020**	10-Sep-2020	✓	**18-Aug-2020**	10-Sep-2020	✓
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066-EM)								
BH01_0.1,	BH01_0.5	**10-Aug-2020**	**17-Aug-2020**	24-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP066-EM)								
BH11_0.1,	BH11_0.5	**13-Aug-2020**	**17-Aug-2020**	27-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓
EP074A: Monocyclic Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP074-UT)								
BH01_0.1,	BH01_0.5	**10-Aug-2020**	**15-Aug-2020**	17-Aug-2020	✓	**15-Aug-2020**	17-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH11_0.1,	BH11_0.5	**13-Aug-2020**	**15-Aug-2020**	20-Aug-2020	✓	**15-Aug-2020**	20-Aug-2020	✓
EP074H: Naphthalene								
Soil Glass Jar - Unpreserved (EP074-UT)								
BH01_0.1,	BH01_0.5	**10-Aug-2020**	**15-Aug-2020**	17-Aug-2020	✓	**15-Aug-2020**	17-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH11_0.1,	BH11_0.5	**13-Aug-2020**	**15-Aug-2020**	20-Aug-2020	✓	**15-Aug-2020**	20-Aug-2020	✓
EP074I: Volatile Halogenated Compounds								
Soil Glass Jar - Unpreserved (EP074-UT)								
BH01_0.1,	BH01_0.5	**10-Aug-2020**	**15-Aug-2020**	17-Aug-2020	✓	**15-Aug-2020**	17-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH11_0.1,	BH11_0.5	**13-Aug-2020**	**15-Aug-2020**	20-Aug-2020	✓	**15-Aug-2020**	20-Aug-2020	✓
EP075A: Phenolic Compounds (Halogenated)								
Soil Glass Jar - Unpreserved (EP075-EM)								
BH01_0.1,	BH01_0.5	**10-Aug-2020**	**17-Aug-2020**	24-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH11_0.1,	BH11_0.5	**13-Aug-2020**	**17-Aug-2020**	27-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓

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
EP075A: Phenolic Compounds (Non-halogenated)							
Soil Glass Jar - Unpreserved (EP075-EM) BH01_0.1, BH01_0.5	**10-Aug-2020**	**17-Aug-2020**	24-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM) BH11_0.1, BH11_0.5	**13-Aug-2020**	**17-Aug-2020**	27-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓
EP075B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075-EM) BH01_0.1, BH01_0.5	**10-Aug-2020**	**17-Aug-2020**	24-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM) BH11_0.1, BH11_0.5	**13-Aug-2020**	**17-Aug-2020**	27-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓
EP075I: Organochlorine Pesticides							
Soil Glass Jar - Unpreserved (EP075-EM) BH01_0.1, BH01_0.5	**10-Aug-2020**	**17-Aug-2020**	24-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM) BH11_0.1, BH11_0.5	**13-Aug-2020**	**17-Aug-2020**	27-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP074-UT) BH01_0.1, BH01_0.5	**10-Aug-2020**	**15-Aug-2020**	17-Aug-2020	✓	**15-Aug-2020**	17-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP071-EM) BH01_0.1, BH01_0.5	**10-Aug-2020**	**17-Aug-2020**	24-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT) BH11_0.1, BH11_0.5	**13-Aug-2020**	**15-Aug-2020**	20-Aug-2020	✓	**15-Aug-2020**	20-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP071-EM) BH11_0.1, BH11_0.5	**13-Aug-2020**	**17-Aug-2020**	27-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP074-UT) BH01_0.1, BH01_0.5	**10-Aug-2020**	**15-Aug-2020**	17-Aug-2020	✓	**15-Aug-2020**	17-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP071-EM) BH01_0.1, BH01_0.5	**10-Aug-2020**	**17-Aug-2020**	24-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT) BH11_0.1, BH11_0.5	**13-Aug-2020**	**15-Aug-2020**	20-Aug-2020	✓	**15-Aug-2020**	20-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP071-EM) BH11_0.1, BH11_0.5	**13-Aug-2020**	**17-Aug-2020**	27-Aug-2020	✓	**17-Aug-2020**	26-Sep-2020	✓

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) BH04	**13-Aug-2020**	**----**	----	----	**18-Aug-2020**	13-Aug-2020	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) BH04	**13-Aug-2020**	**----**	----	----	**18-Aug-2020**	10-Sep-2020	✓

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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
BH04	**13-Aug-2020**	**----**	----	----	**18-Aug-2020**	27-Aug-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
BH04	**13-Aug-2020**	**----**	----	----	**18-Aug-2020**	10-Sep-2020	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
BH04	**13-Aug-2020**	**----**	----	----	**18-Aug-2020**	10-Sep-2020	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
BH04	**13-Aug-2020**	**----**	----	----	**18-Aug-2020**	20-Aug-2020	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Natural (EG020A-F)							
BH04	**13-Aug-2020**	**----**	----	----	**18-Aug-2020**	09-Feb-2021	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Natural (EG035F)							
BH04	**13-Aug-2020**	**----**	----	----	**17-Aug-2020**	10-Sep-2020	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH04	**13-Aug-2020**	**----**	----	----	**19-Aug-2020**	10-Sep-2020	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH04	**13-Aug-2020**	**----**	----	----	**18-Aug-2020**	15-Aug-2020	×
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH04	**13-Aug-2020**	**----**	----	----	**18-Aug-2020**	10-Sep-2020	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH04	**13-Aug-2020**	**17-Aug-2020**	10-Sep-2020	✓	**18-Aug-2020**	10-Sep-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH04	**13-Aug-2020**	**17-Aug-2020**	10-Sep-2020	✓	**18-Aug-2020**	10-Sep-2020	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH in soil using a 0.01M CaCl2 extract	EA001	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	20	**15.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	13	**7.69**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Fluoride	EK040T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	4	**25.00**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	**5.88**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	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	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	3	**33.33**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Dissolved Mercury by FIMS	EG035F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**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	20	**5.00**	**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.

Analytical Methods	Method	Matrix	Method Descriptions
pH in soil using a 0.01M CaCl2 extract	EA001	SOIL	In house: Referenced to Rayment and Lyons 4B3 (mod.) or 4B4 (mod.) 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
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 AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (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 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)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3)
Total Cyanide by Segmented Flow Analyser	EK026SF	SOIL	In house: Referenced to APHA 4500-CN C / ASTM D7511. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM Schedule B(3).
Total Fluoride	EK040T	SOIL	(In-house) Total fluoride is determined by ion specific electrode (ISE) in a solution obtained after a Sodium Carbonate / Potassium Carbonate fusion dissolution.
PCB - VIC EPA 448.3 Screen	EP066-EM	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 method is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071-EM	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against a kane standards over the range C10 - C40.
Volatile Organic Compounds - Ultra-trace	EP074-UT	SOIL	In house: Referenced to USEPA SW 846 - 8260 Extracts are analysed by Purge and Trap, Capillary GC/MS in partial SIM/Scan mode. Quantification is by comparison against an established multi-point calibration curves. This method is compliant with NEPM Schedule B(3).

Analytical Methods	Method	Matrix	Method Descriptions
Volatile Organic Compounds - Ultra-trace - Summations	EP074-UT-SUM	SOIL	Summation of MAHs and VHCs
Semivolatile Organic Compounds - Waste Classification	EP075-EM	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).
SVOC - Waste Classification (Sums)	EP075-EM-SUM	SOIL	Summations for EP075 (EM variation)
pH by PC 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 PC 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)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. 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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
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 AS 3550, 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 seperately 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)

Preparation Methods	Method	Matrix	Method Descriptions
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
pH in soil using a 0.01M CaCl2 extract	EA001-PR	SOIL	In house: Referenced to Rayment and Higginson 4B1, 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
Total Fluoride	EK040T-PR	SOIL	In house: Samples are fused with Sodium Carbonate / Potassium Carbonate flux.
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).
Methanolic Extraction of Soils - Ultra-trace.	ORG16-UT	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 - VIC EPA Screen	ORG17-EM	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.
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)

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM2014137**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: 12529997	Page	: 1 of 3
Order number	: ----	Quote number	: EM2018GHDSER0037 (EN/005/17 (Victoria Primary Quote))
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: MM		

Dates

Date Samples Received	: 14-Aug-2020 09:15	Issue Date	: 14-Aug-2020
Client Requested Due Date	: 21-Aug-2020	Scheduled Reporting Date	: **21-Aug-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 0.7°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 7 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - P-16 WRG 621
EM2014137-001	10-Aug-2020 00:00	BH01_0.1		✓	✓
EM2014137-002	10-Aug-2020 00:00	BH01_0.5		✓	✓
EM2014137-003	13-Aug-2020 00:00	BH11_0.1		✓	✓
EM2014137-004	13-Aug-2020 00:00	BH11_0.5		✓	✓
EM2014137-005	13-Aug-2020 00:00	BH11_1.0	✓		
EM2014137-006	13-Aug-2020 00:00	BH11_2.0	✓		

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) WATER No analysis requested
EM2014137-007	13-Aug-2020 00:00	BH04	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- A4 - AU Tax Invoice (INV)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EPA Waste Classification & Categorisation Guideline Report (COA_GL_EPA_WASTE)	Email	[redacted]

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

GHD LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)	Email	ghdlabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ghdlabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ghdlabreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ghdlabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ghdlabreports@ghd.com
- EPA Waste Classification & Categorisation Guideline Report (COA_GL_EPA_WASTE)	Email	ghdlabreports@ghd.com

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EPA Waste Classification & Categorisation Guideline Report (COA_GL_EPA_WASTE)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EPA Waste Classification & Categorisation Guideline Report (COA_GL_EPA_WASTE)	Email	[redacted]

CHAIN OF CUSTODY

Page 1 of 1

GHD

GHD Melbourne
180 Lonsdale Street, Melbourne 3000
Telephone: 613 8687 8000 Facsimile: 613 8687 8111

Job Number	GHD Office	Laboratory:	ALS Springvale
12529997	Melbourne	Address:	2 - 4 Westall Rd, Springvale
Project: WORM		Lab Contact:	[redacted]
GHD Contact: [redacted]	Contact Email: [redacted]		
TAT: Five-days	Quote No./GHD Reference		

PLEASE NOTE:
- Sign white copy on receipt and release of samples
- Samples are to be delivered to the Laboratory Address
- On receipt of samples, the laboratory contact to sign white copy and fax/email to GHD Contact.
- On completion of analyses please return white copy with resu
Pink copy is returned to the sampler once the courier has signed

Environmental Division
Melbourne
Work Order Reference
EM2014137

Telephone : + 61-3-8549 9600

HD Contact with the GHD Job Numb

be provided in ESDAT compatible

	Sample I.D.	Date	Time	Composite Sample	Sample Matrix (Soil, Water, Waste, Oil, Gas, Sediment)	Preservative	Container Type (Bottle, Bag, Vial, Cassette, Core, Jar, Tube)	Container Number	Container Volume (mL)	IWRG (P-16)	S-26	ASS field screen	HOLD	Remarks
1	BH01_0.1	10.8.2020	AM		S	N/A	V	1		X				
2	BH01_0.5	10.8.2020	"		"	"	"	"		X				
3	BH11_0.1	13.8.2020	"		"	"	"	"		X				
4	BH11_0.5	"	"		"	"	"	"		X				
5	BH11_1.0	"	"		"	"	"	"					X	
6	BH11_2.0	"	↓		↓	"	↓	↓					X	
7	BH04	"	PM		GW	"	P	3					X	Please filter metals

NOTES:

Sampled by:	MM	Date/Time:	10 and 13.8.2020	Relinquished by:	MM	Date/Time:	14.8.2020, 8:05
Received by:		Date/Time:		Relinquished by:		Date/Time:	
Received by Courier:		Date/Time:		Relinquished by:		Date/Time:	
Received by Lab:	[signature]	Date/Time:					
Remarks:							

Received: 14/8, 9-15 Carrier:

C/note

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2014250**	Page	: 1 of 13
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997/08	Date Samples Received	: 17-Aug-2020 12:10
Order number	: 12529997/08	Date Analysis Commenced	: 18-Aug-2020
C-O-C number	: ----	Issue Date	: 20-Aug-2020 17:48
Sampler	: [redacted]		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 10		
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. 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.

Signatories	*Position*	*Accreditation Category*
[redacted]	Senior Inorganic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Me bourne Organics, Springvale, VIC
[redacted]	Senior Organic Chemist	Me bourne Inorganics, Springvale, VIC

General Comments

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

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

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

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

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

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

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

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of he 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.
- EP074-UT: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EG035T: EM2014298 #1 Poor duplicate precision for total mercury due to sample matrix. Confirmed by re-extraction and re-analysis.
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH9_0.1	BH9_0.5	BH9_1	BH9_2	BH9_4
			Client sampling date / time	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00
Compound	CAS Number	LOR	Unit	EM2014250-001	EM2014250-002	EM2014250-003	EM2014250-004	EM2014250-005
				Result	Result	Result	Result	Result
EA001: pH in soil using 0.01M CaCl extract								
pH (CaCl2)	----	0.1	pH Unit	6.5	7.4	----	----	----
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	7.7	8.0	8.2	8.3	7.9
ø pH (Fox)	----	0.1	pH Unit	5.2	6.9	8.2	6.8	8.4
ø Reaction Rate	----	1	-	3	4	4	4	4
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	33.2	28.8	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	6	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Copper	7440-50-8	5	mg/kg	12	13	----	----	----
Lead	7439-92-1	5	mg/kg	10	10	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	<2	----	----	----
Nickel	7440-02-0	2	mg/kg	27	33	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	<5	----	----	----
Silver	7440-22-4	2	mg/kg	<2	<2	----	----	----
Tin	7440-31-5	5	mg/kg	<5	<5	----	----	----
Zinc	7440-66-6	5	mg/kg	20	20	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	----	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	----	----	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	120	140	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH9_0.1	BH9_0.5	BH9_1	BH9_2	BH9_4
				Client sampling date / time	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00
Compound	CAS Number	LOR	Unit		EM2014250-001	EM2014250-002	EM2014250-003	EM2014250-004	EM2014250-005
					Result	Result	Result	Result	Result
EP074A: Monocyclic Aromatic Hydrocarbons - Continued									
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of monocyclic aromatic hydrocarbons	----	0.2	mg/kg		<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	----	----	----
EP074H: Naphthalene									
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP074I: Volatile Halogenated Compounds									
Vinyl chloride	75-01-4	0.02	mg/kg		<0.02	<0.02	----	----	----
1.1-Dichloroethene	75-35-4	0.01	mg/kg		<0.01	<0.01	----	----	----
Methylene chloride	75-09-2	0.4	mg/kg		<0.4	<0.4	----	----	----
trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg		<0.02	<0.02	----	----	----
cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg		<0.01	<0.01	----	----	----
Chloroform	67-66-3	0.02	mg/kg		<0.02	<0.02	----	----	----
1.1.1-Trichloroethane	71-55-6	0.01	mg/kg		<0.01	<0.01	----	----	----
Carbon Tetrachloride	56-23-5	0.01	mg/kg		<0.01	<0.01	----	----	----
1.2-Dichloroethane	107-06-2	0.02	mg/kg		<0.02	<0.02	----	----	----
Trichloroethene	79-01-6	0.02	mg/kg		<0.02	<0.02	----	----	----
1.1.2-Trichloroethane	79-00-5	0.04	mg/kg		<0.04	<0.04	----	----	----
Tetrachloroethene	127-18-4	0.02	mg/kg		<0.02	<0.02	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg		<0.01	<0.01	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg		<0.02	<0.02	----	----	----
Hexachlorobutadiene	87-68-3	0.02	mg/kg		<0.02	<0.02	----	----	----
Chlorobenzene	108-90-7	0.02	mg/kg		<0.02	<0.02	----	----	----
1.4-Dichlorobenzene	106-46-7	0.02	mg/kg		<0.02	<0.02	----	----	----
1.2-Dichlorobenzene	95-50-1	0.02	mg/kg		<0.02	<0.02	----	----	----
1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg		<0.01	<0.01	----	----	----
^ Sum of volatile chlorinated hydrocarbons	----	0.01	mg/kg		<0.01	<0.01	----	----	----
^ Sum of other chlorinated hydrocarbons	----	0.01	mg/kg		<0.01	<0.01	----	----	----
EP075A: Phenolic Compounds (Halogenated)									
2-Chlorophenol	95-57-8	0.03	mg/kg		<0.03	<0.03	----	----	----
2.4-Dichlorophenol	120-83-2	0.03	mg/kg		<0.03	<0.03	----	----	----
2.6-Dichlorophenol	87-65-0	0.03	mg/kg		<0.03	<0.03	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg		<0.03	<0.03	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH9_0.1	BH9_0.5	BH9_1	BH9_2	BH9_4
				Client sampling date / time	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00
Compound	CAS Number	LOR	Unit		EM2014250-001	EM2014250-002	EM2014250-003	EM2014250-004	EM2014250-005
					Result	Result	Result	Result	Result
EP075A: Phenolic Compounds (Halogenated) - Continued									
2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg		<0.05	<0.05	----	----	----
2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg		<0.03	<0.03	----	----	----
2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg		<0.05	<0.05	----	----	----
Pentachlorophenol	87-86-5	0.2	mg/kg		<0.2	<0.2	----	----	----
^ Sum of Phenols (halogenated)	----	0.03	mg/kg		<0.03	<0.03	----	----	----
EP075A: Phenolic Compounds (Non-halogenated)									
Phenol	108-95-2	1	mg/kg		<1	<1	----	----	----
2-Methylphenol	95-48-7	1	mg/kg		<1	<1	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	----	----	----
2-Nitrophenol	88-75-5	1	mg/kg		<1	<1	----	----	----
2.4-Dimethylphenol	105-67-9	1	mg/kg		<1	<1	----	----	----
2.4-Dinitrophenol	51-28-5	5	mg/kg		<5	<5	----	----	----
4-Nitrophenol	100-02-7	5	mg/kg		<5	<5	----	----	----
2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg		<5	<5	----	----	----
Dinoseb	88-85-7	5	mg/kg		<5	<5	----	----	----
2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg		<5	<5	----	----	----
^ Sum of Phenols (non-halogenated)	----	1	mg/kg		<1	<1	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg		<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH9_0.1	BH9_0.5	BH9_1	BH9_2	BH9_4
				Client sampling date / time	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00
Compound	CAS Number	LOR	Unit		EM2014250-001	EM2014250-002	EM2014250-003	EM2014250-004	EM2014250-005
					Result	Result	Result	Result	Result
EP075B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	----	----	----
EP075I: Organochlorine Pesticides									
alpha-BHC	319-84-6	0.03	mg/kg		<0.03	<0.03	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg		<0.03	<0.03	----	----	----
beta-BHC	319-85-7	0.03	mg/kg		<0.03	<0.03	----	----	----
gamma-BHC	58-89-9	0.03	mg/kg		<0.03	<0.03	----	----	----
delta-BHC	319-86-8	0.03	mg/kg		<0.03	<0.03	----	----	----
Heptachlor	76-44-8	0.03	mg/kg		<0.03	<0.03	----	----	----
Aldrin	309-00-2	0.03	mg/kg		<0.03	<0.03	----	----	----
Heptachlor epoxide	1024-57-3	0.03	mg/kg		<0.03	<0.03	----	----	----
cis-Chlordane	5103-71-9	0.03	mg/kg		<0.03	<0.03	----	----	----
trans-Chlordane	5103-74-2	0.03	mg/kg		<0.03	<0.03	----	----	----
Endosulfan 1	959-98-8	0.03	mg/kg		<0.03	<0.03	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	----	----	----
Dieldrin	60-57-1	0.03	mg/kg		<0.03	<0.03	----	----	----
Endrin aldehyde	7421-93-4	0.03	mg/kg		<0.03	<0.03	----	----	----
Endrin	72-20-8	0.03	mg/kg		<0.03	<0.03	----	----	----
Endosulfan 2	33213-65-9	0.03	mg/kg		<0.03	<0.03	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.03	mg/kg		<0.03	<0.03	----	----	----
4.4`-DDT	50-29-3	0.05	mg/kg		<0.05	<0.05	----	----	----
Methoxychlor	72-43-5	0.03	mg/kg		<0.03	<0.03	----	----	----
^ Sum of organochlorine pesticides	----	0.03	mg/kg		<0.03	<0.03	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.03	mg/kg		<0.03	<0.03	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	----	----	----
^ Chlordane	57-74-9	0.03	mg/kg		<0.03	<0.03	----	----	----
^ Sum of other organochlorine pesticides	----	0.03	mg/kg		<0.03	<0.03	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH9_0.1	BH9_0.5	BH9_1	BH9_2	BH9_4
				Client sampling date / time	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00
Compound	CAS Number	LOR	Unit		EM2014250-001	EM2014250-002	EM2014250-003	EM2014250-004	EM2014250-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	----	----
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		111	108	----	----	----
EP074S: VOC Surrogates (Ultra-Trace)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		92.0	83.9	----	----	----
Toluene-D8	2037-26-5	0.1	%		89.2	82.8	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		99.3	90.5	----	----	----
EP075S: Acid Extractable Surrogates (Waste Classification)									
Phenol-d6	13127-88-3	0.025	%		111	102	----	----	----
2-Chlorophenol-D4	93951-73-6	0.025	%		103	93.8	----	----	----
2.4.6-Tribromophenol	118-79-6	0.025	%		112	102	----	----	----
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)									
Nitrobenzene-D5	4165-60-0	0.025	%		108	98.3	----	----	----
1.2-Dichlorobenzene-D4	2199-69-1	0.025	%		98.7	91.4	----	----	----
2-Fluorobiphenyl	321-60-8	0.025	%		116	110	----	----	----
Anthracene-d10	1719-06-8	0.025	%		105	101	----	----	----
4-Terphenyl-d14	1718-51-0	0.025	%		102	98.2	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH10_0.1	BH10_1	DUP01	----	----
				Client sampling date / time	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014250-006	EM2014250-008	EM2014250-010	--------	--------
					Result	Result	Result	----	----
EA001: pH in soil using 0.01M CaCl extract									
pH (CaCl2)	----	0.1	pH Unit		6.6	7.1	7.2	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		21.2	25.4	26.8	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		11	<5	<5	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	----	----
Copper	7440-50-8	5	mg/kg		17	27	27	----	----
Lead	7439-92-1	5	mg/kg		6	10	11	----	----
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	----	----
Nickel	7440-02-0	2	mg/kg		43	41	46	----	----
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	----	----
Silver	7440-22-4	2	mg/kg		<2	<2	<2	----	----
Tin	7440-31-5	5	mg/kg		<5	<5	<5	----	----
Zinc	7440-66-6	5	mg/kg		42	14	16	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
EG048: Hexavalent Chromium (Alkaline Digest)									
Hexavalent Chromium	18540-29-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	1	mg/kg		<1	<1	<1	----	----
EK040T: Fluoride Total									
Fluoride	16984-48-8	40	mg/kg		300	240	200	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
EP074A: Monocyclic Aromatic Hydrocarbons									
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	----	----
Styrene	100-42-5	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 monocyclic aromatic hydrocarbons	----	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH10_0.1	BH10_1	DUP01	----	----
				Client sampling date / time	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014250-006	EM2014250-008	EM2014250-010	--------	--------
					Result	Result	Result	----	----
EP074H: Naphthalene									
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	----	----
EP074I: Volatile Halogenated Compounds									
Vinyl chloride	75-01-4	0.02	mg/kg		<0.02	<0.02	<0.02	----	----
1.1-Dichloroethene	75-35-4	0.01	mg/kg		<0.01	<0.01	<0.01	----	----
Methylene chloride	75-09-2	0.4	mg/kg		<0.4	<0.4	<0.4	----	----
trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg		<0.02	<0.02	<0.02	----	----
cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg		<0.01	<0.01	<0.01	----	----
Chloroform	67-66-3	0.02	mg/kg		<0.02	<0.02	<0.02	----	----
1.1.1-Trichloroethane	71-55-6	0.01	mg/kg		<0.01	<0.01	<0.01	----	----
Carbon Tetrachloride	56-23-5	0.01	mg/kg		<0.01	<0.01	<0.01	----	----
1.2-Dichloroethane	107-06-2	0.02	mg/kg		<0.02	<0.02	<0.02	----	----
Trichloroethene	79-01-6	0.02	mg/kg		<0.02	<0.02	<0.02	----	----
1.1.2-Trichloroethane	79-00-5	0.04	mg/kg		<0.04	<0.04	<0.04	----	----
Tetrachloroethene	127-18-4	0.02	mg/kg		<0.02	<0.02	<0.02	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg		<0.01	<0.01	<0.01	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg		<0.02	<0.02	<0.02	----	----
Hexachlorobutadiene	87-68-3	0.02	mg/kg		<0.02	<0.02	<0.02	----	----
Chlorobenzene	108-90-7	0.02	mg/kg		<0.02	<0.02	<0.02	----	----
1.4-Dichlorobenzene	106-46-7	0.02	mg/kg		<0.02	<0.02	<0.02	----	----
1.2-Dichlorobenzene	95-50-1	0.02	mg/kg		<0.02	<0.02	<0.02	----	----
1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg		<0.01	<0.01	<0.01	----	----
^ Sum of volatile chlorinated hydrocarbons	----	0.01	mg/kg		<0.01	<0.01	<0.01	----	----
^ Sum of other chlorinated hydrocarbons	----	0.01	mg/kg		<0.01	<0.01	<0.01	----	----
EP075A: Phenolic Compounds (Halogenated)									
2-Chlorophenol	95-57-8	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
2.4-Dichlorophenol	120-83-2	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
2.6-Dichlorophenol	87-65-0	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Pentachlorophenol	87-86-5	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
^ Sum of Phenols (halogenated)	----	0.03	mg/kg		<0.03	<0.03	<0.03	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH10_0.1	BH10_1	DUP01	----	----
				Client sampling date / time	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014250-006	EM2014250-008	EM2014250-010	--------	--------
					Result	Result	Result	----	----
EP075A: Phenolic Compounds (Halogenated) - Continued									
EP075A: Phenolic Compounds (Non-halogenated)									
Phenol	108-95-2	1	mg/kg		<1	<1	<1	----	----
2-Methylphenol	95-48-7	1	mg/kg		<1	<1	<1	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	<1	----	----
2-Nitrophenol	88-75-5	1	mg/kg		<1	<1	<1	----	----
2.4-Dimethylphenol	105-67-9	1	mg/kg		<1	<1	<1	----	----
2.4-Dinitrophenol	51-28-5	5	mg/kg		<5	<5	<5	----	----
4-Nitrophenol	100-02-7	5	mg/kg		<5	<5	<5	----	----
2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg		<5	<5	<5	----	----
Dinoseb	88-85-7	5	mg/kg		<5	<5	<5	----	----
2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg		<5	<5	<5	----	----
^ **Sum of Phenols (non-halogenated)**	----	1	mg/kg		<1	<1	<1	----	----
EP075B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	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) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg		<1.0	<1.0	<1.0	----	----
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**	----	----
EP075I: Organochlorine Pesticides									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH10_0.1	BH10_1	DUP01	----	----
				Client sampling date / time	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014250-006	EM2014250-008	EM2014250-010	--------	--------
					Result	Result	Result	----	----
EP075l: Organochlorine Pesticides - Continued									
alpha-BHC	319-84-6	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
beta-BHC	319-85-7	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
gamma-BHC	58-89-9	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
delta-BHC	319-86-8	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
Heptachlor	76-44-8	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
Aldrin	309-00-2	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
Heptachlor epoxide	1024-57-3	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
cis-Chlordane	5103-71-9	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
trans-Chlordane	5103-74-2	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
Endosulfan 1	959-98-8	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Dieldrin	60-57-1	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
Endrin aldehyde	7421-93-4	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
Endrin	72-20-8	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
Endosulfan 2	33213-65-9	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
4.4`-DDT	50-29-3	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Methoxychlor	72-43-5	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
^ Sum of organochlorine pesticides	----	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
^ Chlordane	57-74-9	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
^ Sum of other organochlorine pesticides	----	0.03	mg/kg		<0.03	<0.03	<0.03	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	----	----
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	----	----
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									
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH10_0.1	BH10_1	DUP01	----	----
				Client sampling date / time	14-Aug-2020 00:00	14-Aug-2020 00:00	14-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014250-006	EM2014250-008	EM2014250-010	--------	--------
					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	----	----
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**96.9**	**105**	**108**	----	----
EP074S: VOC Surrogates (Ultra-Trace)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**81.0**	**78.1**	**85.6**	----	----
Toluene-D8	2037-26-5	0.1	%		**78.0**	**77.8**	**81.6**	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		**83.4**	**89.2**	**91.9**	----	----
EP075S: Acid Extractable Surrogates (Waste Classification)									
Phenol-d6	13127-88-3	0.025	%		**103**	**104**	**113**	----	----
2-Chlorophenol-D4	93951-73-6	0.025	%		**91.2**	**95.4**	**104**	----	----
2.4.6-Tribromophenol	118-79-6	0.025	%		**102**	**99.0**	**109**	----	----
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)									
Nitrobenzene-D5	4165-60-0	0.025	%		**94.7**	**94.4**	**110**	----	----
1.2-Dichlorobenzene-D4	2199-69-1	0.025	%		**87.0**	**80.2**	**99.4**	----	----
2-Fluorobiphenyl	321-60-8	0.025	%		**104**	**106**	**117**	----	----
Anthracene-d10	1719-06-8	0.025	%		**94.6**	**97.8**	**107**	----	----
4-Terphenyl-d14	1718-51-0	0.025	%		**91.2**	**94.8**	**105**	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	41	122
EP074S: VOC Surrogates (Ultra-Trace)			
1.2-Dichloroethane-D4	17060-07-0	59	119
Toluene-D8	2037-26-5	55	117
4-Bromofluorobenzene	460-00-4	59	123
EP075S: Acid Extractable Surrogates (Waste Classification)			
Phenol-d6	13127-88-3	28	134
2-Chlorophenol-D4	93951-73-6	27	123
2.4.6-Tribromophenol	118-79-6	25	149
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)			
Nitrobenzene-D5	4165-60-0	29	125
1.2-Dichlorobenzene-D4	2199-69-1	31	117
2-Fluorobiphenyl	321-60-8	44	136
Anthracene-d10	1719-06-8	53	133
4-Terphenyl-d14	1718-51-0	59	141

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2014250**	Page	: 1 of 10
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997/08	Date Samples Received	: 17-Aug-2020
Order number	: 12529997/08	Date Analysis Commenced	: 18-Aug-2020
C-O-C number	: ----	Issue Date	: 20-Aug-2020
Sampler	: [redacted]		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 10		
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. 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*
[redacted]	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
[redacted]	Senior Organic Chemist	Melbourne Inorganics, Springvale, VIC

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

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	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3206720)									
EM2014250-001	BH9_0.1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	27	29	7.04	0% - 50%
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	8	39.5	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	12	12	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	11	0.00	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	20	22	9.39	No Limit
EA001: pH in soil using 0.01M CaCl extract (QC Lot: 3206241)									
EM2014250-001	BH9_0.1	EA001: pH (CaCl2)	----	0.1	pH Unit	6.5	6.5	0.00	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 3206793)									
EM2014250-001	BH9_0.1	EA037: Reaction Rate	----	1	-	3	3	0.00	No Limit
		EA037: pH (F)	----	0.1	pH Unit	7.7	7.6	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.2	5.2	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3207325)									
EM2014250-001	BH9_0.1	EA055: Moisture Content	----	0.1	%	33.2	33.6	1.07	0% - 20%
EM2014298-001	Anonymous	EA055: Moisture Content	----	0.1	%	29.6	29.4	0.622	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3206719)									
EM2014298-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	8310	# 12900	43.5	0% - 20%
EM2014250-001	BH9_0.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 3206239)									
EM2014250-001	BH9_0.1	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 3206240)									
EM2014250-001	BH9_0.1	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EK040T: Fluoride Total (QC Lot: 3206237)									
EM2014250-001	BH9_0.1	EK040T: Fluoride	16984-48-8	40	mg/kg	120	150	17.9	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3206236)									
EM2014250-001	BH9_0.1	EP066-EM: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 3206232)									
EM2014250-001	BH9_0.1	EP074-UT: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP074-UT: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074H: Naphthalene (QC Lot: 3206232)									
EM2014250-001	BH9_0.1	EP074-UT: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP074I: Volatile Halogenated Compounds (QC Lot: 3206232)									
EM2014250-001	BH9_0.1	EP074-UT: 1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chloroform	67-66-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Trichloroethene	79-01-6	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	<0.04	0.00	No Limit
		EP074-UT: Methylene chloride	75-09-2	0.4	mg/kg	<0.4	<0.4	0.00	No Limit
EP075A: Phenolic Compounds (Halogenated) (QC Lot: 3206234)									
EM2014250-001	BH9_0.1	EP075-EM: 2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	<0.03	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075A: Phenolic Compounds (Halogenated) (QC Lot: 3206234) - continued									
EM2014250-001	BH9_0.1	EP075-EM: 4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP075A: Phenolic Compounds (Non-halogenated) (QC Lot: 3206234)									
EM2014250-001	BH9_0.1	EP075-EM: Phenol	108-95-2	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Methylphenol	95-48-7	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Nitrophenol	88-75-5	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dimethylphenol	105-67-9	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dinitrophenol	51-28-5	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 4-Nitrophenol	100-02-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: Dinoseb	88-85-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg	<5	<5	0.00	No Limit
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3206234)									
EM2014250-001	BH9_0.1	EP075-EM: Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2/207-08-9	1	mg/kg	<1.0	<1.0	0.00	No Limit
EP075I: Organochlorine Pesticides (QC Lot: 3206234)									
EM2014250-001	BH9_0.1	EP075-EM: alpha-BHC	319-84-6	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: beta-BHC	319-85-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: gamma-BHC	58-89-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075I: Organochlorine Pesticides (QC Lot: 3206234) - continued									
EM2014250-001	BH9_0.1	EP075-EM: delta-BHC	319-86-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor	76-44-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Aldrin	309-00-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Dieldrin	60-57-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin	72-20-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Methoxychlor	72-43-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3206232)									
EM2014250-001	BH9_0.1	EP074-UT: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3206235)									
EM2014250-001	BH9_0.1	EP071-EM: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3206232)									
EM2014250-001	BH9_0.1	EP074-UT: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
		EP074-UT: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3206235)									
EM2014250-001	BH9_0.1	EP071-EM: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (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 Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3206720)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	106	78.5	107
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	98.7	76.2	108
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	105	78.1	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	99.3	78.4	106
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	7.9 mg/kg	93.6	78.0	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	108	79.9	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	106	92.0	110
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.1 mg/kg	84.3	80.0	108
EG005T: Tin	7440-31-5	5	mg/kg	<5	5.2 mg/kg	98.6	78.4	117
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	108	79.1	110
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3206719)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	94.6	76.9	110
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3206239)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	20 mg/kg	88.8	70.0	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 3206240)								
EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	20 mg/kg	80.8	70.0	130
EK040T: Fluoride Total (QCLot: 3206237)								
EK040T: Fluoride	16984-48-8	40	mg/kg	<40	400 mg/kg	83.2	75.2	110
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3206236)								
EP066-EM: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	98.0	70.8	136
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3206232)								
EP074-UT: Benzene	71-43-2	0.2	mg/kg	<0.2	2.1 mg/kg	100	69.2	116
EP074-UT: Toluene	108-88-3	0.5	mg/kg	<0.5	2.1 mg/kg	99.8	67.7	116
EP074-UT: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2.1 mg/kg	98.5	66.6	115
EP074-UT: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4.2 mg/kg	97.7	65.2	112
EP074-UT: Styrene	100-42-5	0.5	mg/kg	<0.5	2.1 mg/kg	95.4	69.4	111
EP074-UT: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2.1 mg/kg	95.4	68.4	110
EP074H: Naphthalene (QCLot: 3206232)								
EP074-UT: Naphthalene	91-20-3	1	mg/kg	<1	0.6 mg/kg	108	72.3	114
EP074I: Volatile Halogenated Compounds (QCLot: 3206232)								
EP074-UT: Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	0.1 mg/kg	93.0	47.0	138
EP074-UT: 1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	0.1 mg/kg	96.0	57.6	125

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074I: Volatile Halogenated Compounds (QCLot: 3206232) - continued								
EP074-UT: Methylene chloride	75-09-2	0.4	mg/kg	<0.4	2.1 mg/kg	91.7	72.3	115
EP074-UT: trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	0.1 mg/kg	97.2	60.5	122
EP074-UT: cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	0.1 mg/kg	91.8	70.3	112
EP074-UT: Chloroform	67-66-3	0.02	mg/kg	<0.02	0.1 mg/kg	90.6	66.6	115
EP074-UT: 1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	0.1 mg/kg	95.2	64.4	122
EP074-UT: Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	0.1 mg/kg	97.1	58.4	127
EP074-UT: 1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	0.1 mg/kg	88.1	72.9	114
EP074-UT: Trichloroethene	79-01-6	0.02	mg/kg	<0.02	0.1 mg/kg	96.6	64.7	115
EP074-UT: 1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	0.1 mg/kg	99.8	72.6	116
EP074-UT: Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	0.1 mg/kg	98.7	60.0	119
EP074-UT: 1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	0.1 mg/kg	99.0	71.8	116
EP074-UT: 1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	0.1 mg/kg	95.5	66.1	116
EP074-UT: Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	0.1 mg/kg	107	39.8	128
EP074-UT: Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	0.1 mg/kg	96.9	70.3	113
EP074-UT: 1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	0.1 mg/kg	98.4	62.6	113
EP074-UT: 1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	0.1 mg/kg	99.3	70.8	110
EP074-UT: 1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	0.1 mg/kg	106	48.4	120
EP075A: Phenolic Compounds (Halogenated) (QCLot: 3206234)								
EP075-EM: 2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	2 mg/kg	110	71.4	123
EP075-EM: 2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	2 mg/kg	106	73.1	132
EP075-EM: 2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	2 mg/kg	108	72.2	132
EP075-EM: 4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	2 mg/kg	108	70.8	128
EP075-EM: 2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	2 mg/kg	106	70.9	134
EP075-EM: 2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	2 mg/kg	110	70.9	126
EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	2 mg/kg	106	61.9	126
EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/5 8-90-2	0.05	mg/kg	<0.05	4 mg/kg	102	47.2	128
EP075-EM: Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	4 mg/kg	99.9	44.0	135
EP075A: Phenolic Compounds (Non-halogenated) (QCLot: 3206234)								
EP075-EM: Phenol	108-95-2	1	mg/kg	<1	2 mg/kg	106	71.5	127
EP075-EM: 2-Methylphenol	95-48-7	1	mg/kg	<1	2 mg/kg	106	70.2	129
EP075-EM: 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	4 mg/kg	106	74.0	130
EP075-EM: 2-Nitrophenol	88-75-5	1	mg/kg	<1	2 mg/kg	104	70.9	133
EP075-EM: 2.4-Dimethylphenol	105-67-9	1	mg/kg	<1	2 mg/kg	102	64.8	132
EP075-EM: 2.4-Dinitrophenol	51-28-5	5	mg/kg	<5	10 mg/kg	71.8	41.0	156
EP075-EM: 4-Nitrophenol	100-02-7	5	mg/kg	<5	10 mg/kg	107	52.6	128
EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg	<5	10 mg/kg	101	42.6	125
EP075-EM: Dinoseb	88-85-7	5	mg/kg	<5	10 mg/kg	106	47.3	128
EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg	<5	1 mg/kg	95.9	34.5	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3206234)								
EP075-EM: Naphthalene	91-20-3	0.5	mg/kg	<0.5	2 mg/kg	107	73.0	131
EP075-EM: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	2 mg/kg	110	70.8	130
EP075-EM: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	2 mg/kg	110	72.0	135
EP075-EM: Fluorene	86-73-7	0.5	mg/kg	<0.5	2 mg/kg	111	74.4	131
EP075-EM: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	2 mg/kg	108	73.3	130
EP075-EM: Anthracene	120-12-7	0.5	mg/kg	<0.5	2 mg/kg	107	59.4	127
EP075-EM: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	2 mg/kg	111	75.3	132
EP075-EM: Pyrene	129-00-0	0.5	mg/kg	<0.5	2 mg/kg	113	75.4	130
EP075-EM: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	2 mg/kg	111	69.6	133
EP075-EM: Chrysene	218-01-9	0.5	mg/kg	<0.5	2 mg/kg	113	75.0	133
EP075-EM: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1.0	4 mg/kg	116	75.8	133
EP075-EM: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	2 mg/kg	115	65.1	130
EP075-EM: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	2 mg/kg	111	72.1	134
EP075-EM: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	2 mg/kg	112	72.9	135
EP075-EM: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	2 mg/kg	112	71.3	134
EP075I: Organochlorine Pesticides (QCLot: 3206234)								
EP075-EM: alpha-BHC	319-84-6	0.03	mg/kg	<0.03	2 mg/kg	111	71.0	129
EP075-EM: Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	2 mg/kg	111	65.9	125
EP075-EM: beta-BHC	319-85-7	0.03	mg/kg	<0.03	2 mg/kg	110	66.2	130
EP075-EM: gamma-BHC	58-89-9	0.03	mg/kg	<0.03	2 mg/kg	114	70.8	130
EP075-EM: delta-BHC	319-86-8	0.03	mg/kg	<0.03	2 mg/kg	110	68.7	134
EP075-EM: Heptachlor	76-44-8	0.03	mg/kg	<0.03	2 mg/kg	108	67.2	131
EP075-EM: Aldrin	309-00-2	0.03	mg/kg	<0.03	2 mg/kg	108	70.2	130
EP075-EM: Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	2 mg/kg	110	65.6	130
EP075-EM: cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	2 mg/kg	111	65.3	133
EP075-EM: trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	2 mg/kg	109	66.7	131
EP075-EM: Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	2 mg/kg	113	67.9	135
EP075-EM: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	2 mg/kg	103	70.9	132
EP075-EM: Dieldrin	60-57-1	0.03	mg/kg	<0.03	2 mg/kg	109	70.0	133
EP075-EM: Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	2 mg/kg	110	49.6	157
EP075-EM: Endrin	72-20-8	0.03	mg/kg	<0.03	2 mg/kg	89.1	55.4	148
EP075-EM: Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	2 mg/kg	111	71.4	135
EP075-EM: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	2 mg/kg	116	74.8	134
EP075-EM: Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	2 mg/kg	114	70.2	135
EP075-EM: 4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	2 mg/kg	113	67.1	133
EP075-EM: Methoxychlor	72-43-5	0.03	mg/kg	<0.03	2 mg/kg	116	63.6	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3206232)								
EP074-UT: C6 - C9 Fraction	----	10	mg/kg	<10	39.6 mg/kg	100	61.1	119

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3206235)								
EP071-EM: C10 - C14 Fraction	----	50	mg/kg	<50	900 mg/kg	102	69.9	128
EP071-EM: C15 - C28 Fraction	----	100	mg/kg	<100	3030 mg/kg	103	83.0	124
EP071-EM: C29 - C36 Fraction	----	100	mg/kg	<100	1520 mg/kg	101	76.9	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3206232)								
EP074-UT: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	48.9 mg/kg	101	59.9	119
EP074-UT: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3206235)								
EP071-EM: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	99.8	70.2	126
EP071-EM: >C16 - C34 Fraction	----	100	mg/kg	<100	4020 mg/kg	102	81.4	120
EP071-EM: >C34 - C40 Fraction	----	100	mg/kg	<100	280 mg/kg	106	53.4	129

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	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3206720)							
EM2014250-002	BH9_0.5	EG005T: Arsenic	7440-38-2	50 mg/kg	94 9	78.0	124
		EG005T: Cadmium	7440-43-9	50 mg/kg	96 8	84.0	116
		EG005T: Copper	7440-50-8	250 mg/kg	98 9	80.0	120
		EG005T: Lead	7439-92-1	250 mg/kg	97.6	80.0	120
		EG005T: Nickel	7440-02-0	50 mg/kg	109	78.0	120
		EG005T: Zinc	7440-66-6	250 mg/kg	94 3	80.0	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3206719)							
EM2014250-002	BH9_0.5	EG035T: Mercury	7439-97-6	0.5 mg/kg	99.6	76.0	116
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3206239)							
EM2014250-002	BH9_0.5	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	64.4	58.0	114
EM2014250-002	BH9_0.5	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	75 9	58.0	114
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 3206240)							
EM2014250-002	BH9_0.5	EK026SF: Total Cyanide	57-12-5	20 mg/kg	106	70.0	130
EK040T: Fluoride Total (QCLot: 3206237)							
EM2014250-002	BH9_0.5	EK040T: Fluoride	16984-48-8	400 mg/kg	98 2	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3206236)							
EM2014250-008	BH10_1	EP066-EM: Total Polychlorinated biphenyls	----	1 mg/kg	93.1	36.0	152

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3206232)							
EM2014250-002	BH9_0.5	EP074-UT: Benzene	71-43-2	2 mg/kg	92 2	50.0	138
		EP074-UT: Toluene	108-88-3	2 mg/kg	95 2	56.0	134
EP074I: Volatile Halogenated Compounds (QCLot: 3206232)							
EM2014250-002	BH9_0.5	EP074-UT: 1.1-Dichloroethene	75-35-4	2 mg/kg	90.7	26.0	141
		EP074-UT: Trichloroethene	79-01-6	2 mg/kg	96 8	50.0	134
		EP074-UT: Chlorobenzene	108-90-7	2 mg/kg	102	28.0	134
EP075A: Phenolic Compounds (Halogenated) (QCLot: 3206234)							
EM2014250-002	BH9_0.5	EP075-EM: 2-Chlorophenol	95-57-8	3 mg/kg	116	34.0	118
		EP075-EM: 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	113	41.0	139
		EP075-EM: Pentachlorophenol	87-86-5	3 mg/kg	95 0	10.0	144
EP075A: Phenolic Compounds (Non-halogenated) (QCLot: 3206234)							
EM2014250-002	BH9_0.5	EP075-EM: Phenol	108-95-2	3 mg/kg	116	31.5	134
		EP075-EM: 2-Nitrophenol	88-75-5	3 mg/kg	112	13.0	129
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3206234)							
EM2014250-002	BH9_0.5	EP075-EM: Acenaphthene	83-32-9	3 mg/kg	110	46.0	138
		EP075-EM: Pyrene	129-00-0	3 mg/kg	115	26.5	169
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3206232)							
EM2014250-002	BH9_0.5	EP074-UT: C6 - C9 Fraction	----	28 mg/kg	84 2	43.0	111
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3206235)							
EM2014250-006	BH10_0.1	EP071-EM: C10 - C14 Fraction	----	900 mg/kg	89 0	53.0	123
		EP071-EM: C15 - C28 Fraction	----	3030 mg/kg	92 2	70.0	124
		EP071-EM: C29 - C36 Fraction	----	1520 mg/kg	90.4	64.0	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3206232)							
EM2014250-002	BH9_0.5	EP074-UT: C6 - C10 Fraction	C6_C10	33 mg/kg	83 9	42.0	106
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3206235)							
EM2014250-006	BH10_0.1	EP071-EM: >C10 - C16 Fraction	----	1160 mg/kg	87 9	65.0	123
		EP071-EM: >C16 - C34 Fraction	----	4020 mg/kg	92 0	67.0	121
		EP071-EM: >C34 - C40 Fraction	----	280 mg/kg	93 8	44.0	126

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2014250**	Page	: 1 of 8
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 12529997/08	Date Samples Received	: 17-Aug-2020
Site	: ----	Issue Date	: 20-Aug-2020
Sampler	: [redacted]	No. of samples received	: 10
Order number	: 12529997/08	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 Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG035T: Total Recoverable Mercury by FIMS	EM2014298--001	Anonymous	**Mercury**	7439-97-6	43.5 %	0% - 20%	**RPD exceeds LOR based limits**

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; o hers 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
EA001: pH in soil using 0.01M CaCl extract								
Soil Glass Jar - Frozen on receipt (EA001)								
BH10_0.1, DUP01	BH10_1,	**14-Aug-2020**	**19-Aug-2020**	21-Aug-2020	✓	**19-Aug-2020**	19-Aug-2020	✓
Soil Glass Jar - Unpreserved (EA001)								
BH9_0.1,	BH9_0.5	**14-Aug-2020**	**19-Aug-2020**	21-Aug-2020	✓	**19-Aug-2020**	19-Aug-2020	✓
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH9_0.1, BH9_1,	BH9_0.5, BH9_2	**14-Aug-2020**	**19-Aug-2020**	10-Feb-2021	✓	**19-Aug-2020**	10-Feb-2021	✓
Snap Lock Bag - frozen on receipt at ALS (EA037)								
BH9_4		**14-Aug-2020**	**19-Aug-2020**	10-Feb-2021	✓	**19-Aug-2020**	10-Feb-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Frozen on receipt (EA055)								
BH10_0.1, DUP01	BH10_1,	**14-Aug-2020**	**----**	----	----	**19-Aug-2020**	10-Feb-2021	✓
Soil Glass Jar - Unpreserved (EA055)								
BH9_0.1,	BH9_0.5	**14-Aug-2020**	**----**	----	----	**19-Aug-2020**	28-Aug-2020	✓
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Frozen on receipt (EG005T)								
BH10_0.1, DUP01	BH10_1,	**14-Aug-2020**	**19-Aug-2020**	10-Feb-2021	✓	**19-Aug-2020**	10-Feb-2021	✓
Soil Glass Jar - Unpreserved (EG005T)								
BH9_0.1,	BH9_0.5	**14-Aug-2020**	**19-Aug-2020**	10-Feb-2021	✓	**19-Aug-2020**	10-Feb-2021	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Frozen on receipt (EG035T) BH10_0.1, DUP01 BH10_1,	**14-Aug-2020**	**19-Aug-2020**	11-Sep-2020	✓	**19-Aug-2020**	11-Sep-2020	✓
Soil Glass Jar - Unpreserved (EG035T) BH9_0.1, BH9_0.5	**14-Aug-2020**	**19-Aug-2020**	11-Sep-2020	✓	**19-Aug-2020**	11-Sep-2020	✓
EG048: Hexavalent Chromium (Alkaline Digest)							
Soil Glass Jar - Frozen on receipt (EG048G) BH10_0.1, DUP01 BH10_1,	**14-Aug-2020**	**18-Aug-2020**	11-Sep-2020	✓	**18-Aug-2020**	25-Aug-2020	✓
Soil Glass Jar - Unpreserved (EG048G) BH9_0.1, BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	11-Sep-2020	✓	**18-Aug-2020**	25-Aug-2020	✓
EK026SF: Total CN by Segmented Flow Analyser							
Soil Glass Jar - Frozen on receipt (EK026SF) BH10_0.1, DUP01 BH10_1,	**14-Aug-2020**	**18-Aug-2020**	28-Aug-2020	✓	**19-Aug-2020**	01-Sep-2020	✓
Soil Glass Jar - Unpreserved (EK026SF) BH9_0.1, BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	28-Aug-2020	✓	**19-Aug-2020**	01-Sep-2020	✓
EK040T: Fluoride Total							
Soil Glass Jar - Frozen on receipt (EK040T) BH10_0.1, DUP01 BH10_1,	**14-Aug-2020**	**18-Aug-2020**	11-Sep-2020	✓	**20-Aug-2020**	11-Sep-2020	✓
Soil Glass Jar - Unpreserved (EK040T) BH9_0.1, BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	11-Sep-2020	✓	**20-Aug-2020**	11-Sep-2020	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Frozen on receipt (EP066-EM) BH10_0.1, DUP01 BH10_1,	**14-Aug-2020**	**18-Aug-2020**	28-Aug-2020	✓	**18-Aug-2020**	27-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP066-EM) BH9_0.1, BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	28-Aug-2020	✓	**18-Aug-2020**	27-Sep-2020	✓
EP074A: Monocyclic Aromatic Hydrocarbons							
Soil Glass Jar - Frozen on receipt (EP074-UT) BH10_0.1, DUP01 BH10_1,	**14-Aug-2020**	**18-Aug-2020**	21-Aug-2020	✓	**18-Aug-2020**	21-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT) BH9_0.1, BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	21-Aug-2020	✓	**18-Aug-2020**	21-Aug-2020	✓
EP074H: Naphthalene							
Soil Glass Jar - Frozen on receipt (EP074-UT) BH10_0.1, DUP01 BH10_1,	**14-Aug-2020**	**18-Aug-2020**	21-Aug-2020	✓	**18-Aug-2020**	21-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT) BH9_0.1, BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	21-Aug-2020	✓	**18-Aug-2020**	21-Aug-2020	✓

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
EP074I: Volatile Halogenated Compounds								
Soil Glass Jar - Frozen on receipt (EP074-UT)								
BH10_0.1, DUP01	BH10_1,	**14-Aug-2020**	**18-Aug-2020**	21-Aug-2020	✓	**18-Aug-2020**	21-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH9_0.1,	BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	21-Aug-2020	✓	**18-Aug-2020**	21-Aug-2020	✓
EP075A: Phenolic Compounds (Halogenated)								
Soil Glass Jar - Frozen on receipt (EP075-EM)								
BH10_0.1, DUP01	BH10_1,	**14-Aug-2020**	**18-Aug-2020**	28-Aug-2020	✓	**18-Aug-2020**	27-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH9_0.1,	BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	28-Aug-2020	✓	**18-Aug-2020**	27-Sep-2020	✓
EP075A: Phenolic Compounds (Non-halogenated)								
Soil Glass Jar - Frozen on receipt (EP075-EM)								
BH10_0.1, DUP01	BH10_1,	**14-Aug-2020**	**18-Aug-2020**	28-Aug-2020	✓	**18-Aug-2020**	27-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH9_0.1,	BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	28-Aug-2020	✓	**18-Aug-2020**	27-Sep-2020	✓
EP075B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Frozen on receipt (EP075-EM)								
BH10_0.1, DUP01	BH10_1,	**14-Aug-2020**	**18-Aug-2020**	28-Aug-2020	✓	**18-Aug-2020**	27-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH9_0.1,	BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	28-Aug-2020	✓	**18-Aug-2020**	27-Sep-2020	✓
EP075I: Organochlorine Pesticides								
Soil Glass Jar - Frozen on receipt (EP075-EM)								
BH10_0.1, DUP01	BH10_1,	**14-Aug-2020**	**18-Aug-2020**	28-Aug-2020	✓	**18-Aug-2020**	27-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP075-EM)								
BH9_0.1,	BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	28-Aug-2020	✓	**18-Aug-2020**	27-Sep-2020	✓
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Frozen on receipt (EP074-UT)								
BH10_0.1, DUP01	BH10_1,	**14-Aug-2020**	**18-Aug-2020**	21-Aug-2020	✓	**18-Aug-2020**	21-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH9_0.1,	BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	21-Aug-2020	✓	**18-Aug-2020**	21-Aug-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Frozen on receipt (EP074-UT)								
BH10_0.1, DUP01	BH10_1,	**14-Aug-2020**	**18-Aug-2020**	21-Aug-2020	✓	**18-Aug-2020**	21-Aug-2020	✓
Soil Glass Jar - Unpreserved (EP074-UT)								
BH9_0.1,	BH9_0.5	**14-Aug-2020**	**18-Aug-2020**	21-Aug-2020	✓	**18-Aug-2020**	21-Aug-2020	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH in soil using a 0.01M CaCl2 extract	EA001	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**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
TRH - Semivolatile Fraction	EP071-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**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
TRH - Semivolatile Fraction	EP071-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	5	**20.00**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Cyanide by Segmented Flow Analyser	EK026SF	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**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
TRH - Semivolatile Fraction	EP071-EM	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	5	**20.00**	**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.

Analytical Methods	Method	Matrix	Method Descriptions
pH in soil using a 0.01M CaCl2 extract	EA001	SOIL	In house: Referenced to Rayment and Lyons 4B3 (mod.) or 4B4 (mod.) 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
ASS Field Screening Analysis	* EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.
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 AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (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 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)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3)
Total Cyanide by Segmented Flow Analyser	EK026SF	SOIL	In house: Referenced to APHA 4500-CN C / ASTM D7511. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM Schedule B(3).
Total Fluoride	EK040T	SOIL	(In-house) Total fluoride is determined by ion specific electrode (ISE) in a solution obtained after a Sodium Carbonate / Potassium Carbonate fusion dissolution.
PCB - VIC EPA 448.3 Screen	EP066-EM	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 method is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071-EM	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against a kane standards over the range C10 - C40.

Analytical Methods	Method	Matrix	Method Descriptions
Volatile Organic Compounds - Ultra-trace	EP074-UT	SOIL	In house: Referenced to USEPA SW 846 - 8260 Extracts are analysed by Purge and Trap, Capillary GC/MS in partial SIM/Scan mode. Quantification is by comparison against an established multi-point calibration curves. This method is compliant with NEPM Schedule B(3).
Volatile Organic Compounds - Ultra-trace - Summations	EP074-UT-SUM	SOIL	Summation of MAHs and VHCs
Semivolatile Organic Compounds - Waste Classification	EP075-EM	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).
SVOC - Waste Classification (Sums)	EP075-EM-SUM	SOIL	Summations for EP075 (EM variation)

Preparation Methods	Method	Matrix	Method Descriptions
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
pH in soil using a 0.01M CaCl2 extract	EA001-PR	SOIL	In house: Referenced to Rayment and Higginson 4B1, 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
Total Fluoride	EK040T-PR	SOIL	In house: Samples are fused with Sodium Carbonate / Potassium Carbonate flux.
Drying only	* EN020D	SOIL	In house
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).
Methanolic Extraction of Soils - Ultra-trace.	ORG16-UT	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 - VIC EPA Screen	ORG17-EM	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.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM2014250**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Facsimile	: [redacted]	Facsimile	: [redacted]
Project	: 12529997/08	Page	: 1 of 3
Order number	: 12529997/08	Quote number	: EM2018GHDSER0037 (EN/005/17 (Victoria Primary Quote))
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: [redacted]		

Dates

Date Samples Received	: 17-Aug-2020 12:10	Issue Date	: 18-Aug-2020
Client Requested Due Date	: 24-Aug-2020	Scheduled Reporting Date	: **24-Aug-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 2.2°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 10 / 8

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

Method / Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Hexavalent Chromium by Alkaline Digestion and DA Finish : EG048G		
BH10_0.1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
BH10_1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
DUP01	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
PCB - VIC EPA 448.3 Screen : EP066-EM		
BH10_0.1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
BH10_1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
DUP01	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
pH in soil using a 0.01M CaCl2 extract : EA001		
BH10_0.1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
BH10_1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
DUP01	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
Semivolatile Organic Compounds - Waste Classification : EP075-EM		
BH10_0.1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
BH10_1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
DUP01	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
Total Cyanide by Segmented Flow Analyser : EK026SF		
BH10_0.1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
BH10_1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
DUP01	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
Total Fluoride : EK040T		
BH10_0.1	- Soil Glass Jar - Frozen on receipt	- Pulp Bag
BH10_1	- Soil Glass Jar - Frozen on receipt	- Pulp Bag
DUP01	- Soil Glass Jar - Frozen on receipt	- Pulp Bag
Total Mercury by FIMS : EG035T		
BH10_0.1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
BH10_1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
DUP01	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
Total Metals by ICP-AES : EG005T		
BH10_0.1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
BH10_1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
DUP01	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
TRH - Semivolatile Fraction : EP071-EM		
BH10_0.1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
BH10_1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
DUP01	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
Volatile Organic Compounds - Ultra-trace : EP074-UT		
BH10_0.1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
BH10_1	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved
DUP01	- Soil Glass Jar - Frozen on receipt	- Soil Glass Jar - Unpreserved

Summary of Sample(s) and Requested Analysis

Some items descr bed below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA037 ASS Field Screening Analysis	SOIL - EA055-103 Moisture Content	SOIL - P-16 IWRG 621
EM2014250-001	14-Aug-2020 00:00	BH9_0.1		✓	✓	✓
EM2014250-002	14-Aug-2020 00:00	BH9_0.5		✓	✓	✓
EM2014250-003	14-Aug-2020 00:00	BH9_1		✓		
EM2014250-004	14-Aug-2020 00:00	BH9_2		✓		
EM2014250-005	14-Aug-2020 00:00	BH9_4		✓		
EM2014250-006	14-Aug-2020 00:00	BH10_0.1			✓	✓
EM2014250-007	14-Aug-2020 00:00	BH10_0.5	✓			
EM2014250-008	14-Aug-2020 00:00	BH10_1			✓	✓
EM2014250-009	14-Aug-2020 00:00	BH10_2	✓			
EM2014250-010	14-Aug-2020 00:00	DUP01			✓	✓

Proactive Holding Time Report

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

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV) — Email — accountspayableAU@ghd.com

GHD LAB REPORTS

- *AU Certificate of Analysis - NATA (COA) — Email — ghdlabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — ghdlabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — ghdlabreports@ghd.com
- EDI Format - ESDAT (ESDAT) — Email — ghdlabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT) — Email — ghdlabreports@ghd.com

[redacted]

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0980 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah 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 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/3 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: [illegible]
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☑ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: Melbourne		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: 12529997/08	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free Ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: 12529997/08		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: [redacted]	CONTACT PH:	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: [redacted]	SAMPLER MOBILE: [redacted]	RELINQUISHED BY: ADW	RECEIVED BY:
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default): Esdat	DATE/TIME: 17/08/2020	DATE/TIME:
Email Reports to (will default to PM if no other addresses are listed):		RELINQUISHED BY:	RECEIVED BY: Mone
Email Invoice to (will default to PM if no other addresses are listed):		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 (refer to codes below)	TOTAL CONTAINERS	HOLD	ASS field screen		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH09_0.1	14-Aug-20	Soil			✓	✓		
2	BH09_0.5	14-Aug-20	Soil			✓	✓		
3	BH09_1	14-Aug-20	Soil			✓	✓		
4	BH09_2	14-Aug-20	Soil			✓	✓		
5	BH09_4	14-Aug-20	Soil			[redacted]	✓		
6	BH10_0.1	14-Aug-20	Soil			✓	✓		
7	BH10_0.5	14-Aug-20	Soil			✓	✓		
8	BH10_1	14-Aug-20	Soil			✓	✓		
9	BH10_2	14-Aug-20	Soil			✓			
10	DUP01	14-Aug-20	Soil			✓			
				TOTAL					

Environmental Division
Melbourne
Work Order Reference
EM2014250

Telephone : +61-3-8549 9600

•All samples collected 14/Aug/2020
•Jars kept on ice in eskie over weekend.
•ASS samples frozen on 14/Aug & placed in eskie for pick up by lab

Received: 17/8 Carrier:
C/note:
Temp: 2 °C Seal: Y N
Ice / Ice bricks / NA

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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2014371**	Page	: 1 of 13
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: [redacted]
Project	: 12529997/08	Date Samples Received	: 19-Aug-2020 16:00
Order number	: ----	Date Analysis Commenced	: 20-Aug-2020
C-O-C number	: ----	Issue Date	: 27-Aug-2020 16:23
Sampler	: MM		
Site	: ----		
Quote number	: ME/458/20		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
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. 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.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
[redacted]	Senior Inorganic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Me bourne Organics, Springvale, VIC
[redacted]	Senior Inorganic Instrument Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	Laboratory Coordinator	WRG Subcontracting, Springvale, VIC

General Comments

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

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

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

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

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

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

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

- EA005-P: EM2014450 #10 Poor duplicate precision for pH due to sample heterogeneity. Confirmed by re-preparation and re-analysis.
- EA010-P: Electrical Conductivity @ 25°C was analysed by manual method (EA010).
- 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.
- EP075: 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.
- EP074: Where reported, Total Trihalomethanes is the sum of the reported concentrations of all Trihalomethanes at or above the LOR.
- EP074: Where reported, Total Trimethylbenzenes is the sum of the reported concentrations of 1.2.3-Trimethylbenzene, 1.2.4-Trimethylbenzene and 1.3.5-Trimethylbenzene 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.
- MBAS (EP050) is calculated as LAS, molecular weight 348 g/mol.
- EA015H: EM2014371 #2: TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- The analytical BOD run containing samples from this work order recovered the certified reference standard within acceptable criteria but the dilution water blank was elevated above 0.2 mg/L.
- EP075: Where reported, 'Sum of PAH' is the sum of the USEPA 16 priority PAHs
- E.coli & Total Coliforms by MPN (MM514) is conducted by ALS Scoresby NATA accreditation no. 992, site no. 989.
- 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: GROUNDWATER (Matrix: WATER)				Client sample ID	BH14	BH12	BH23A	----	----
				Client sampling date / time	18-Aug-2020 00:00	18-Aug-2020 00:00	19-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014371-001	EM2014371-002	EM2014371-003	--------	--------
					Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.76**	**7.64**	**7.41**	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**2410**	**3900**	**7190**	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**1300**	**3790**	**3560**	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**25**	**15**	**12**	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**489**	**357**	**469**	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**489**	**357**	**469**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**88**	**123**	**386**	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**457**	**1090**	**1920**	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**32**	**71**	**137**	----	----
Magnesium	7439-95-4	1	mg/L		**66**	**195**	**238**	----	----
Sodium	7440-23-5	1	mg/L		**315**	**333**	**926**	----	----
Potassium	7440-09-7	1	mg/L		**9**	**13**	**32**	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		**0.001**	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		**0.016**	**0.012**	**0.022**	----	----
Nickel	7440-02-0	0.001	mg/L		**0.012**	**0.008**	**0.023**	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		**0.078**	**0.041**	**0.087**	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.03**	**0.02**	**0.90**	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH14	BH12	BH23A	----	----
				Client sampling date / time	18-Aug-2020 00:00	18-Aug-2020 00:00	19-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014371-001	EM2014371-002	EM2014371-003	--------	--------
					Result	Result	Result	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.01**	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**1.04**	**0.72**	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**1.05**	**0.72**	<0.01	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	**0.2**	**0.9**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.2**	**0.9**	**0.9**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.23**	**0.14**	**0.02**	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**24.5**	**40.4**	**71.6**	----	----
ø Total Cations	----	0.01	meq/L		**21.0**	**34.4**	**67.5**	----	----
ø Ionic Balance	----	0.01	%		**7.77**	**8.06**	**2.91**	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	<5	----	----
EP026SP: Chemical Oxygen Demand (Spectrophotometric)									
Chemical Oxygen Demand	----	10	mg/L		**14**	**16**	**24**	----	----
EP030: Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	----	2	mg/L		<2	<2	<2	----	----
EP050: Anionic Surfactants as MBAS									
Anionic Surfactants as MBAS	----	0.1	mg/L		<0.1	<0.1	<0.1	----	----
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH14	BH12	BH23A	----	----
				Client sampling date / time	18-Aug-2020 00:00	18-Aug-2020 00:00	19-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014371-001	EM2014371-002	EM2014371-003	--------	--------
					Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4.4`-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4.4`-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4.4`-DDT	50-29-3	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	<2.0	<2.0	----	----
^ **Total Chlordane (sum)**	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.5	µg/L		<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	----	----
EP074A: Monocyclic Aromatic Hydrocarbons									
Styrene	100-42-5	5	µg/L		<5	<5	<5	----	----
Isopropylbenzene	98-82-8	5	µg/L		<5	<5	<5	----	----
n-Propylbenzene	103-65-1	5	µg/L		<5	<5	<5	----	----
1.3.5-Trimethylbenzene	108-67-8	5	µg/L		<5	<5	<5	----	----
sec-Butylbenzene	135-98-8	5	µg/L		<5	<5	<5	----	----
1.2.4-Trimethylbenzene	95-63-6	5	µg/L		<5	<5	<5	----	----
tert-Butylbenzene	98-06-6	5	µg/L		<5	<5	<5	----	----
p-Isopropyltoluene	99-87-6	5	µg/L		<5	<5	<5	----	----
n-Butylbenzene	104-51-8	5	µg/L		<5	<5	<5	----	----
EP074B: Oxygenated Compounds									
Vinyl Acetate	108-05-4	50	µg/L		<50	<50	<50	----	----
2-Butanone (MEK)	78-93-3	50	µg/L		<50	<50	<50	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L		<50	<50	<50	----	----
2-Hexanone (MBK)	591-78-6	50	µg/L		<50	<50	<50	----	----
EP074C: Sulfonated Compounds									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH14	BH12	BH23A	----	----
				Client sampling date / time	18-Aug-2020 00:00	18-Aug-2020 00:00	19-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014371-001	EM2014371-002	EM2014371-003	--------	--------
					Result	Result	Result	----	----
EP074C: Sulfonated Compounds - Continued									
Carbon disulfide	75-15-0	5	µg/L		<5	<5	<5	----	----
EP074D: Fumigants									
2.2-Dichloropropane	594-20-7	5	µg/L		<5	<5	<5	----	----
1.2-Dichloropropane	78-87-5	5	µg/L		<5	<5	<5	----	----
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L		<5	<5	<5	----	----
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L		<5	<5	<5	----	----
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L		<5	<5	<5	----	----
EP074E: Halogenated Aliphatic Compounds									
Dichlorodifluoromethane	75-71-8	50	µg/L		<50	<50	<50	----	----
Chloromethane	74-87-3	50	µg/L		<50	<50	<50	----	----
Vinyl chloride	75-01-4	50	µg/L		<50	<50	<50	----	----
Bromomethane	74-83-9	50	µg/L		<50	<50	<50	----	----
Chloroethane	75-00-3	50	µg/L		<50	<50	<50	----	----
Trichlorofluoromethane	75-69-4	50	µg/L		<50	<50	<50	----	----
1.1-Dichloroethene	75-35-4	5	µg/L		<5	<5	<5	----	----
Iodomethane	74-88-4	5	µg/L		<5	<5	<5	----	----
trans-1.2-Dichloroethene	156-60-5	5	µg/L		<5	<5	<5	----	----
1.1-Dichloroethane	75-34-3	5	µg/L		<5	<5	<5	----	----
cis-1.2-Dichloroethene	156-59-2	5	µg/L		<5	<5	<5	----	----
1.1.1-Trichloroethane	71-55-6	5	µg/L		<5	<5	<5	----	----
1.1-Dichloropropylene	563-58-6	5	µg/L		<5	<5	<5	----	----
Carbon Tetrachloride	56-23-5	5	µg/L		<5	<5	<5	----	----
1.2-Dichloroethane	107-06-2	5	µg/L		<5	<5	<5	----	----
Trichloroethene	79-01-6	5	µg/L		<5	<5	<5	----	----
Dibromomethane	74-95-3	5	µg/L		<5	<5	<5	----	----
1.1.2-Trichloroethane	79-00-5	5	µg/L		<5	<5	<5	----	----
1.3-Dichloropropane	142-28-9	5	µg/L		<5	<5	<5	----	----
Tetrachloroethene	127-18-4	5	µg/L		<5	<5	<5	----	----
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L		<5	<5	<5	----	----
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L		<5	<5	<5	----	----
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L		<5	<5	<5	----	----
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L		<5	<5	<5	----	----
1.2.3-Trichloropropane	96-18-4	5	µg/L		<5	<5	<5	----	----
Pentachloroethane	76-01-7	5	µg/L		<5	<5	<5	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH14	BH12	BH23A	----	----
				Client sampling date / time	18-Aug-2020 00:00	18-Aug-2020 00:00	19-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014371-001	EM2014371-002	EM2014371-003	--------	--------
					Result	Result	Result	----	----
EP074E: Halogenated Aliphatic Compounds - Continued									
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L		<5	<5	<5	----	----
EP074F: Halogenated Aromatic Compounds									
Chlorobenzene	108-90-7	5	µg/L		<5	<5	<5	----	----
Bromobenzene	108-86-1	5	µg/L		<5	<5	<5	----	----
2-Chlorotoluene	95-49-8	5	µg/L		<5	<5	<5	----	----
4-Chlorotoluene	106-43-4	5	µg/L		<5	<5	<5	----	----
1.2.3-Trichlorobenzene	87-61-6	5	µg/L		<5	<5	<5	----	----
EP074G: Trihalomethanes									
Chloroform	67-66-3	5	µg/L		<5	<5	<5	----	----
Bromodichloromethane	75-27-4	5	µg/L		<5	<5	<5	----	----
Dibromochloromethane	124-48-1	5	µg/L		<5	<5	<5	----	----
Bromoform	75-25-2	5	µg/L		<5	<5	<5	----	----
EP075A: Phenolic Compounds									
Phenol	108-95-2	2	µg/L		<2	<2	<2	----	----
2-Chlorophenol	95-57-8	2	µg/L		<2	<2	<2	----	----
2-Methylphenol	95-48-7	2	µg/L		<2	<2	<2	----	----
3- & 4-Methylphenol	1319-77-3	4	µg/L		<4	<4	<4	----	----
2-Nitrophenol	88-75-5	2	µg/L		<2	<2	<2	----	----
2.4-Dimethylphenol	105-67-9	2	µg/L		<2	<2	<2	----	----
2.4-Dichlorophenol	120-83-2	2	µg/L		<2	<2	<2	----	----
2.6-Dichlorophenol	87-65-0	2	µg/L		<2	<2	<2	----	----
4-Chloro-3-methylphenol	59-50-7	2	µg/L		<2	<2	<2	----	----
2.4.6-Trichlorophenol	88-06-2	2	µg/L		<2	<2	<2	----	----
2.4.5-Trichlorophenol	95-95-4	2	µg/L		<2	<2	<2	----	----
Pentachlorophenol	87-86-5	4	µg/L		<4	<4	<4	----	----
EP075B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	2	µg/L		<2	<2	<2	----	----
2-Methylnaphthalene	91-57-6	2	µg/L		<2	<2	<2	----	----
2-Chloronaphthalene	91-58-7	2	µg/L		<2	<2	<2	----	----
Acenaphthylene	208-96-8	2	µg/L		<2	<2	<2	----	----
Acenaphthene	83-32-9	2	µg/L		<2	<2	<2	----	----
Fluorene	86-73-7	2	µg/L		<2	<2	<2	----	----
Phenanthrene	85-01-8	2	µg/L		<2	<2	<2	----	----
Anthracene	120-12-7	2	µg/L		<2	<2	<2	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH14	BH12	BH23A	----	----
				Client sampling date / time	18-Aug-2020 00:00	18-Aug-2020 00:00	19-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014371-001	EM2014371-002	EM2014371-003	--------	--------
					Result	Result	Result	----	----
EP075B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluoranthene	206-44-0	2	µg/L		<2	<2	<2	----	----
Pyrene	129-00-0	2	µg/L		<2	<2	<2	----	----
N-2-Fluorenyl Acetamide	53-96-3	2	µg/L		<2	<2	<2	----	----
Benz(a)anthracene	56-55-3	2	µg/L		<2	<2	<2	----	----
Chrysene	218-01-9	2	µg/L		<2	<2	<2	----	----
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	4	µg/L		<4	<4	<4	----	----
7.12-Dimethylbenz(a)anthracene	57-97-6	2	µg/L		<2	<2	<2	----	----
Benzo(a)pyrene	50-32-8	2	µg/L		<2	<2	<2	----	----
3-Methylcholanthrene	56-49-5	2	µg/L		<2	<2	<2	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	2	µg/L		<2	<2	<2	----	----
Dibenz(a.h)anthracene	53-70-3	2	µg/L		<2	<2	<2	----	----
Benzo(g.h.i)perylene	191-24-2	2	µg/L		<2	<2	<2	----	----
^ Sum of PAHs	----	2	µg/L		<2	<2	<2	----	----
^ Benzo(a)pyrene TEQ (zero)	----	2	µg/L		<2	<2	<2	----	----
EP075C: Phthalate Esters									
Dimethyl phthalate	131-11-3	2	µg/L		<2	<2	<2	----	----
Diethyl phthalate	84-66-2	2	µg/L		<2	<2	<2	----	----
Di-n-butyl phthalate	84-74-2	2	µg/L		<2	<2	<2	----	----
Butyl benzyl phthalate	85-68-7	2	µg/L		<2	<2	<2	----	----
bis(2-ethylhexyl) phthalate	117-81-7	10	µg/L		<10	<10	<10	----	----
Di-n-octylphthalate	117-84-0	2	µg/L		<2	<2	<2	----	----
EP075D: Nitrosamines									
N-Nitrosomethylethylamine	10595-95-6	2	µg/L		<2	<2	<2	----	----
N-Nitrosodiethylamine	55-18-5	2	µg/L		<2	<2	<2	----	----
N-Nitrosopyrrolidine	930-55-2	4	µg/L		<4	<4	<4	----	----
N-Nitrosomorpholine	59-89-2	2	µg/L		<2	<2	<2	----	----
N-Nitrosodi-n-propylamine	621-64-7	2	µg/L		<2	<2	<2	----	----
N-Nitrosopiperidine	100-75-4	2	µg/L		<2	<2	<2	----	----
N-Nitrosodibutylamine	924-16-3	2	µg/L		<2	<2	<2	----	----
N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	4	µg/L		<4	<4	<4	----	----
Methapyrilene	91-80-5	2	µg/L		<2	<2	<2	----	----
EP075E: Nitroaromatics and Ketones									
2-Picoline	109-06-8	2	µg/L		<2	<2	<2	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH14	BH12	BH23A	----	----
				Client sampling date / time	18-Aug-2020 00:00	18-Aug-2020 00:00	19-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014371-001	EM2014371-002	EM2014371-003	--------	--------
					Result	Result	Result	----	----
EP075E: Nitroaromatics and Ketones - Continued									
Acetophenone	98-86-2	2	µg/L		<2	<2	<2	----	----
Nitrobenzene	98-95-3	2	µg/L		<2	<2	<2	----	----
Isophorone	78-59-1	2	µg/L		<2	<2	<2	----	----
2.6-Dinitrotoluene	606-20-2	4	µg/L		<4	<4	<4	----	----
2.4-Dinitrotoluene	121-14-2	4	µg/L		<4	<4	<4	----	----
1-Naphthylamine	134-32-7	2	µg/L		<2	<2	<2	----	----
4-Nitroquinoline-N-oxide	56-57-5	2	µg/L		<2	<2	<2	----	----
5-Nitro-o-toluidine	99-55-8	2	µg/L		<2	<2	<2	----	----
Azobenzene	103-33-3	2	µg/L		<2	<2	<2	----	----
1.3.5-Trinitrobenzene	99-35-4	2	µg/L		<2	<2	<2	----	----
Phenacetin	62-44-2	2	µg/L		<2	<2	<2	----	----
4-Aminobiphenyl	92-67-1	2	µg/L		<2	<2	<2	----	----
Pentachloronitrobenzene	82-68-8	2	µg/L		<2	<2	<2	----	----
Pronamide	23950-58-5	2	µg/L		<2	<2	<2	----	----
Dimethylaminoazobenzene	60-11-7	2	µg/L		<2	<2	<2	----	----
Chlorobenzilate	510-15-6	2	µg/L		<2	<2	<2	----	----
EP075F: Haloethers									
Bis(2-chloroethyl) ether	111-44-4	2	µg/L		<2	<2	<2	----	----
Bis(2-chloroethoxy) methane	111-91-1	2	µg/L		<2	<2	<2	----	----
4-Chlorophenyl phenyl ether	7005-72-3	2	µg/L		<2	<2	<2	----	----
4-Bromophenyl phenyl ether	101-55-3	2	µg/L		<2	<2	<2	----	----
EP075G: Chlorinated Hydrocarbons									
1.3-Dichlorobenzene	541-73-1	2	µg/L		<2	<2	<2	----	----
1.4-Dichlorobenzene	106-46-7	2	µg/L		<2	<2	<2	----	----
1.2-Dichlorobenzene	95-50-1	2	µg/L		<2	<2	<2	----	----
Hexachloroethane	67-72-1	2	µg/L		<2	<2	<2	----	----
1.2.4-Trichlorobenzene	120-82-1	2	µg/L		<2	<2	<2	----	----
Hexachloropropylene	1888-71-7	2	µg/L		<2	<2	<2	----	----
Hexachlorobutadiene	87-68-3	2	µg/L		<2	<2	<2	----	----
Hexachlorocyclopentadiene	77-47-4	10	µg/L		<10	<10	<10	----	----
Pentachlorobenzene	608-93-5	2	µg/L		<2	<2	<2	----	----
Hexachlorobenzene (HCB)	118-74-1	4	µg/L		<4	<4	<4	----	----
EP075H: Anilines and Benzidines									
Aniline	62-53-3	2	µg/L		<2	<2	<2	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH14	BH12	BH23A	----	----
				Client sampling date / time	18-Aug-2020 00:00	18-Aug-2020 00:00	19-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014371-001	EM2014371-002	EM2014371-003	--------	--------
					Result	Result	Result	----	----
EP075H: Anilines and Benzidines - Continued									
4-Chloroaniline	106-47-8	2	µg/L		<2	<2	<2	----	----
2-Nitroaniline	88-74-4	4	µg/L		<4	<4	<4	----	----
3-Nitroaniline	99-09-2	4	µg/L		<4	<4	<4	----	----
Dibenzofuran	132-64-9	2	µg/L		<2	<2	<2	----	----
4-Nitroaniline	100-01-6	2	µg/L		<2	<2	<2	----	----
Carbazole	86-74-8	2	µg/L		<2	<2	<2	----	----
3.3`-Dichlorobenzidine	91-94-1	2	µg/L		<2	<2	<2	----	----
EP075I: Organochlorine Pesticides									
alpha-BHC	319-84-6	2	µg/L		<2	<2	<2	----	----
beta-BHC	319-85-7	2	µg/L		<2	<2	<2	----	----
gamma-BHC	58-89-9	2	µg/L		<2	<2	<2	----	----
delta-BHC	319-86-8	2	µg/L		<2	<2	<2	----	----
Heptachlor	76-44-8	2	µg/L		<2	<2	<2	----	----
Aldrin	309-00-2	2	µg/L		<2	<2	<2	----	----
Heptachlor epoxide	1024-57-3	2	µg/L		<2	<2	<2	----	----
alpha-Endosulfan	959-98-8	2	µg/L		<2	<2	<2	----	----
4.4`-DDE	72-55-9	2	µg/L		<2	<2	<2	----	----
Dieldrin	60-57-1	2	µg/L		<2	<2	<2	----	----
Endrin	72-20-8	2	µg/L		<2	<2	<2	----	----
beta-Endosulfan	33213-65-9	2	µg/L		<2	<2	<2	----	----
4.4`-DDD	72-54-8	2	µg/L		<2	<2	<2	----	----
Endosulfan sulfate	1031-07-8	2	µg/L		<2	<2	<2	----	----
4.4`-DDT	50-29-3	4	µg/L		<4	<4	<4	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	4	µg/L		<4	<4	<4	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	4	µg/L		<4	<4	<4	----	----
EP075J: Organophosphorus Pesticides									
Dichlorvos	62-73-7	2	µg/L		<2	<2	<2	----	----
Dimethoate	60-51-5	2	µg/L		<2	<2	<2	----	----
Diazinon	333-41-5	2	µg/L		<2	<2	<2	----	----
Chlorpyrifos-methyl	5598-13-0	2	µg/L		<2	<2	<2	----	----
Malathion	121-75-5	2	µg/L		<2	<2	<2	----	----
Fenthion	55-38-9	2	µg/L		<2	<2	<2	----	----
Chlorpyrifos	2921-88-2	2	µg/L		<2	<2	<2	----	----
Pirimphos-ethyl	23505-41-1	2	µg/L		<2	<2	<2	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH14	BH12	BH23A	----	----
				Client sampling date / time	18-Aug-2020 00:00	18-Aug-2020 00:00	19-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014371-001	EM2014371-002	EM2014371-003	--------	--------
					Result	Result	Result	----	----
EP075J: Organophosphorus Pesticides - Continued									
Chlorfenvinphos	470-90-6	2	µg/L		<2	<2	<2	----	----
Prothiofos	34643-46-4	2	µg/L		<2	<2	<2	----	----
Ethion	563-12-2	2	µg/L		<2	<2	<2	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
MM514: E.coli & Total Coliforms MPN by Colilert									
Escherichia coli (Colilert)	----	1	orgs/100mL		**0**	**0**	**0**	----	----
EP074S: VOC Surrogates									
1.2-Dichloroethane-D4	17060-07-0	5	%		**112**	**113**	**112**	----	----
Toluene-D8	2037-26-5	5	%		**107**	**109**	**107**	----	----
4-Bromofluorobenzene	460-00-4	5	%		**109**	**112**	**113**	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH14	BH12	BH23A	----	----
				Client sampling date / time	18-Aug-2020 00:00	18-Aug-2020 00:00	19-Aug-2020 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2014371-001	EM2014371-002	EM2014371-003	--------	--------
					Result	Result	Result	----	----
EP075S: Acid Extractable Surrogates									
2-Fluorophenol	367-12-4	2	%		55.8	70.2	72.1	----	----
Phenol-d6	13127-88-3	2	%		27.6	35.0	34.6	----	----
2 Chlorophenol D4	93951-73-6	2	%		62 6	74 0	76 0		
2.4.6-Tribromophenol	118-79-6	2	%		53.6	63.0	61.3	----	----
EP075T: Base/Neutral Extractable Surrogates									
Nitrobenzene-D5	4165-60-0	2	%		67.5	81.2	81.6	----	----
1.2-Dichlorobenzene-D4	2199-69-1	2	%		56.0	68.0	69.2	----	----
2-Fluorobiphenyl	321-60-8	2	%		66.4	80.0	80.5	----	----
Anthracene-d10	1719-06-8	2	%		75.5	93.1	94.0	----	----
4-Terphenyl-d14	1718-51-0	2	%		68.8	86.9	89.4	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		99.7	101	100.0	----	----
Toluene-D8	2037-26-5	2	%		96.3	97.8	96.8	----	----
4-Bromofluorobenzene	460-00-4	2	%		115	110	112	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72	132
Toluene-D8	2037-26-5	77	132
4-Bromofluorobenzene	460-00-4	67	131
EP075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	10	75
Phenol-d6	13127-88-3	10	65
2-Chlorophenol-D4	93951-73-6	21	103
2.4.6-Tribromophenol	118-79-6	22	120
EP075T: Base/Neutral Extractable Surrogates			
Nitrobenzene-D5	4165-60-0	24	116
1.2-Dichlorobenzene-D4	2199-69-1	23	99
2-Fluorobiphenyl	321-60-8	32	114
Anthracene-d10	1719-06-8	47	119
4-Terphenyl-d14	1718-51-0	44	124
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2014371**	Page	: 1 of 16
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: [redacted]
Project	: 12529997/08	Date Samples Received	: 19-Aug-2020
Order number	: ----	Date Analysis Commenced	: 20-Aug-2020
C-O-C number	: ----	Issue Date	: 27-Aug-2020
Sampler	: MM		
Site	: ----		
Quote number	: ME/458/20		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
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. 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*
[redacted]	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
[redacted]	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
[redacted]	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	Laboratory Coordinator	WRG Subcontracting, Springvale, VIC

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

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	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 3213263)									
EM2014371-002	BH12	EA005-P: pH Value	----	0.01	pH Unit	7.64	7.69	0.652	0% - 20%
EM2014450-010	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.17	7.36	2.62	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3213264)									
EM2014371-002	BH12	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	3900	3930	0.664	0% - 20%
EM2014374-012	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1800	1840	2.08	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3217409)									
EM2014459-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	210	183	13.5	0% - 20%
EM2014333-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2910	2880	1.04	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3217410)									
EM2014440-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	21	22	0.00	No Limit
EM2014333-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	32	30	5.67	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3213261)									
EM2014374-012	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	440	436	0.889	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	440	436	0.889	0% - 20%
EM2014323-020	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3210689)									
EM2014417-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1040	1250	18.1	0% - 20%
EM2014371-001	BH14	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	88	89	1.25	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3210688)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 3210688) - continued									
EM2014417-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3090	3140	1.53	0% - 20%
EM2014371-001	BH14	ED045G: Chloride	16887-00-6	1	mg/L	457	459	0.462	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3213625)									
EM2014371-002	BH12	ED093F: Calcium	7440-70-2	1	mg/L	71	71	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	195	196	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	333	332	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	13	13	0.00	0% - 50%
EM2014453-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	25	25	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	29	29	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	73	73	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3213627)									
EM2014371-001	BH14	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.016	0.016	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.078	0.080	1.63	0% - 50%
EM2014440-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0001	71.2	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.102	0.097	5.06	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.015	0.015	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.129	0.126	1.71	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 3213626)									
EM2014512-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2014371-001	BH14	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3211610)									
EM2014371-001	BH14	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.03	0.00	No Limit
EM2014425-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.05	0.08	55.4	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3210687)									
EM2014371-001	BH14	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.01	0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3211611)									
EM2014371-001	BH14	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.05	1.03	1.31	0% - 20%
EM2014425-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.07	0.07	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3211239)									
EM2014356-005	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.9	0.9	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3211239) - continued									
EM2014371-002	BH12	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3211237)									
EM2014209-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.08	0.06	26.2	No Limit
EM2014349-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QC Lot: 3222731)									
EM2014371-001	BH14	EP026SP: Chemical Oxygen Demand	----	10	mg/L	14	14	0.00	No Limit
EM2014471-002	Anonymous	EP026SP: Chemical Oxygen Demand	----	10	mg/L	14	14	0.00	No Limit
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 3211827)									
EM2014350-001	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	8	8	0.00	No Limit
EM2014434-001	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	198	217	9.25	0% - 20%
EP050: Anionic Surfactants as MBAS (QC Lot: 3213805)									
ES2029454-001	Anonymous	EP050: Anionic Surfactants as MBAS		0.1	mg/L	<0.1	<0.1	0.00	No Limit
WN2007296-005	Anonymous	EP050: Anionic Surfactants as MBAS		0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 3211086)									
EM2014371-001	BH14	EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
EM2014374-017	Anonymous	EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 3211086)									
EM2014371-001	BH14	EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
EM2014374-017	Anonymous	EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074B: Oxygenated Compounds (QC Lot: 3211086) - continued									
EM2014374-017	Anonymous	EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
EP074C: Sulfonated Compounds (QC Lot: 3211086)									
EM2014371-001	BH14	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EM2014374-017	Anonymous	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EP074D: Fumigants (QC Lot: 3211086)									
EM2014371-001	BH14	EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
EM2014374-017	Anonymous	EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 3211086)									
EM2014371-001	BH14	EP074: 1.1-Dichloroe hene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroe hane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroe hane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074E: Halogenated Aliphatic Compounds (QC Lot: 3211086) - continued									
EM2014371-001	BH14	EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
EM2014374-017	Anonymous	EP074: 1.1-Dichloroe hene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroe hane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroe hane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 3211086)									
EM2014371-001	BH14	EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
EM2014374-017	Anonymous	EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074F: Halogenated Aromatic Compounds (QC Lot: 3211086) - continued									
EM2014374-017	Anonymous	EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 3211086)									
EM2014371-001	BH14	EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
EM2014374-017	Anonymous	EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3211085)									
EM2014371-001	BH14	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM2014374-017	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3211085)									
EM2014371-001	BH14	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM2014374-017	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3211085)									
EM2014371-001	BH14	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM2014374-017	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (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 Spike (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 Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 3213264)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.4	85.0	119
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3217409)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	93.7	107
				<10	293 mg/L	99.0	90.0	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3217410)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	94.7	90.3	109
				<5	1000 mg/L	99.9	90.3	109
ED037P: Alkalinity by PC Titrator (QCLot: 3213261)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	92.6	88.0	112
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3210689)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	85.8	117
				<1	100 mg/L	111	85.8	117
ED045G: Chloride by Discrete Analyser (QCLot: 3210688)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	106	85.0	122
				<1	1000 mg/L	105	85.0	122
ED093F: Dissolved Major Cations (QCLot: 3213625)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	106	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	101	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	104	86.7	111
EG020F: Dissolved Metals by ICP-MS (QCLot: 3213627)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	88.5	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	103	83.5	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100	83.2	105
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.5	83.1	106
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	84.6	107
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.6	84.3	108
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	86.3	111
EG035F: Dissolved Mercury by FIMS (QCLot: 3213626)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	71.1	112
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3211610)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	96.0	88.0	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3210687)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3210687) - continued								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	90.9	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3211611)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	90.0	117
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3211239)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	76.7	70.0	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3211237)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	83.2	71.9	114
EP020: Oil and Grease (O&G) (QCLot: 3217995)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	92.7	81.0	121
EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QCLot: 3222731)								
EP026SP: Chemical Oxygen Demand	----	10	mg/L	<10	50 mg/L	99.0	82.0	112
				<10	500 mg/L	100	83.0	113
EP030: Biochemical Oxygen Demand (BOD) (QCLot: 3211827)								
EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	198 mg/L	97.2	77.5	120
EP050: Anionic Surfactants as MBAS (QCLot: 3213805)								
EP050: Anionic Surfactants as MBAS		0.1	mg/L	<0.1	1 mg/L	87.8	74.0	118
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3210889)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	74.7	47.7	124
EP068A: Organochlorine Pesticides (OC) (QCLot: 3210887)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	2.5 µg/L	67.1	50.6	119
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	2.5 µg/L	66.7	44.2	117
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	2.5 µg/L	71.1	53.7	119
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	2.5 µg/L	72.5	47.7	117
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	2.5 µg/L	73.1	50.1	117
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	2.5 µg/L	72.9	46.5	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	2.5 µg/L	76.4	48.0	115
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	2.5 µg/L	77.9	51.1	119
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	2.5 µg/L	67.9	46.1	120
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	2.5 µg/L	89.5	49.9	118
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	2.5 µg/L	71.9	50.0	118
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	2.5 µg/L	71.0	48.0	116
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	2.5 µg/L	71.6	47.8	116
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	2.5 µg/L	100	47.1	128
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	2.5 µg/L	74.4	51.4	118
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	2.5 µg/L	71.0	48.6	122
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	2.5 µg/L	73.7	49.4	128
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	2.5 µg/L	70.5	49.1	123

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 3210887) - continued								
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	2.5 µg/L	79.0	45.6	126
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	2.5 µg/L	73.8	52.8	117
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	2.5 µg/L	81.4	47.1	126
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3211086)								
EP074: Styrene	100-42-5	5	µg/L	<5	20 µg/L	106	80.4	117
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	20 µg/L	106	75.0	118
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	20 µg/L	99.2	68.7	114
EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	20 µg/L	99.2	72.1	114
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	20 µg/L	100	69.6	115
EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	20 µg/L	98.2	72.4	113
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	20 µg/L	101	72.6	116
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	20 µg/L	101	69.2	115
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	20 µg/L	100	61.4	115
EP074B: Oxygenated Compounds (QCLot: 3211086)								
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	200 µg/L	100	71.3	125
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	200 µg/L	92.3	66.4	132
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	200 µg/L	106	75.2	132
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	200 µg/L	104	73.9	131
EP074C: Sulfonated Compounds (QCLot: 3211086)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	20 µg/L	100	58.2	124
EP074D: Fumigants (QCLot: 3211086)								
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	20 µg/L	101	68.7	120
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	20 µg/L	99.5	79.6	116
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	20 µg/L	98.3	76.2	114
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	20 µg/L	101	77.0	114
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	20 µg/L	105	80.1	118
EP074E: Halogenated Aliphatic Compounds (QCLot: 3211086)								
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	200 µg/L	104	53.4	140
EP074: Chloromethane	74-87-3	50	µg/L	<50	200 µg/L	102	63.8	134
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	200 µg/L	96.6	57.1	135
EP074: Bromomethane	74-83-9	50	µg/L	<50	200 µg/L	92.0	51.1	126
EP074: Chloroethane	75-00-3	50	µg/L	<50	200 µg/L	103	64.9	129
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	200 µg/L	107	65.7	127
EP074: 1.1-Dichloroe hene	75-35-4	5	µg/L	<5	20 µg/L	102	67.4	123
EP074: Iodomethane	74-88-4	5	µg/L	<5	20 µg/L	64.6	30.9	126
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	20 µg/L	101	69.2	119
EP074: 1.1-Dichloroe hane	75-34-3	5	µg/L	<5	20 µg/L	101	76.7	120
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	20 µg/L	101	78.9	118

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 3211086) - continued								
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	20 µg/L	101	69.2	120
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	20 µg/L	101	67.0	120
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	20 µg/L	100	63.7	120
EP074: 1.2-Dichloroe hane	107-06-2	5	µg/L	<5	20 µg/L	101	82.0	116
EP074: Trichloroethene	79-01-6	5	µg/L	<5	20 µg/L	102	72.9	118
EP074: Dibromomethane	74-95-3	5	µg/L	<5	20 µg/L	99.7	81.0	116
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	20 µg/L	104	84.9	118
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	20 µg/L	107	83.4	119
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	20 µg/L	104	70.4	118
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	20 µg/L	102	77.9	113
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	20 µg/L	108	72.6	122
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	20 µg/L	107	67.8	119
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	20 µg/L	110	83.0	125
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	20 µg/L	112	82.4	123
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	20 µg/L	96.8	72.7	111
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	20 µg/L	101	75.4	114
EP074F: Halogenated Aromatic Compounds (QCLot: 3211086)								
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	20 µg/L	105	81.7	116
EP074: Bromobenzene	108-86-1	5	µg/L	<5	20 µg/L	101	75.2	118
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	20 µg/L	100	75.0	114
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	20 µg/L	99.6	72.8	113
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	20 µg/L	101	75.5	119
EP074G: Trihalomethanes (QCLot: 3211086)								
EP074: Chloroform	67-66-3	5	µg/L	<5	20 µg/L	101	80.4	118
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	20 µg/L	98.6	78.6	115
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	20 µg/L	102	77.7	113
EP074: Bromoform	75-25-2	5	µg/L	<5	20 µg/L	105	74.2	113
EP075A: Phenolic Compounds (QCLot: 3210985)								
EP075: Phenol	108-95-2	2	µg/L	<2	10 µg/L	43.4	19.6	48.4
EP075: 2-Chlorophenol	95-57-8	2	µg/L	<2	10 µg/L	81.3	45.4	100
EP075: 2-Methylphenol	95-48-7	2	µg/L	<2	10 µg/L	74.6	41.6	93.8
EP075: 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2	10 µg/L	73.4	36.3	89.8
EP075: 2-Nitrophenol	88-75-5	2	µg/L	<2	10 µg/L	80.2	46.4	110
EP075: 2.4-Dimethylphenol	105-67-9	2	µg/L	<2	10 µg/L	87.7	48.6	108
EP075: 2.4-Dichlorophenol	120-83-2	2	µg/L	<2	10 µg/L	82.5	49.3	109
EP075: 2.6-Dichlorophenol	87-65-0	2	µg/L	<2	10 µg/L	85.0	50.6	108
EP075: 4-Chloro-3-methylphenol	59-50-7	2	µg/L	<2	10 µg/L	88.8	48.6	110
EP075: 2.4.6-Trichlorophenol	88-06-2	2	µg/L	<2	10 µg/L	79.6	45.9	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075A: Phenolic Compounds (QCLot: 3210985) - continued								
EP075: 2.4.5-Trichlorophenol	95-95-4	2	µg/L	<2	10 µg/L	78.8	46.0	113
EP075: Pentachlorophenol	87-86-5	4	µg/L	<4	10 µg/L	61.7	14.2	121
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3210985)								
EP075: Naphthalene	91-20-3	2	µg/L	<2	10 µg/L	82.4	52.2	109
EP075: 2-Methylnaphthalene	91-57-6	2	µg/L	<2	10 µg/L	82.0	52.2	112
EP075: 2-Chloronaphthalene	91-58-7	2	µg/L	<2	10 µg/L	79.4	50.9	113
EP075: Acenaphthylene	208-96-8	2	µg/L	<2	10 µg/L	82.3	53.3	113
EP075: Acenaphthene	83-32-9	2	µg/L	<2	10 µg/L	86.2	53.1	112
EP075: Fluorene	86-73-7	2	µg/L	<2	10 µg/L	88.2	56.0	113
EP075: Phenanthrene	85-01-8	2	µg/L	<2	10 µg/L	89.5	58.2	115
EP075: Anthracene	120-12-7	2	µg/L	<2	10 µg/L	88.3	57.8	115
EP075: Fluoranthene	206-44-0	2	µg/L	<2	10 µg/L	90.3	57.2	117
EP075: Pyrene	129-00-0	2	µg/L	<2	10 µg/L	90.3	52.3	119
EP075: N-2-Fluorenyl Acetamide	53-96-3	2	µg/L	<2	10 µg/L	90.7	52.2	122
EP075: Benz(a)anthracene	56-55-3	2	µg/L	<2	10 µg/L	88.4	56.2	118
EP075: Chrysene	218-01-9	2	µg/L	<2	10 µg/L	87.2	56.9	119
EP075: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	4	µg/L	<4	20 µg/L	79.4	56.9	115
EP075: 7.12-Dimethylbenz(a)anthracene	57-97-6	2	µg/L	<2	10 µg/L	84.5	55.7	122
EP075: Benzo(a)pyrene	50-32-8	2	µg/L	<2	10 µg/L	83.0	56.2	116
EP075: 3-Methylcholanthrene	56-49-5	2	µg/L	<2	10 µg/L	81.3	51.6	121
EP075: Indeno(1.2.3.cd)pyrene	193-39-5	2	µg/L	<2	10 µg/L	84.0	55.6	114
EP075: Dibenz(a.h)anthracene	53-70-3	2	µg/L	<2	10 µg/L	88.4	55.5	115
EP075: Benzo(g.h.i)perylene	191-24-2	2	µg/L	<2	10 µg/L	83.3	53.5	116
EP075C: Phthalate Esters (QCLot: 3210985)								
EP075: Dimethyl phthalate	131-11-3	2	µg/L	<2	10 µg/L	94.4	56.4	114
EP075: Diethyl phthalate	84-66-2	2	µg/L	<2	10 µg/L	88.4	58.1	114
EP075: Di-n-butyl phthalate	84-74-2	2	µg/L	<2	10 µg/L	94.0	61.7	120
EP075: Butyl benzyl phthalate	85-68-7	2	µg/L	<2	10 µg/L	92.6	57.3	119
EP075: bis(2-ethylhexyl) phthalate	117-81-7	10	µg/L	<10	10 µg/L	97.3	57.8	114
EP075: Di-n-octylphthalate	117-84-0	2	µg/L	<2	10 µg/L	91.7	58.4	115
EP075D: Nitrosamines (QCLot: 3210985)								
EP075: N-Nitrosomethylethylamine	10595-95-6	2	µg/L	<2	10 µg/L	102	23.9	106
EP075: N-Nitrosodiethylamine	55-18-5	2	µg/L	<2	10 µg/L	85.8	43.7	109
EP075: N-Nitrosopyrrolidine	930-55-2	4	µg/L	<4	10 µg/L	74.0	36.9	81.9
EP075: N-Nitrosomorpholine	59-89-2	2	µg/L	<2	10 µg/L	65.4	33.8	79.9
EP075: N-Nitrosodi-n-propylamine	621-64-7	2	µg/L	<2	10 µg/L	95.2	51.6	113
EP075: N-Nitrosopiperidine	100-75-4	2	µg/L	<2	10 µg/L	82.4	48.9	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075D: Nitrosamines (QCLot: 3210985) - continued								
EP075: N-Nitrosodibutylamine	924-16-3	2	µg/L	<2	10 µg/L	74.6	51.8	115
EP075: N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	4	µg/L	<4	10 µg/L	77.3	55.7	113
EP075: Methapyrilene	91-80-5	2	µg/L	<2	10 µg/L	12.0	10.0	147
EP075E: Nitroaromatics and Ketones (QCLot: 3210985)								
EP075: 2-Picoline	109-06-8	2	µg/L	<2	10 µg/L	105	18.8	106
EP075: Acetophenone	98-86-2	2	µg/L	<2	10 µg/L	88.4	52.2	110
EP075: Nitrobenzene	98-95-3	2	µg/L	<2	10 µg/L	83.4	48.9	110
EP075: Isophorone	78-59-1	2	µg/L	<2	10 µg/L	91.1	52.7	111
EP075: 2.6-Dinitrotoluene	606-20-2	4	µg/L	<4	10 µg/L	85.4	53.8	115
EP075: 2.4-Dinitrotoluene	121-14-2	4	µg/L	<4	10 µg/L	80.0	53.2	113
EP075: 1-Naphthylamine	134-32-7	2	µg/L	<2	10 µg/L	18.9	10.9	119
EP075: 4-Nitroquinoline-N-oxide	56-57-5	2	µg/L	<2	10 µg/L	43.9	27.3	148
EP075: 5-Nitro-o-toluidine	99-55-8	2	µg/L	<2	10 µg/L	63.4	49.3	119
EP075: Azobenzene	103-33-3	2	µg/L	<2	10 µg/L	90.2	55.4	114
EP075: 1.3.5-Trinitrobenzene	99-35-4	2	µg/L	<2	10 µg/L	39.2	38.2	122
EP075: Phenacetin	62-44-2	2	µg/L	<2	10 µg/L	80.6	45.5	104
EP075: 4-Aminobiphenyl	92-67-1	2	µg/L	<2	10 µg/L	34.5	24.0	149
EP075: Pentachloronitrobenzene	82-68-8	2	µg/L	<2	10 µg/L	79.4	54.0	114
EP075: Pronamide	23950-58-5	2	µg/L	<2	10 µg/L	93.4	58.8	116
EP075: Dimethylaminoazobenzene	60-11-7	2	µg/L	<2	10 µg/L	73.7	52.6	117
EP075: Chlorobenzilate	510-15-6	2	µg/L	<2	10 µg/L	85.6	55.9	118
EP075F: Haloethers (QCLot: 3210985)								
EP075: Bis(2-chloroethyl) ether	111-44-4	2	µg/L	<2	10 µg/L	85.5	48.0	109
EP075: Bis(2-chloroethoxy) methane	111-91-1	2	µg/L	<2	10 µg/L	88.4	51.8	111
EP075: 4-Chlorophenyl phenyl ether	7005-72-3	2	µg/L	<2	10 µg/L	87.2	55.5	113
EP075: 4-Bromophenyl phenyl ether	101-55-3	2	µg/L	<2	10 µg/L	80.4	54.1	114
EP075G: Chlorinated Hydrocarbons (QCLot: 3210985)								
EP075: 1.4-Dichlorobenzene	106-46-7	2	µg/L	<2	10 µg/L	79.6	45.6	105
EP075: 1.3-Dichlorobenzene	541-73-1	2	µg/L	<2	10 µg/L	77.6	45.5	104
EP075: 1.2-Dichlorobenzene	95-50-1	2	µg/L	<2	10 µg/L	78.3	46.4	106
EP075: Hexachloroethane	67-72-1	2	µg/L	<2	10 µg/L	69.4	43.8	106
EP075: 1.2.4-Trichlorobenzene	120-82-1	2	µg/L	<2	10 µg/L	77.1	45.9	109
EP075: Hexachloropropylene	1888-71-7	2	µg/L	<2	10 µg/L	50.5	41.8	112
EP075: Hexachlorobutadiene	87-68-3	2	µg/L	<2	10 µg/L	75.1	47.8	110
EP075: Hexachlorocyclopentadiene	77-47-4	10	µg/L	<10	10 µg/L	18.4	13.3	129
EP075: Pentachlorobenzene	608-93-5	2	µg/L	<2	10 µg/L	76.1	53.6	112
EP075: Hexachlorobenzene (HCB)	118-74-1	4	µg/L	<4	10 µg/L	79.9	54.8	114

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075H: Anilines and Benzidines (QCLot: 3210985)								
EP075: Aniline	62-53-3	2	µg/L	<2	10 µg/L	61.6	30.2	108
EP075: 4-Chloroaniline	106-47-8	2	µg/L	<2	10 µg/L	21.3	14.5	126
EP075: 2-Nitroaniline	88-74-4	4	µg/L	<4	10 µg/L	79.2	50.8	111
EP075: 3-Nitroaniline	99-09-2	4	µg/L	<4	10 µg/L	53.4	34.2	119
EP075: Dibenzofuran	132-64-9	2	µg/L	<2	10 µg/L	85.5	55.3	112
EP075: 4-Nitroaniline	100-01-6	2	µg/L	<2	10 µg/L	71.6	40.9	116
EP075: Carbazole	86-74-8	2	µg/L	<2	10 µg/L	73.4	57.1	118
EP075: 3.3`-Dichlorobenzidine	91-94-1	2	µg/L	<2	10 µg/L	99.2	50.2	137
EP075I: Organochlorine Pesticides (QCLot: 3210985)								
EP075: alpha-BHC	319-84-6	2	µg/L	<2	10 µg/L	79.2	55.6	114
EP075: beta-BHC	319-85-7	2	µg/L	<2	10 µg/L	95.8	55.2	115
EP075: gamma-BHC	58-89-9	2	µg/L	<2	10 µg/L	74.9	56.0	115
EP075: delta-BHC	319-86-8	2	µg/L	<2	10 µg/L	63.0	56.3	117
EP075: Heptachlor	76-44-8	2	µg/L	<2	10 µg/L	67.5	54.1	117
EP075: Aldrin	309-00-2	2	µg/L	<2	10 µg/L	83.5	54.4	117
EP075: Heptachlor epoxide	1024-57-3	2	µg/L	<2	10 µg/L	79.1	53.9	119
EP075: alpha-Endosulfan	959-98-8	2	µg/L	<2	10 µg/L	91.0	55.8	120
EP075: 4.4`-DDE	72-55-9	2	µg/L	<2	10 µg/L	90.7	56.7	121
EP075: Dieldrin	60-57-1	2	µg/L	<2	10 µg/L	83.3	55.6	118
EP075: Endrin	72-20-8	2	µg/L	<2	10 µg/L	64.7	51.8	121
EP075: beta-Endosulfan	33213-65-9	2	µg/L	<2	10 µg/L	83.4	55.3	119
EP075: 4.4`-DDD	72-54-8	2	µg/L	<2	10 µg/L	103	56.4	120
EP075: Endosulfan sulfate	1031-07-8	2	µg/L	<2	10 µg/L	# 51.1	51.8	125
EP075: 4.4`-DDT	50-29-3	4	µg/L	<4	10 µg/L	63.5	42.7	127
EP075J: Organophosphorus Pesticides (QCLot: 3210985)								
EP075: Dichlorvos	62-73-7	2	µg/L	<2	10 µg/L	62.9	53.5	113
EP075: Dimethoate	60-51-5	2	µg/L	<2	10 µg/L	61.4	40.5	110
EP075: Diazinon	333-41-5	2	µg/L	<2	10 µg/L	96.3	57.9	118
EP075: Chlorpyrifos-methyl	5598-13-0	2	µg/L	<2	10 µg/L	64.5	54.9	118
EP075: Malathion	121-75-5	2	µg/L	<2	10 µg/L	59.9	56.3	126
EP075: Fenthion	55-38-9	2	µg/L	<2	10 µg/L	81.2	56.1	119
EP075: Chlorpyrifos	2921-88-2	2	µg/L	<2	10 µg/L	81.6	57.1	118
EP075: Pirimphos-ethyl	23505-41-1	2	µg/L	<2	10 µg/L	91.7	57.4	118
EP075: Chlorfenvinphos	470-90-6	2	µg/L	<2	10 µg/L	64.2	52.1	122
EP075: Prothiofos	34643-46-4	2	µg/L	<2	10 µg/L	88.8	56.8	118
EP075: Ethion	563-12-2	2	µg/L	<2	10 µg/L	84.7	56.4	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3210886)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3330 µg/L	106	44.8	125

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3210886) - continued								
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16500 µg/L	105	51.3	135
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7800 µg/L	111	49.4	134
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3211085)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	104	65.5	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3210886)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5690 µg/L	108	47.3	129
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	20700 µg/L	107	50.4	133
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1510 µg/L	102	45.2	136
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3211085)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	102	64.3	126
EP080: BTEXN (QCLot: 3211085)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	102	69.8	124
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	107	73.6	126
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	105	72.0	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	106	71.5	132
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	106	76.5	132
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	120	70.5	127

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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3210689)							
EM2014371-002	BH12	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	89 0	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3210688)							
EM2014371-002	BH12	ED045G: Chloride	16887-00-6	400 mg/L	89 3	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3213627)							
EM2014371-001	BH14	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	97.1	85.0	131
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	92 8	81.0	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	89 8	71.0	135
		EG020A-F: Copper	7440-50-8	0.2 mg/L	93 8	76.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	91.4	75.0	133
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	91.4	73.0	131

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3213627) - continued							
EM2014371-001	BH14	EG020A-F: Zinc	7440-66-6	0.2 mg/L	94.4	75.0	131
EG035F: Dissolved Mercury by FIMS (QCLot: 3213626)							
EM2014371-002	BH12	EG035F: Mercury	7439-97-6	0.01 mg/L	87 5	70.0	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3211610)							
EM2014371-002	BH12	EK055G: Ammonia as N	7664-41-7	1 mg/L	121	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3210687)							
EM2014371-002	BH12	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	101	80.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3211611)							
EM2014371-002	BH12	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	74.7	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3211239)							
EM2014356-006	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	85 3	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3211237)							
EM2014209-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	75 2	70.0	130
EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QCLot: 3222731)							
EM2014371-001	BH14	EP026SP: Chemical Oxygen Demand	----	47.6 mg/L	111	70.0	130
EP050: Anionic Surfactants as MBAS (QCLot: 3213805)							
ES2029454-001	Anonymous	EP050: Anionic Surfactants as MBAS		1 mg/L	93 3	70.0	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 3211086)							
EM2014371-002	BH12	EP074: 1.1-Dichloroethene	75-35-4	20 µg/L	71 0	40.0	124
		EP074: Trichloroethene	79-01-6	20 µg/L	93.4	54.0	126
EP074F: Halogenated Aromatic Compounds (QCLot: 3211086)							
EM2014371-002	BH12	EP074: Chlorobenzene	108-90-7	20 µg/L	105	68.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3211085)							
EM2014371-002	BH12	EP080: C6 - C9 Fraction	----	280 µg/L	74 2	43.0	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3211085)							
EM2014371-002	BH12	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	71 9	44.0	122
EP080: BTEXN (QCLot: 3211085)							
EM2014371-002	BH12	EP080: Benzene	71-43-2	20 µg/L	91 9	68.0	130
		EP080: Toluene	108-88-3	20 µg/L	95 5	72.0	132

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2014371**	Page	: 1 of 14
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 12529997/08	Date Samples Received	: 19-Aug-2020
Site	: ----	Issue Date	: 27-Aug-2020
Sampler	: MM	No. of samples received	: 3
Order number	: ----	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 Matrix Spike outliers occur.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **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 D	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP075I: Organochlorine Pesticides	QC-3210985-001	----	**Endosulfan sulfate**	1031-07-8	51.1 %	51.8-125%	**Recovery less than lower control limit**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample D(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						
BH14, BH12	----	----	----	21-Aug-2020	18-Aug-2020	**3**
Clear Plastic Bottle - Natural						
BH23A	----	----	----	21-Aug-2020	19-Aug-2020	**2**
MM514: E.coli & Total Coliforms MPN by Colilert						
Sterile Plastic Bottle - Sodium Thiosulfate						
BH14, BH12	----	----	----	20-Aug-2020	19-Aug-2020	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Pesticides by GCMS	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Pesticides by GCMS	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	3	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; o hers 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.

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) BH14, BH12	**18-Aug-2020**	**----**	----	----	**21-Aug-2020**	18-Aug-2020	×
Clear Plastic Bottle - Natural (EA005-P) BH23A	**19-Aug-2020**	**----**	----	----	**21-Aug-2020**	19-Aug-2020	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) BH14, BH12	**18-Aug-2020**	**----**	----	----	**21-Aug-2020**	15-Sep-2020	✓
Clear Plastic Bottle - Natural (EA010-P) BH23A	**19-Aug-2020**	**----**	----	----	**21-Aug-2020**	16-Sep-2020	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) BH14, BH12	**18-Aug-2020**	**----**	----	----	**25-Aug-2020**	25-Aug-2020	✓
Clear Plastic Bottle - Natural (EA015H) BH23A	**19-Aug-2020**	**----**	----	----	**25-Aug-2020**	26-Aug-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H) BH14, BH12	**18-Aug-2020**	**----**	----	----	**25-Aug-2020**	25-Aug-2020	✓
Clear Plastic Bottle - Natural (EA025H) BH23A	**19-Aug-2020**	**----**	----	----	**25-Aug-2020**	26-Aug-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) BH14, BH12	**18-Aug-2020**	**----**	----	----	**21-Aug-2020**	01-Sep-2020	✓
Clear Plastic Bottle - Natural (ED037-P) BH23A	**19-Aug-2020**	**----**	----	----	**21-Aug-2020**	02-Sep-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) BH14, BH12	**18-Aug-2020**	**----**	----	----	**21-Aug-2020**	15-Sep-2020	✓
Clear Plastic Bottle - Natural (ED041G) BH23A	**19-Aug-2020**	**----**	----	----	**21-Aug-2020**	16-Sep-2020	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) BH14, BH12	**18-Aug-2020**	**----**	----	----	**21-Aug-2020**	15-Sep-2020	✓
Clear Plastic Bottle - Natural (ED045G) BH23A	**19-Aug-2020**	**----**	----	----	**21-Aug-2020**	16-Sep-2020	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH14, BH12	**18-Aug-2020**	**----**	----	----	**25-Aug-2020**	15-Sep-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH23A	**19-Aug-2020**	**----**	----	----	**25-Aug-2020**	16-Sep-2020	✓

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 - Nitric Acid; Filtered (EG020A-F) BH14, BH12	**18-Aug-2020**	**----**	----	----	**21-Aug-2020**	14-Feb-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH23A	**19-Aug-2020**	**----**	----	----	**21-Aug-2020**	15-Feb-2021	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH14, BH12	**18-Aug-2020**	**----**	----	----	**21-Aug-2020**	15-Sep-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH23A	**19-Aug-2020**	**----**	----	----	**21-Aug-2020**	16-Sep-2020	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH14, BH12	**18-Aug-2020**	**----**	----	----	**21-Aug-2020**	15-Sep-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH23A	**19-Aug-2020**	**----**	----	----	**21-Aug-2020**	16-Sep-2020	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) BH14, BH12	**18-Aug-2020**	**----**	----	----	**20-Aug-2020**	20-Aug-2020	✓
Clear Plastic Bottle - Natural (EK057G) BH23A	**19-Aug-2020**	**----**	----	----	**20-Aug-2020**	21-Aug-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH14, BH12	**18-Aug-2020**	**----**	----	----	**21-Aug-2020**	15-Sep-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH23A	**19-Aug-2020**	**----**	----	----	**21-Aug-2020**	16-Sep-2020	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	15-Sep-2020	✓	**21-Aug-2020**	15-Sep-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH23A	**19-Aug-2020**	**20-Aug-2020**	16-Sep-2020	✓	**21-Aug-2020**	16-Sep-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	15-Sep-2020	✓	**21-Aug-2020**	15-Sep-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH23A	**19-Aug-2020**	**20-Aug-2020**	16-Sep-2020	✓	**21-Aug-2020**	16-Sep-2020	✓
EP020: Oil and Grease (O&G)							
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020) BH14, BH12	**18-Aug-2020**	**----**	----	----	**25-Aug-2020**	15-Sep-2020	✓
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020) BH23A	**19-Aug-2020**	**----**	----	----	**25-Aug-2020**	16-Sep-2020	✓

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
EP026SP: Chemical Oxygen Demand (Spectrophotometric)							
Clear Plastic Bottle - Sulfuric Acid (EP026SP) BH14, BH12	**18-Aug-2020**	**----**	----	----	**27-Aug-2020**	15-Sep-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EP026SP) BH23A	**19-Aug-2020**	**----**	----	----	**27-Aug-2020**	16-Sep-2020	✓
EP030: Biochemical Oxygen Demand (BOD)							
Clear Plastic Bottle - Natural (EP030) BH14, BH12	**18-Aug-2020**	**----**	----	----	**20-Aug-2020**	20-Aug-2020	✓
Clear Plastic Bottle - Natural (EP030) BH23A	**19-Aug-2020**	**----**	----	----	**20-Aug-2020**	21-Aug-2020	✓
EP050: Anionic Surfactants as MBAS							
Pres. with Formaldehyde on receipt (EP050) BH14, BH12	**18-Aug-2020**	**----**	----	----	**21-Aug-2020**	22-Aug-2020	✓
Pres. with Formaldehyde on receipt (EP050) BH23A	**19-Aug-2020**	**----**	----	----	**21-Aug-2020**	23-Aug-2020	✓
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP066) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP068) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
EP074A: Monocyclic Aromatic Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP074) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	01-Sep-2020	✓	**20-Aug-2020**	01-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074) BH23A	**19-Aug-2020**	**20-Aug-2020**	02-Sep-2020	✓	**20-Aug-2020**	02-Sep-2020	✓
EP074B: Oxygenated Compounds							
Amber VOC Vial - Sulfuric Acid (EP074) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	01-Sep-2020	✓	**20-Aug-2020**	01-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074) BH23A	**19-Aug-2020**	**20-Aug-2020**	02-Sep-2020	✓	**20-Aug-2020**	02-Sep-2020	✓
EP074C: Sulfonated Compounds							
Amber VOC Vial - Sulfuric Acid (EP074) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	01-Sep-2020	✓	**20-Aug-2020**	01-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074) BH23A	**19-Aug-2020**	**20-Aug-2020**	02-Sep-2020	✓	**20-Aug-2020**	02-Sep-2020	✓

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
EP074D: Fumigants							
Amber VOC Vial - Sulfuric Acid (EP074) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	01-Sep-2020	✓	**20-Aug-2020**	01-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074) BH23A	**19-Aug-2020**	**20-Aug-2020**	02-Sep-2020	✓	**20-Aug-2020**	02-Sep-2020	✓
EP074E: Halogenated Aliphatic Compounds							
Amber VOC Vial - Sulfuric Acid (EP074) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	01-Sep-2020	✓	**20-Aug-2020**	01-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074) BH23A	**19-Aug-2020**	**20-Aug-2020**	02-Sep-2020	✓	**20-Aug-2020**	02-Sep-2020	✓
EP074F: Halogenated Aromatic Compounds							
Amber VOC Vial - Sulfuric Acid (EP074) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	01-Sep-2020	✓	**20-Aug-2020**	01-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074) BH23A	**19-Aug-2020**	**20-Aug-2020**	02-Sep-2020	✓	**20-Aug-2020**	02-Sep-2020	✓
EP074G: Trihalomethanes							
Amber VOC Vial - Sulfuric Acid (EP074) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	01-Sep-2020	✓	**20-Aug-2020**	01-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074) BH23A	**19-Aug-2020**	**20-Aug-2020**	02-Sep-2020	✓	**20-Aug-2020**	02-Sep-2020	✓
EP075A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP075) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
EP075B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP075) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
EP075C: Phthalate Esters							
Amber Glass Bottle - Unpreserved (EP075) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP075) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
EP075D: Nitrosamines							
Amber Glass Bottle - Unpreserved (EP075) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP075) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓

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
EP075E: Nitroaromatics and Ketones							
Amber Glass Bottle - Unpreserved (EP075) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP075) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
EP075F: Haloethers							
Amber Glass Bottle - Unpreserved (EP075) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP075) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
EP075G: Chlorinated Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP075) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
EP075H: Anilines and Benzidines							
Amber Glass Bottle - Unpreserved (EP075) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP075) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
EP075I: Organochlorine Pesticides							
Amber Glass Bottle - Unpreserved (EP075) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP075) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
EP075J: Organophosphorus Pesticides							
Amber Glass Bottle - Unpreserved (EP075) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP075) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP071) BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	01-Sep-2020	✓	**20-Aug-2020**	01-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH23A	**19-Aug-2020**	**20-Aug-2020**	02-Sep-2020	✓	**20-Aug-2020**	02-Sep-2020	✓

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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	25-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber Glass Bottle - Unpreserved (EP071)							
BH23A	**19-Aug-2020**	**20-Aug-2020**	26-Aug-2020	✓	**21-Aug-2020**	29-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	01-Sep-2020	✓	**20-Aug-2020**	01-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH23A	**19-Aug-2020**	**20-Aug-2020**	02-Sep-2020	✓	**20-Aug-2020**	02-Sep-2020	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH14, BH12	**18-Aug-2020**	**20-Aug-2020**	01-Sep-2020	✓	**20-Aug-2020**	01-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH23A	**19-Aug-2020**	**20-Aug-2020**	02-Sep-2020	✓	**20-Aug-2020**	02-Sep-2020	✓
MM514: E.coli & Total Coliforms MPN by Colilert							
Sterile Plastic Bottle - Sodium Thiosulfate (MM514)							
BH14, BH12	**18-Aug-2020**	**----**	----	----	**20-Aug-2020**	19-Aug-2020	×
Sterile Plastic Bottle - Sodium Thiosulfate (MM514)							
BH23A	**19-Aug-2020**	**----**	----	----	**20-Aug-2020**	20-Aug-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within he 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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Anionic Surfactants as MBAS	EP050	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	3	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	3	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	0	3	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	3	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Anionic Surfactants as MBAS	EP050	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	**5.88**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Anionic Surfactants as MBAS	EP050	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Anionic Surfactants as MBAS	EP050	1	13	**7.69**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	15	**6.67**	**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 PC 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 PC 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 f bre 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)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescr bed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. 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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
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.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, 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)
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 seperately 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)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM Schedule B(3)
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	WATER	In house: Referenced to APHA 5220 D. Samples are digested with a known excess of an acidic potassium dichromate solution using silver sulfate as a catalyst. The chromium is reduced from the Cr (VI) oxidation state to the Cr (III) state by the oxygen present in the organic material. Both of these chromium species are coloued and absorb in the visible region of (400nm & 600nm) the spectrum. The oxidisable organic matter can be calculated in terms of oxygen equivalents.
Biochemical Oxygen Demand (BOD)	EP030	WATER	In house: Referenced to APHA 5210 B. The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM Schedule B(3).

Analytical Methods	Method	Matrix	Method Descriptions
Anionic Surfactants as MBAS	EP050	WATER	In house: Referenced to APHA 5540 B&C. This method comprises three successive extractions from acid aqueous medium containing excess methylene blue, into chloroform, followed by an aqueous backwash and measurement of the colour by spectrophotometry at 652nm. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	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)
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 - Semivolatile 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-A kane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
Volatile Organic Compounds	EP074	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. This method is compliant with NEPM Schedule B(3)
Semivolatile Organic Compounds	EP075	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 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)
E.coli & Total Coliforms by MPN Colilert	MM514	WATER	Microbiological analysis subcontracted to ALS Scoresby (NATA Accredited Laboratory No. 992).

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 sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM2014371**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: 12529997/08	Page	: 1 of 3
Order number	: ----	Quote number	: EM2020GHDSER0037 (ME/458/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: MM		

Dates

Date Samples Received	: 19-Aug-2020 16:00	Issue Date	: 20-Aug-2020
Client Requested Due Date	: 27-Aug-2020	Scheduled Reporting Date	: **27-Aug-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 4.7°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **ALS did not receive a Cyanide bottle for Cyanide analysis or a Hexavalent metals bottle for Hexavalent Chromium analysis. These tests have been excluded from this batch.**
- **Only one amber bottle was received for each sample so the Phenols analysis has been logged as EP075 instead of EP075-EM.**
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale, ALS Sydney and ALS Scoresby.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EP020 Oil & Grease (O&G)	WATER - EP026SP Chemical Oxygen Demand (COD)	WATER - EP030 BOD	WATER - EP050 Anionic Surfactants as MBAS	WATER - MM696 (Ec) E. coli by MF (Chromogenic Media)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P
EM2014371-001	18-Aug-2020 00:00	BH14	✓	✓	✓	✓	✓	✓	✓
EM2014371-002	18-Aug-2020 00:00	BH12	✓	✓	✓	✓	✓	✓	✓
EM2014371-003	19-Aug-2020 00:00	BH23A	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005P pH (PCT)	WATER - EA010P Electrical Conductivity (PCT)	WATER - EA015H Total Dissolved Solids - S andard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EK040-P Fluoride (PCT)	WATER - EP074 - WD (Solvent Screen) Volatile Organic Compounds (Solvent Screen	WATER - W-17 TRH/BTEXN/PAH/Phenols/OC/PCB
EM2014371-001	18-Aug-2020 00:00	BH14	✓	✓	✓	✓	✓	✓	✓
EM2014371-002	18-Aug-2020 00:00	BH12	✓	✓	✓	✓	✓	✓	✓
EM2014371-003	19-Aug-2020 00:00	BH23A	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG035F Dissolved Mercury
EM2014371-001	18-Aug-2020 00:00	BH14	✓	✓
EM2014371-002	18-Aug-2020 00:00	BH12	✓	✓
EM2014371-003	19-Aug-2020 00:00	BH23A	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
BH12	Clear Plastic Bottle - Natural	----	18-Aug-2020	19-Aug-2020	✗	20-Aug-2020	✗
BH14	Clear Plastic Bottle - Natural	----	18-Aug-2020	19-Aug-2020	✗	20-Aug-2020	✗
BH23A	Clear Plastic Bottle - Natural	----	19-Aug-2020	19-Aug-2020	✓	20-Aug-2020	✗
MM696: E. coli and Faecal Coliforms by MF (Chromogenic Media)							
BH12	Sterile Plastic Bottle - Sodium Th	- --	19-Aug-2020	19-Aug-2020	✓	20-Aug-2020	✗
BH14	Sterile Plastic Bottle - Sodium Th	- --	19-Aug-2020	19-Aug-2020	✓	20-Aug-2020	✗

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV) Email accountspayableAU@ghd.com

[redacted]

- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ENMRG (ENMRG) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]
- Electronic SRN for ESdat (ESRN_ESDAT) Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) Email [redacted]
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SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM2014371**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: 12529997/08	Page	: 1 of 3
Order number	: ----	Quote number	: EM2020GHDSER0037 (ME/458/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: MM		

Dates

Date Samples Received	: 19-Aug-2020 16:00	Issue Date	: 26-Aug-2020
Client Requested Due Date	: 27-Aug-2020	Scheduled Reporting Date	: **27-Aug-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 4.7°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **ALS did not receive a Cyanide bottle for Cyanide analysis or a Hexavalent metals bottle for Hexavalent Chromium analysis. These tests have been excluded from this batch.**
- **Only one amber bottle was received for each sample so the Phenols analysis has been logged as EP075 instead of EP075-EM.**
- **Additional analysis instruction was received by ALS on 20/08/2020 at 12:20.**
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale, ALS Sydney and ALS Scoresby.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EP020 Oil & Grease (O&G)	WATER - EP026SP Chemical Oxygen Demand (COD)	WATER - EP030 BOD	WATER - EP050 Anionic Surfactants as MBAS	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P	WATER - W-02 8 Metals
EM2014371-001	18-Aug-2020 00:00	BH14	✓	✓	✓	✓	✓	✓	✓
EM2014371-002	18-Aug-2020 00:00	BH12	✓	✓	✓	✓	✓	✓	✓
EM2014371-003	19-Aug-2020 00:00	BH23A	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005P pH (PCT)	WATER - EA010P Electrical Conductivity (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - MM514 E.coli & Total Coliforms by MPN Colilert	WATER - W-17 TRH/BTEXN/PAH/Phenols/OC/PCB	WATER - W-23 SVOC/VOC
EM2014371-001	18-Aug-2020 00:00	BH14	✓	✓	✓	✓	✓	✓	✓
EM2014371-002	18-Aug-2020 00:00	BH12	✓	✓	✓	✓	✓	✓	✓
EM2014371-003	19-Aug-2020 00:00	BH23A	✓	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

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

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
BH12	Clear Plastic Bottle - Natural	----	18-Aug-2020	19-Aug-2020	×	20-Aug-2020	×
BH14	Clear Plastic Bottle - Natural	----	18-Aug-2020	19-Aug-2020	×	20-Aug-2020	×
BH23A	Clear Plastic Bottle - Natural	----	19-Aug-2020	19-Aug-2020	✓	20-Aug-2020	×
MM514: E.coli & Total Coliforms by MPN Colilert							
BH12	Sterile Plastic Bottle - Sodium Th	- --	19-Aug-2020	19-Aug-2020	✓	20-Aug-2020	×
BH14	Sterile Plastic Bottle - Sodium Th	- --	19-Aug-2020	19-Aug-2020	✓	20-Aug-2020	×

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- A4 - AU Tax Invoice (INV)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
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- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
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- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
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- Electronic SRN for ESdat (ESRN_ESDAT)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
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- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	[redacted]

CHAIN OF CUSTODY

Page of

GHD

GHD Melbourne
180 Lonsdale Street, Melbourne 3000
Telephone: 613 8687 8000 Facsimile: 613 8687 8111

Job Number 12529997	**GHD Office** Melbourne	**Laboratory:** ALS Springvale	
Project WORM		**Address:** 2 - 4 Westall Rd, Springvale	
GHD Contact [redacted]	**Contact Email** [redacted]	**Lab Contact:** [redacted]	
TAT: Five days	**Quote No./GHD Reference**		

PLEASE NOTE:

- Sign white copy on receipt and release of samples.
- Samples are to be delivered to the Laboratory Address.
- On receipt of samples, the laboratory contact to sign white copy and forward to GHD Contact.
- On completion of analyses, please return white copy with results. Pink copy is returned to the sampler once the courier has signed for the samples.
- E-mail results to the GHD Contact with the GHD Job Number in the e-mail subject line.

Results to be provided in ESDAT compatible format

	Sample ID	Date	Time	Composite Samples	Sample Matrix	Preservative	Container Type	Container #	IWRG (P-16)	S-26	ASS field screen	HOLD	Remarks
~~Blank~~		[illegible]			AW		BA	4					
1	BH14	18.8.2020	PM		GW		V,G,P	10				X	
2	BH12	18.8.2020	PM		GW		V,G,P	10				X	
3	BH23A	19.8.2020	PM		GW		V,G,P	10				X	

Environmental Division
Melbourne
Work Order Reference
EM2014371

Telephone : - 61-3-8549 9600

Micro Nitrate Colour Turbidity RP MBAS NP 2018

Received: 19/8/20 15:00 Carrier:
C/note:
Temp: 4.7 °C Seal (Y) N
Ice / Icebricks / NA

ALS

NOTES:

Sampled by:	MM	Date/Time:	18 and 19.8.2020	Relinquished by:	MM	Date/Time:	19.8.2020, 15:00
Received by:		Date/Time:		Relinquished by:		Date/Time:	
Received by Courier:		Date/Time:		Relinquished by:		Date/Time:	
Received by Lab:	19/8/20 16:00	Date/Time:					
Remarks:							

Australian Laboratory Services Pty Ltd
4 Westall Rd, Springvale VIC Australia
T +61-3-8549 9600 | F +61-3-8549 9626

Tailored Analytical Services & Charges: ALL BORES

Parameter	ALS Code	Technique/ Method Reference	Limit Of Reporting (LOR)	No.	Price per Sample ($)	Total ($)
8 Metals	W-02	USEPA / APHA	0.0001 - 0.005 mg/L	11		
pH (PCT)	EA005P	APHA	0.01 pH Unit	21		
Electrical Conductivity (PCT)	EA010P	APHA	1 µS/cm	21		
Total Nitrogen + NO2 + NO3 + NH3 + Total P	NT-08	APHA	0.01 - 0.1 mg/L	21		
Total Dissolved Solids	EA015H	APHA	10 mg/L	21		
Ca, Mg, Na, K, Cl, SO4, Alkalinity	NT-01 & 02	USEPA / APHA	1 mg/L, 0.01 meq/L, 0.01 %	21		
Total cost for this table based on sample numbers provided (Excluding GST)						

Sample Containers for: ALL BORES

No.	Label Colour	Container Type (Preservation noted if required)	Test Parameter(s)
	Red	1 x 60mL Clear Plastic Bottle - Nitric Acid; Filtered	Dissolved Metals
	Green	1 x 500mL Clear Plastic Bottle - Natural	Cations, Anions, TDS, EC, pH, NO2, NO3
	Purple	1 x 60mL Clear Plastic Bottle - Sulfuric Acid	Total Nitrogen + NH3 + Total P

Tailored Analytical Services & Charges: SELECTED BORES

Parameter	ALS Code	Technique/ Method Reference	Limit Of Reporting (LOR)	No.	Price per Sample ($)	Total ($)
BOD	EP030	APHA	2 mg/L	10		
Anionic Surfactants as MBAS	EP050	APHA	0.1 mg/L	10		
VIC EPA IWRG621 - Water Equivalent Suite	448.3 Water	Various	0.5 - 100 µg/L, 0.0001 - 0.1 mg/L, 0.01 pH Unit	10		
Suspended Solids	EA025H	APHA 2540 D	5 mg/L	10		
Chemical Oxygen Demand	EP026SP	APHA 5220 D	10 mg/L	10		
E. coli	MM696 (Ec)	Chromogenic Media	1 CFU/100mL	10		
Total cost per Sample (Excluding GST)						
Total cost for this table based on sample numbers provided (Excluding GST)						

Sample Containers for: SELECTED BORES

No.	Label Colour	Container Type (Preservation noted if required)	Test Parameter(s)
	Brown	1 x 500mL Pres. with Formaldehyde on receipt	Anionic Surfactants as MBAS
	Orange	1 x 100mL Amber Glass Bottle - Unpreserved	Semi volatile Organics
	Purple	2 x 40mL Amber VOC Vial - Sulfuric Acid	Volatile Organics
	Red	1 x 60mL Clear Plastic Bottle - Nitric Acid; Filtered	Dissolved Metals
	Blue	1 x 60mL Opaque plastic bottle - NaOH	Cyanide
	Green	1 x 500mL Clear Plastic Bottle - Natural	TSS, F
	Blue	1 x 60mL Clear Plastic Bottle - NaOH Filtered	Hex Chromium
	Purple	1 x 60mL Clear Plastic Bottle - Sulfuric Acid	Chemical Oxygen Demand (COD)
	Grey	1 x 250mL Sterile Plastic Bottle - Sodium Thiosulfate	E. coli

Additional bottles are required on water samples for semi-volatile organics analysis for laboratory QA/QC purposes.

[redacted]

From: [redacted]
Sent: Thursday, 20 August 2020 8:47 AM
To: Samples Melbourne; COC Melbourne
Subject: FW: [EXTERNAL] - RE: CoC for ALS Workorder : EM2014371 | Overall Description: NO ANALYSIS
Attachments: ME-458-20 GHD - GW Metro Melb .pdf

Importance: High

Please see below for analysis.

Short holding times !

[redacted]
Client Services Coordinator – Springvale
Environmental

[redacted]
2-4 Westall Rd
Springvale Vic 3171
Australia

EnviroMail™ 124 – PFOS Analysis to Freshwater Species Protection Lvl 99%
EnviroMail™ 125 – ALS Now Provides Testing capabilities for TOF
EnviroMail™ 126 – TOF for Compliance with Guideline ERA 60
EnviroMail™ 00 – All EnviroMails™ in one convenient library.

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www.alsglobal.com

From: [redacted]
Sent: Thursday, 20 August 2020 8:35 AM
To: [redacted]
Subject: [EXTERNAL] - RE: CoC for ALS Workorder : EM2014371 | Overall Description: NO ANALYSIS

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 [redacted]

Would you please log these groundwater samples in under GHD project details:

- APA WORM EES
- 12529997/08

Analysis

- Salinity (measured as mg/L TDS), pH, EC, major ions
- Ammonia (as N), nitrate (as N), Nitrate (as N), nitrite (as N), total nitrogen, Total Kjeldahl Nitrogen
- Sulfate as SO4
- Total phosphorous
- **Metals screen – exclude this (in EPA 621)**
- E.Coli
- Total Suspended Solids (TSS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD)
- Oil and grease, surfactants (MBAS)
- EPA screen 621 (incl metals screen)

Regards,

[redacted]
Hydrogeologist

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CHAIN OF CUSTODY

GHD

GHD Melbourne
180 Lonsdale Street, Melbourne 3000
Telephone: 613 8687 8000 Facsimile: 613 8687 8111

Job Number	GHD Office
12529997	Melbourne

Project: WORM

GHD Contact: [redacted] | Contact Email: [redacted]

TAT: Five days | Quote No./GHD Reference

Laboratory: ALS Springvale
Address: 2 - 4 Westall Rd, Springvale
Lab Contact: [redacted]

	Sample ID	Date	Time	Container Type	Container Number	IWRG (P-16)	S-26	ASS field screen	HOLD
	[illegible]	[illegible]		[illegible]	[illegible]				
1	BH14	18.8.2020	PM	V,G,P	10				X
2	BH12	18.8.2020	PM	V,G,P	10				X
3	BH23A	19.8.2020	PM	V,G,P	10				X

Micro Nitrate Colour Turbidity RP MBAS NP 2018

NOTES:

Environmental Division
Melbourne
Work Order Reference
EM2014371

Telephone : +61-3-8549 9600

PLEASE NOTE:
- Sign white copy on receipt and release of samples.
- Samples are to be delivered to the Laboratory Address.
- On receipt of samples, the laboratory contact to sign white copy and fax/email to GHD Contact.
- On completion of analyses please return white copy with results. Pink copy is returned to the sampler once the courier has signed for the samples.
- E-mail results to the GHD Contact with the GHD Job Number in the e-mail subject line.

Results to be provided in ESDAT compatible format

Remarks

Received: Rm 19/8/20 C 15.00 Carrier:
C/note:
Temp: 4.7 °C Seal (Y) N
Ice / Icebricks / NA

ALS

Sampled by:	MM	Date/Time:	18 and 19.8.2020	Relinquished by:	MM	Date/Time:	19.8.2020, 15:00
Received by:	Rm 19/8/20 C 16.00	Date/Time:		Relinquished by:		Date/Time:	
Received by Courier:		Date/Time:		Relinquished by:		Date/Time:	
Received by Lab:		Date/Time:					
Remarks:							

SCANNED

NP 2018

Australian Laboratory Services Pty Ltd
4 Westall Rd. Springvale VIC Australia
T +61-3-8549 9600 | F +61-3-8549 9626

Tailored Analytical Services & Charges: ALL BORES

Parameter	ALS Code	Technique/ Method Reference	Limit Of Reporting (LOR)	No.	Price per Sample ($)	Total ($)
8 Metals	W-02	USEPA / APHA	0.0001 - 0.005 mg/L	11		
pH (PCT)	EA005P	APHA	0.01 pH Unit	21		
Electrical Conductivity (PCT)	EA010P	APHA	1 µS/cm	21		
Total Nitrogen + NO2 + NO3 + NH3 + Total P	NT-08	APHA	0.01 - 0.1 mg/L	21		
Total Dissolved Solids	EA015H	APHA	10 mg/L	21		
Ca, Mg, Na, K, Cl, SO4, Alkalinity	NT-01 & 02	USEPA / APHA	1 mg/L, 0.01 meq/L, 0.01 %	21		
Total cost for this table based on sample numbers provided (Excluding GST)						

Sample Containers for: ALL BORES

No.	Label Colour	Container Type (Preservation noted if required)	Test Parameter(s)
	Red	1 x 60mL Clear Plastic Bottle - Nitric Acid; Filtered	Dissolved Metals
	Green	1 x 500mL Clear Plastic Bottle - Natural	Cations, Anions, TDS, EC, pH, NO2, NO3
	Purple	1 x 60mL Clear Plastic Bottle - Sulfuric Acid	Total Nitrogen + NH3 + Total P

Tailored Analytical Services & Charges: SELECTED BORES

Parameter	ALS Code	Technique/ Method Reference	Limit Of Reporting (LOR)	No.	Price per Sample ($)	Total ($)
BOD	EP030	APHA	2 mg/L	10		
Anionic Surfactants as MBAS	EP050	APHA	0.1 mg/L	10		
VIC EPA IWRG621 - Water Equivalent Suite	448.3 Water	Various	0.5 - 100 µg/L, 0.0001 - 0.1 mg/L, 0.01 pH Unit	10		
Suspended Solids	EA025H	APHA 2540 D	5 mg/L	10		
Chemical Oxygen Demand	EP026SP	APHA 5220 D	10 mg/L	10		
E. coli	MM696 (Ec)	Chromogenic Media	1 CFU/100mL	10		
Total cost per sample (Excluding GST)						
Total cost for this table based on sample numbers provided (Excluding GST)						

Sample Containers for: SELECTED BORES

No.	Label Colour	Container Type (Preservation noted if required)	Test Parameter(s)
	Brown	1 x 500mL Pres. with Formaldehyde on receipt	Anionic Surfactants as MBAS
	Orange	1 x 100mL Amber Glass Bottle - Unpreserved	Semi volatile Organics
	Purple	2 x 40mL Amber VOC Vial - Sulfuric Acid	Volatile Organics
	Red	1 x 60mL Clear Plastic Bottle - Nitric Acid; Filtered	Dissolved Metals
	Blue	1 x 60mL Opaque plastic bottle - NaOH	Cyanide
	Green	1 x 500mL Clear Plastic Bottle - Natural	TSS, F
	Blue	1 x 60mL Clear Plastic Bottle - NaOH Filtered	Hex Chromium
	Purple	1 x 60mL Clear Plastic Bottle - Sulfuric Acid	Chemical Oxygen Demand (COD)
	Grey	1 x 250mL Sterile Plastic Bottle - Sodium Thiosulfate	E. coli

Additional bottles are required on water samples for semi-volatile organics analysis for laboratory QA/QC purposes.

[redacted]

Subject: FW: [EXTERNAL] - FW: SRN for ALS Workorder : EM2014371 | Overall Description: APA WORM EES

Attachments: EM2014371_0_SRN_200820113517.pdf; EM2014371_ESRN_ESDAT_0.Header.xml; EM2014371_COC.pdf; EM2014371_COC_1.pdf

From: [redacted]
Sent: Thursday, 20 August 2020 12:20 PM
To: [redacted]
Cc: [redacted]
Subject: [EXTERNAL] - FW: SRN for ALS Workorder : EM2014371 | Overall Description: APA WORM EES

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 [redacted]

Regarding EM2014341 (attached), can you please schedule groundwater samples ,**BH12, BH14 and BH23A**' for the following analysis, as per quote **ME/458/20**:

- Salinity (mg/L TDS), EC, pH
- Major ions
- Ammonia (as N), nitrate (as N), nitrite (as N), total nitrogen, total kjeldahl nitrogen
- Sulfate as SO4
- Total phosphorous
- Metals screen
- E. Coli
- Total suspended solids, biological oxygen demand, chemical oxygen demand
- Oil and grease surfactants (MBAS)
- General environmental screen: pesticides (OCPs), semi-volatile and volatile organic compounds (SVOCs and VOCs), petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs)

I don't have access to a printer at the moment, so I have to email the analysis through to you.

Regards

[redacted]
Hydrogeologist, Water Resources

GHD
[redacted]
180 Lonsdale St Melbourne VIC 3000 Australia | www.ghd.com

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

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From: [redacted]
Sent: Thursday, August 20, 2020 11:36 AM

To: [redacted]
Subject: SRN for ALS Workorder : EM2014371 | Overall Description: APA WORM EES

Deliverables for ALS Workorder EM2014371

Project: 12529997/08

Overall Description: APA WORM EES

Dear [redacted]

Please find enclosed the following deliverables for **EM2014371**:

- EM2014371_0_SRN_200820113517.pdf
- EM2014371_ESRN_ESDAT_0.Header.xml
- EM2014371_COC.pdf
- EM2014371_COC_1.pdf

Report Recipients

- [redacted]
  - EM2014371_0_SRN_200820113517.pdf (Email)
  - EM2014371_ESRN_ESDAT_0.Header.xml (Email)
  - EM2014371_COC.pdf (Email)
  - EM2014371_COC_1.pdf (Email)
- [redacted]
  - EM2014371_0_SRN_200820113517.pdf (Email)
  - EM2014371_ESRN_ESDAT_0.Header.xml (Email)
  - EM2014371_COC.pdf (Email)
  - EM2014371_COC_1.pdf (Email)
- [redacted]
  - EM2014371_0_SRN_200820113517.pdf (Email)
  - EM2014371_ESRN_ESDAT_0.Header.xml (Email)
  - EM2014371_COC.pdf (Email)
  - EM2014371_COC_1.pdf (Email)

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[redacted]

From: [redacted]
Sent: Thursday, 20 August 2020 8:47 AM
To: Samples Melbourne; COC Melbourne
Subject: FW: [EXTERNAL] - RE: CoC for ALS Workorder : EM2014371 | Overall Description: NO ANALYSIS
Attachments: ME-458-20 GHD - GW Metro Melb .pdf

Importance: High

Please see below for analysis.

Short holding times !

[redacted]
Client Services Coordinator – Springvale
Environmental

[redacted]
2-4 Westall Rd
Springvale Vic 3171
Australia

EnviroMail™ 124 – PFOS Analysis to Freshwater Species Protection Lvl 99%
EnviroMail™ 125 – ALS Now Provides Testing capabilities for TOF
EnviroMail™ 126 – TOF for Compliance with Guideline ERA 60
EnviroMail™ 00 – All EnviroMails™ in one convenient library.

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From: [redacted]
Sent: Thursday, 20 August 2020 8:35 AM
To: [redacted]
Subject: [EXTERNAL] - RE: CoC for ALS Workorder : EM2014371 | Overall Description: NO ANALYSIS

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 [redacted]

Would you please log these groundwater samples in under GHD project details:

- APA WORM EES
- 12529997/08

Analysis

- Salinity (measured as mg/L TDS), pH, EC, major ions
- Ammonia (as N), nitrate (as N), Nitrate (as N), nitrite (as N), total nitrogen, Total Kjeldahl Nitrogen
- Sulfate as SO4
- Total phosphorous
- **Metals screen – exclude this (in EPA 621)**
- E.Coli
- Total Suspended Solids (TSS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD)
- Oil and grease, surfactants (MBAS)
- EPA screen 621 (incl metals screen)

Regards,

[redacted]
Hydrogeologist

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ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2014410**	Page	: 1 of 3
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 06-Aug-2020 17:10
Order number	: ----	Date Analysis Commenced	: 25-Aug-2020
C-O-C number	: ----	Issue Date	: 26-Aug-2020 12:00
Sampler	: ----		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 1		
No. of samples analysed	: 1		

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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. 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*
[redacted]	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

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

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

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

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

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

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

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

- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- This is a rebatch of EM2013650
- ASS: EA033 (CRS Suite): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in rela ion to incubation ANC. Unless corroborated, the results of ANC tes ing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- 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)			Client sample ID	BH12_0.5	----	----	----	----
			Client sampling date / time	03-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2014410-001	--------	--------	--------	--------
				Result	----	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.8**	----	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic Titratable Actual Acidity (s 23F)	----	0.02	% pyrite S	<0.02				
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.010**	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**1.34**	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**267**	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.43**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2014410**	Page	: 1 of 3
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 06-Aug-2020
Order number	: ----	Date Analysis Commenced	: 25-Aug-2020
C-O-C number	: ----	Issue Date	: 26-Aug-2020
Sampler	: ----		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 1		
No. of samples analysed	: 1		

ilac-MRA NATA
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. 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*
[redacted]	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

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

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	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 3216567)									
EB2021778-017	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.3	8.3	0.00	0% - 20%
EB2021778-027	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	7.3	7.4	1.36	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3216567)									
EB2021778-017	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.771	0.771	0.00	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	481	481	0.00	0% - 20%
EB2021778-027	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.129	0.125	3.12	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	80	78	3.12	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 3216567)									
EB2021778-017	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	6.13	5.98	2.48	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.96	1.92	2.48	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1220	1200	2.48	0% - 20%
EB2021778-027	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.93	0.82	12.5	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.30	0.26	12.5	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	185	163	12.5	0% - 50%

Method Blank (MB) and Laboratory Control Spike (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 Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3216567)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.4 pH Unit	100	91.0	107
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	15 mole H+ / t	117	70.0	124
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3216567)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.198 % S	95.6	77.0	121
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 3216567)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	99.2	91.0	112
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	----	----	----	----

Matrix Spike (MS) Report

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

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

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2014410**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 06-Aug-2020
Site	: ----	Issue Date	: 26-Aug-2020
Sampler	: ----	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

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; o hers 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen on receipt at ALS (EA033)							
BH12_0.5	**03-Aug-2020**	**25-Aug-2020**	03-Aug-2021	✓	**25-Aug-2020**	23-Nov-2020	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen on receipt at ALS (EA033)							
BH12_0.5	**03-Aug-2020**	**25-Aug-2020**	03-Aug-2021	✓	**25-Aug-2020**	23-Nov-2020	✓
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen on receipt at ALS (EA033)							
BH12_0.5	**03-Aug-2020**	**25-Aug-2020**	03-Aug-2021	✓	**25-Aug-2020**	23-Nov-2020	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen on receipt at ALS (EA033)							
BH12_0.5	**03-Aug-2020**	**25-Aug-2020**	03-Aug-2021	✓	**25-Aug-2020**	23-Nov-2020	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen on receipt at ALS (EA033)							
BH12_0.5	**03-Aug-2020**	**25-Aug-2020**	03-Aug-2021	✓	**25-Aug-2020**	23-Nov-2020	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	20	**5.00**	**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.

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

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

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM2014410**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	[redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: 12529997	Page	: 1 of 3
Order number	: ----	Quote number	: EM2018GHDSER0037 (EN/005/17 (Victoria Primary Quote))
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 06-Aug-2020 17:10	Issue Date	: 20-Aug-2020
Client Requested Due Date	: 28-Aug-2020	Scheduled Reporting Date	: **28-Aug-2020**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: ----
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Brisbane.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- This is a rebatch of EM2013650
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EM2014410-001	03-Aug-2020 00:00	BH12_0.5	✓

Proactive Holding Time Report

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

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

[redacted]

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

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

GHD LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)	Email	ghdlabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ghdlabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ghdlabreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ghdlabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ghdlabreports@ghd.com

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]

Rebatch

Client / Client code: GHD
Project: 12529997
Project Manger: [redacted]
Date /time sample rec: 6/8 @5:10pm
Date/time Instructions rec: 19/8 @ 8:42pm
Due date: std
Due date surcharge:

CS Contact: [redacted]
Additional Information:

Environmental Division
Melbourne
Work Order Reference
EM2014410

Telephone : +61-3-8549 9600

New Lab ID	Sample information						Number of Containers	Analysis										
													Leach					
	Client ID	Sampling Date / Time	Previous Work Order Reference	Previous ALS ID	Tray Number(s)	Container		chromium suite										
	BH12_0.5	3/08/2020 0:00	EM2013650	2	FB2			X										

[redacted]

From: [redacted]
Sent: Thursday, 20 August 2020 8:54 AM
To: Samples Melbourne; COC Melbourne
Subject: REBATCH GHD EM2013650 | Overall Description: WORM
Attachments: GHD EM2013650.xlsm

Please re-batch as per below and attached spreadsheet.

Thanks

[redacted]
Client Services Coordinator – Springvale
Environmental

[redacted]
2-4 Westall Rd
Springvale Vic 3171
Australia

EnviroMail™ 124 – PFOS Analysis to Freshwater Species Protection Lvl 99%
EnviroMail™ 125 – ALS Now Provides Testing capabilities for TOF
EnviroMail™ 126 – TOF for Compliance with Guideline ERA 60
EnviroMail™ 00 - All EnviroMails™ in one convenient library.

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From: [redacted]
Sent: Wednesday, 19 August 2020 8:42 PM
To: [redacted]
Subject: [EXTERNAL] - RE: RESULTS & EDD & INVOICE for ALS Workorder : EM2013650 | Overall Description: WORM

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 [redacted]

Would you please log in this sample for the chromium suite for ASS:

- BH12_0.5

Regards,

[redacted]

Hydrogeologist

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From: [redacted]
Sent: Thursday, 13 August 2020 5:57 PM
To: [redacted]
Subject: RESULTS & EDD & INVOICE for ALS Workorder : EM2013650 | Overall Description: WORM

Deliverables for ALS Workorder EM2013650

Project: 12529997

Overall Description: WORM

Dear [redacted]

Please find enclosed the following deliverables for **EM2013650**:

- EM2013650_0_ENMRG.CSV
- 12529997.ESDAT_EM2013650_0.Chemistry2e.CSV
- 12529997.ESDAT_EM2013650_0.Header.XML
- 12529997.ESDAT_EM2013650_0.Sample2e.CSV
- EM2013650_0_QC.pdf
- EM2013650_0_QCI.pdf
- EM2013650_0_COA.pdf
- EM2013650_0_COA_GL_EPA_WASTE.pdf
- 1151127333_INV.pdf
- EM2013650_COC.pdf
- EM2013650_COC_1.pdf

Report Recipients

- Accounts Payable Australia
  - 1151127333_INV.pdf (Email)

- EM2013650_COC.pdf (Email)
- EM2013650_COC_1.pdf (Email)

- [redacted]
  - EM2013650_0_ENMRG.CSV (Email)
  - 12529997.ESDAT_EM2013650_0.Chemistry2e.CSV (Email)
  - 12529997.ESDAT_EM2013650_0.Header.XML (Email)
  - 12529997.ESDAT_EM2013650_0.Sample2e.CSV (Email)
  - EM2013650_0_QC.pdf (Email)
  - EM2013650_0_QCI.pdf (Email)
  - EM2013650_0_COA.pdf (Email)
  - EM2013650_0_COA_GL_EPA_WASTE.pdf (Email)
  - 1151127333_INV.pdf (Email)
  - EM2013650_COC.pdf (Email)
  - EM2013650_COC_1.pdf (Email)
- GHD LAB REPORTS
  - EM2013650_0_COA.pdf (Email)
  - 12529997.ESDAT_EM2013650_0.Chemistry2e.CSV (Email)
  - 12529997.ESDAT_EM2013650_0.Header.XML (Email)
  - 12529997.ESDAT_EM2013650_0.Sample2e.CSV (Email)
  - EM2013650_0_QC.pdf (Email)
  - EM2013650_0_QCI.pdf (Email)
  - EM2013650_0_COA_GL_EPA_WASTE.pdf (Email)
  - EM2013650_COC.pdf (Email)
  - EM2013650_COC_1.pdf (Email)
- [redacted]
  - EM2013650_0_COA_GL_EPA_WASTE.pdf (Email)
  - EM2013650_0_COA.pdf (Email)
  - EM2013650_0_ENMRG.CSV (Email)
  - 12529997.ESDAT_EM2013650_0.Chemistry2e.CSV (Email)
  - 12529997.ESDAT_EM2013650_0.Header.XML (Email)
  - 12529997.ESDAT_EM2013650_0.Sample2e.CSV (Email)
  - EM2013650_0_QC.pdf (Email)
  - EM2013650_0_QCI.pdf (Email)
  - EM2013650_COC.pdf (Email)
  - EM2013650_COC_1.pdf (Email)
- [redacted]
  - EM2013650_0_COA_GL_EPA_WASTE.pdf (Email)
  - EM2013650_0_COA.pdf (Email)
  - EM2013650_0_ENMRG.CSV (Email)
  - 12529997.ESDAT_EM2013650_0.Chemistry2e.CSV (Email)
  - 12529997.ESDAT_EM2013650_0.Header.XML (Email)
  - 12529997.ESDAT_EM2013650_0.Sample2e.CSV (Email)
  - EM2013650_0_QC.pdf (Email)
  - EM2013650_0_QCI.pdf (Email)
  - EM2013650_COC.pdf (Email)
  - EM2013650_COC_1.pdf (Email)
- ALL INVOICES
  - 1151127333_INV.pdf (Email)
  - EM2013650_COC.pdf (Email)
  - EM2013650_COC_1.pdf (Email)

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ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2014440**	Page	: 1 of 13
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: [redacted]
Project	: 12529997/08	Date Samples Received	: 20-Aug-2020 15:30
Order number	: ----	Date Analysis Commenced	: 20-Aug-2020
C-O-C number	: ----	Issue Date	: 27-Aug-2020 15:06
Sampler	: [redacted]		
Site	: ----		
Quote number	: ME/458/20		
No. of samples received	: 1		
No. of samples analysed	: 1		

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. 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.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
[redacted]	Assistant Laboratory Manager	Me bourne Organics, Springvale, VIC
[redacted]	Senior Inorganic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Me bourne Organics, Springvale, VIC
[redacted]	Senior Inorganic Instrument Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	Senior Inorganic Instrument Chemist	WRG Subcontracting, Springvale, VIC
[redacted]	Senior Organic Chemist	Me bourne Organics, Springvale, VIC

General Comments

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

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

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

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

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

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

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

- EK040P: EM2014512 #2 Poor matrix spike recovery for Fluoride due to sample matrix. Confirmed by re-preparation and re-analysis.
- EG050G-F: EM2014440 #1 Hexavalent chromium results may be biased high compared to Dissolved Chromium filtered as sample were not field filtered prior to sample preservation.
- EA010-P: Electrical Conductivity @ 25°C was analysed by manual method (EA010).
- 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.
- EP075: 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.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of he 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.
- EP074: Where reported, Total Trihalomethanes is the sum of the reported concentrations of all Trihalomethanes at or above the LOR.
- EP074: Where reported, Total Trimethylbenzenes is the sum of the reported concentrations of 1.2.3-Trimethylbenzene, 1.2.4-Trimethylbenzene and 1.3.5-Trimethylbenzene 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.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- The analytical BOD run containing samples from this work order recovered the certified reference standard within acceptable criteria but the dilution water blank was elevated above 0.2 mg/L.
- EP075: Where reported, 'Sum of PAH' is the sum of the USEPA 16 priority PAHs
- E.coli & Total Coliforms by MPN (MM514) is conducted by ALS Scoresby NATA accreditation no. 992, site no. 989.
- MBAS (W-MBAS)is conducted by ALS Scoresby NATA accreditation no. 992, site no. 989.
- 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: GROUNDWATER (Matrix: WATER)				Client sample ID	BH32	----	----	----	----
				Client sampling date / time	20-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2014440-001	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.73**	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**12500**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**7340**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**21**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**388**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**388**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**641**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**4090**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**135**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**321**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**1980**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**15**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		**0.0002**	----	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.102**	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.015**	----	----	----	----
Lead	7439-92-1	0.001	mg/L		**0.002**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.129**	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.03**	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH32	----	----	----	----
				Client sampling date / time	20-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2014440-001	--------	--------	--------	--------
					Result	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.08**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.08**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		<0.1	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.03**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**136**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**120**	----	----	----	----
ø Ionic Balance	----	0.01	%		**6.56**	----	----	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	----	----	----	----
EP026SP: Chemical Oxygen Demand (Spectrophotometric)									
Chemical Oxygen Demand	----	10	mg/L		**41**	----	----	----	----
EP030: Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	----	2	mg/L		<2	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	----	----	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH32	----	----	----	----
				Client sampling date / time	20-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2014440-001	--------	--------	--------	--------
					Result	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	----	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L		<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	----	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	----	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L		<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	----	----	----	----
4.4`-DDT	50-29-3	2.0	µg/L		<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	----	----	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L		<0.5	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L		<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		<0.5	----	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons									
Styrene	100-42-5	5	µg/L		<5	----	----	----	----
Isopropylbenzene	98-82-8	5	µg/L		<5	----	----	----	----
n-Propylbenzene	103-65-1	5	µg/L		<5	----	----	----	----
1.3.5-Trimethylbenzene	108-67-8	5	µg/L		<5	----	----	----	----
sec-Butylbenzene	135-98-8	5	µg/L		<5	----	----	----	----
1.2.4-Trimethylbenzene	95-63-6	5	µg/L		<5	----	----	----	----
tert-Butylbenzene	98-06-6	5	µg/L		<5	----	----	----	----
p-Isopropyltoluene	99-87-6	5	µg/L		<5	----	----	----	----
n-Butylbenzene	104-51-8	5	µg/L		<5	----	----	----	----
EP074B: Oxygenated Compounds									
Vinyl Acetate	108-05-4	50	µg/L		<50	----	----	----	----
2-Butanone (MEK)	78-93-3	50	µg/L		<50	----	----	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L		<50	----	----	----	----
2-Hexanone (MBK)	591-78-6	50	µg/L		<50	----	----	----	----
EP074C: Sulfonated Compounds									
Carbon disulfide	75-15-0	5	µg/L		<5	----	----	----	----
EP074D: Fumigants									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH32	----	----	----	----
				Client sampling date / time	20-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2014440-001	--------	--------	--------	--------
					Result	----	----	----	----
EP074D: Fumigants - Continued									
2.2-Dichloropropane	594-20-7	5	µg/L		<5	----	----	----	----
1.2-Dichloropropane	78-87-5	5	µg/L		<5	----	----	----	----
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L		<5	----	----	----	----
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L		<5	----	----	----	----
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L		<5	----	----	----	----
EP074E: Halogenated Aliphatic Compounds									
Dichlorodifluoromethane	75-71-8	50	µg/L		<50	----	----	----	----
Chloromethane	74-87-3	50	µg/L		<50	----	----	----	----
Vinyl chloride	75-01-4	50	µg/L		<50	----	----	----	----
Bromomethane	74-83-9	50	µg/L		<50	----	----	----	----
Chloroethane	75-00-3	50	µg/L		<50	----	----	----	----
Trichlorofluoromethane	75-69-4	50	µg/L		<50	----	----	----	----
1.1-Dichloroethene	75-35-4	5	µg/L		<5	----	----	----	----
Iodomethane	74-88-4	5	µg/L		<5	----	----	----	----
Methylene chloride	75-09-2	5	µg/L		<5	----	----	----	----
trans-1.2-Dichloroethene	156-60-5	5	µg/L		<5	----	----	----	----
1.1-Dichloroethane	75-34-3	5	µg/L		<5	----	----	----	----
cis-1.2-Dichloroethene	156-59-2	5	µg/L		<5	----	----	----	----
1.1.1-Trichloroethane	71-55-6	5	µg/L		<5	----	----	----	----
1.1-Dichloropropylene	563-58-6	5	µg/L		<5	----	----	----	----
Carbon Tetrachloride	56-23-5	5	µg/L		<5	----	----	----	----
1.2-Dichloroethane	107-06-2	5	µg/L		<5	----	----	----	----
Trichloroethene	79-01-6	5	µg/L		<5	----	----	----	----
Dibromomethane	74-95-3	5	µg/L		<5	----	----	----	----
1.1.2-Trichloroethane	79-00-5	5	µg/L		<5	----	----	----	----
1.3-Dichloropropane	142-28-9	5	µg/L		<5	----	----	----	----
Tetrachloroethene	127-18-4	5	µg/L		<5	----	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L		<5	----	----	----	----
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L		<5	----	----	----	----
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L		<5	----	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L		<5	----	----	----	----
1.2.3-Trichloropropane	96-18-4	5	µg/L		<5	----	----	----	----
Pentachloroethane	76-01-7	5	µg/L		<5	----	----	----	----
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L		<5	----	----	----	----
Hexachlorobutadiene	87-68-3	5	µg/L		<5	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH32	----	----	----	----
				Client sampling date / time	20-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2014440-001	--------	--------	--------	--------
					Result	----	----	----	----
EP074F: Halogenated Aromatic Compounds									
Chlorobenzene	108-90-7	5	µg/L		<5	----	----	----	----
Bromobenzene	108-86-1	5	µg/L		<5	----	----	----	----
2-Chlorotoluene	95-49-8	5	µg/L		<5	----	----	----	----
4-Chlorotoluene	106-43-4	5	µg/L		<5	----	----	----	----
1.4-Dichlorobenzene	106-46-7	5	µg/L		<5	----	----	----	----
1.2-Dichlorobenzene	95-50-1	5	µg/L		<5	----	----	----	----
1.2.4-Trichlorobenzene	120-82-1	5	µg/L		<5	----	----	----	----
1.2.3-Trichlorobenzene	87-61-6	5	µg/L		<5	----	----	----	----
EP074G: Trihalomethanes									
Chloroform	67-66-3	5	µg/L		<5	----	----	----	----
Bromodichloromethane	75-27-4	5	µg/L		<5	----	----	----	----
Dibromochloromethane	124-48-1	5	µg/L		<5	----	----	----	----
Bromoform	75-25-2	5	µg/L		<5	----	----	----	----
EP075A: Phenolic Compounds									
Phenol	108-95-2	2	µg/L		<2	----	----	----	----
2-Chlorophenol	95-57-8	2	µg/L		<2	----	----	----	----
2-Methylphenol	95-48-7	2	µg/L		<2	----	----	----	----
3- & 4-Methylphenol	1319-77-3	4	µg/L		<4	----	----	----	----
2-Nitrophenol	88-75-5	2	µg/L		<2	----	----	----	----
2.4-Dimethylphenol	105-67-9	2	µg/L		<2	----	----	----	----
2.4-Dichlorophenol	120-83-2	2	µg/L		<2	----	----	----	----
2.6-Dichlorophenol	87-65-0	2	µg/L		<2	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	2	µg/L		<2	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	2	µg/L		<2	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	2	µg/L		<2	----	----	----	----
Pentachlorophenol	87-86-5	4	µg/L		<4	----	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	2	µg/L		<2	----	----	----	----
2-Methylnaphthalene	91-57-6	2	µg/L		<2	----	----	----	----
2-Chloronaphthalene	91-58-7	2	µg/L		<2	----	----	----	----
Acenaphthylene	208-96-8	2	µg/L		<2	----	----	----	----
Acenaphthene	83-32-9	2	µg/L		<2	----	----	----	----
Fluorene	86-73-7	2	µg/L		<2	----	----	----	----
Phenanthrene	85-01-8	2	µg/L		<2	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH32	----	----	----	----
				Client sampling date / time	20-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2014440-001	--------	--------	--------	--------
					Result	----	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons - Continued									
Anthracene	120-12-7	2	µg/L		<2	----	----	----	----
Fluoranthene	206-44-0	2	µg/L		<2	----	----	----	----
Pyrene	129-00-0	2	µg/L		<2	----	----	----	----
N-2-Fluorenyl Acetamide	53-96-3	2	µg/L		<2	----	----	----	----
Benz(a)anthracene	56-55-3	2	µg/L		<2	----	----	----	----
Chrysene	218-01-9	2	µg/L		<2	----	----	----	----
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	4	µg/L		<4	----	----	----	----
7.12-Dimethylbenz(a)anthracene	57-97-6	2	µg/L		<2	----	----	----	----
Benzo(a)pyrene	50-32-8	2	µg/L		<2	----	----	----	----
3-Methylcholanthrene	56-49-5	2	µg/L		<2	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	2	µg/L		<2	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	2	µg/L		<2	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	2	µg/L		<2	----	----	----	----
^ **Sum of PAHs**	----	2	µg/L		<2	----	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	2	µg/L		<2	----	----	----	----
EP075C: Phthalate Esters									
Dimethyl phthalate	131-11-3	2	µg/L		<2	----	----	----	----
Diethyl phthalate	84-66-2	2	µg/L		<2	----	----	----	----
Di-n-butyl phthalate	84-74-2	2	µg/L		<2	----	----	----	----
Butyl benzyl phthalate	85-68-7	2	µg/L		<2	----	----	----	----
bis(2-ethylhexyl) phthalate	117-81-7	10	µg/L		<10	----	----	----	----
Di-n-octylphthalate	117-84-0	2	µg/L		<2	----	----	----	----
EP075D: Nitrosamines									
N-Nitrosomethylethylamine	10595-95-6	2	µg/L		<2	----	----	----	----
N-Nitrosodiethylamine	55-18-5	2	µg/L		<2	----	----	----	----
N-Nitrosopyrrolidine	930-55-2	4	µg/L		<4	----	----	----	----
N-Nitrosomorpholine	59-89-2	2	µg/L		<2	----	----	----	----
N-Nitrosodi-n-propylamine	621-64-7	2	µg/L		<2	----	----	----	----
N-Nitrosopiperidine	100-75-4	2	µg/L		<2	----	----	----	----
N-Nitrosodibutylamine	924-16-3	2	µg/L		<2	----	----	----	----
N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	4	µg/L		<4	----	----	----	----
Methapyrilene	91-80-5	2	µg/L		<2	----	----	----	----
EP075E: Nitroaromatics and Ketones									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH32	----	----	----	----
				Client sampling date / time	20-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2014440-001	--------	--------	--------	--------
					Result	----	----	----	----
EP075E: Nitroaromatics and Ketones - Continued									
2-Picoline	109-06-8	2	µg/L		<2	----	----	----	----
Acetophenone	98-86-2	2	µg/L		<2	----	----	----	----
Nitrobenzene	98-95-3	2	µg/L		<2	----	----	----	----
Isophorone	78-59-1	2	µg/L		<2	----	----	----	----
2.6-Dinitrotoluene	606-20-2	4	µg/L		<4	----	----	----	----
2.4-Dinitrotoluene	121-14-2	4	µg/L		<4	----	----	----	----
1-Naphthylamine	134-32-7	2	µg/L		<2	----	----	----	----
4-Nitroquinoline-N-oxide	56-57-5	2	µg/L		<2	----	----	----	----
5-Nitro-o-toluidine	99-55-8	2	µg/L		<2	----	----	----	----
Azobenzene	103-33-3	2	µg/L		<2	----	----	----	----
1.3.5-Trinitrobenzene	99-35-4	2	µg/L		<2	----	----	----	----
Phenacetin	62-44-2	2	µg/L		<2	----	----	----	----
4-Aminobiphenyl	92-67-1	2	µg/L		<2	----	----	----	----
Pentachloronitrobenzene	82-68-8	2	µg/L		<2	----	----	----	----
Pronamide	23950-58-5	2	µg/L		<2	----	----	----	----
Dimethylaminoazobenzene	60-11-7	2	µg/L		<2	----	----	----	----
Chlorobenzilate	510-15-6	2	µg/L		<2	----	----	----	----
EP075F: Haloethers									
Bis(2-chloroethyl) ether	111-44-4	2	µg/L		<2	----	----	----	----
Bis(2-chloroethoxy) methane	111-91-1	2	µg/L		<2	----	----	----	----
4-Chlorophenyl phenyl ether	7005-72-3	2	µg/L		<2	----	----	----	----
4-Bromophenyl phenyl ether	101-55-3	2	µg/L		<2	----	----	----	----
EP075G: Chlorinated Hydrocarbons									
1.3-Dichlorobenzene	541-73-1	2	µg/L		<2	----	----	----	----
1.4-Dichlorobenzene	106-46-7	2	µg/L		<2	----	----	----	----
1.2-Dichlorobenzene	95-50-1	2	µg/L		<2	----	----	----	----
Hexachloroethane	67-72-1	2	µg/L		<2	----	----	----	----
1.2.4-Trichlorobenzene	120-82-1	2	µg/L		<2	----	----	----	----
Hexachloropropylene	1888-71-7	2	µg/L		<2	----	----	----	----
Hexachlorobutadiene	87-68-3	2	µg/L		<2	----	----	----	----
Hexachlorocyclopentadiene	77-47-4	10	µg/L		<10	----	----	----	----
Pentachlorobenzene	608-93-5	2	µg/L		<2	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	4	µg/L		<4	----	----	----	----
EP075H: Anilines and Benzidines									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH32	----	----	----	----
				Client sampling date / time	20-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2014440-001	--------	--------	--------	--------
					Result	----	----	----	----
EP075H: Anilines and Benzidines - Continued									
Aniline	62-53-3	2	µg/L		<2	----	----	----	----
4-Chloroaniline	106-47-8	2	µg/L		<2	----	----	----	----
2-Nitroaniline	88-74-4	4	µg/L		<4	----	----	----	----
3-Nitroaniline	99-09-2	4	µg/L		<4	----	----	----	----
Dibenzofuran	132-64-9	2	µg/L		<2	----	----	----	----
4-Nitroaniline	100-01-6	2	µg/L		<2	----	----	----	----
Carbazole	86-74-8	2	µg/L		<2	----	----	----	----
3.3`-Dichlorobenzidine	91-94-1	2	µg/L		<2	----	----	----	----
EP075I: Organochlorine Pesticides									
alpha-BHC	319-84-6	2	µg/L		<2	----	----	----	----
beta-BHC	319-85-7	2	µg/L		<2	----	----	----	----
gamma-BHC	58-89-9	2	µg/L		<2	----	----	----	----
delta-BHC	319-86-8	2	µg/L		<2	----	----	----	----
Heptachlor	76-44-8	2	µg/L		<2	----	----	----	----
Aldrin	309-00-2	2	µg/L		<2	----	----	----	----
Heptachlor epoxide	1024-57-3	2	µg/L		<2	----	----	----	----
alpha-Endosulfan	959-98-8	2	µg/L		<2	----	----	----	----
4.4`-DDE	72-55-9	2	µg/L		<2	----	----	----	----
Dieldrin	60-57-1	2	µg/L		<2	----	----	----	----
Endrin	72-20-8	2	µg/L		<2	----	----	----	----
beta-Endosulfan	33213-65-9	2	µg/L		<2	----	----	----	----
4.4`-DDD	72-54-8	2	µg/L		<2	----	----	----	----
Endosulfan sulfate	1031-07-8	2	µg/L		<2	----	----	----	----
4.4`-DDT	50-29-3	4	µg/L		<4	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	4	µg/L		<4	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	4	µg/L		<4	----	----	----	----
EP075J: Organophosphorus Pesticides									
Dichlorvos	62-73-7	2	µg/L		<2	----	----	----	----
Dimethoate	60-51-5	2	µg/L		<2	----	----	----	----
Diazinon	333-41-5	2	µg/L		<2	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	2	µg/L		<2	----	----	----	----
Malathion	121-75-5	2	µg/L		<2	----	----	----	----
Fenthion	55-38-9	2	µg/L		<2	----	----	----	----
Chlorpyrifos	2921-88-2	2	µg/L		<2	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH32	----	----	----	----
				Client sampling date / time	20-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2014440-001	--------	--------	--------	--------
					Result	----	----	----	----
EP075J: Organophosphorus Pesticides - Continued									
Pirimphos-ethyl	23505-41-1	2	µg/L		<2	----	----	----	----
Chlorfenvinphos	470-90-6	2	µg/L		<2	----	----	----	----
Prothiofos	34643-46-4	2	µg/L		<2	----	----	----	----
Ethion	563-12-2	2	µg/L		<2	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
MM514: E.coli & Total Coliforms MPN by Colilert									
Escherichia coli (Colilert)	----	1	orgs/100mL		**0**	----	----	----	----
Subcontracted Analysis: MBAS									
Anionic Surfactants as MBAS	----	0.05	mg/L		<0.05	----	----	----	----
EP066S: PCB Surrogate									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH32	----	----	----	----
				Client sampling date / time	20-Aug-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2014440-001	--------	--------	--------	--------
					Result	----	----	----	----
EP066S: PCB Surrogate - Continued									
Decachlorobiphenyl	2051-24-3	1	%		59.0	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		90.4	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		74.0	----	----	----	----
EP074S: VOC Surrogates									
1.2-Dichloroethane-D4	17060-07-0	5	%		95.0	----	----	----	----
Toluene-D8	2037-26-5	5	%		85.3	----	----	----	----
4-Bromofluorobenzene	460-00-4	5	%		96.1	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		26.9	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		56.2	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		68.6	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		64.9	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%		78.3	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		75.6	----	----	----	----
EP075S: Acid Extractable Surrogates									
2-Fluorophenol	367-12-4	2	%		37.5	----	----	----	----
Phenol-d6	13127-88-3	2	%		24.3	----	----	----	----
2-Chlorophenol-D4	93951-73-6	2	%		55.3	----	----	----	----
2.4.6-Tribromophenol	118-79-6	2	%		62.6	----	----	----	----
EP075T: Base/Neutral Extractable Surrogates									
Nitrobenzene-D5	4165-60-0	2	%		64.2	----	----	----	----
1.2-Dichlorobenzene-D4	2199-69-1	2	%		60.5	----	----	----	----
2-Fluorobiphenyl	321-60-8	2	%		70.1	----	----	----	----
Anthracene-d10	1719-06-8	2	%		81.8	----	----	----	----
4-Terphenyl-d14	1718-51-0	2	%		80.1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		101	----	----	----	----
Toluene-D8	2037-26-5	2	%		95.1	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		114	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	41	125
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	117
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	51	127
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72	132
Toluene-D8	2037-26-5	77	132
4-Bromofluorobenzene	460-00-4	67	131
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127
EP075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	10	75
Phenol-d6	13127-88-3	10	65
2-Chlorophenol-D4	93951-73-6	21	103
2.4.6-Tribromophenol	118-79-6	22	120
EP075T: Base/Neutral Extractable Surrogates			
Nitrobenzene-D5	4165-60-0	24	116
1.2-Dichlorobenzene-D4	2199-69-1	23	99
2-Fluorobiphenyl	321-60-8	32	114
Anthracene-d10	1719-06-8	47	119
4-Terphenyl-d14	1718-51-0	44	124
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2014440**	Page	: 1 of 15
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: [redacted]
Project	: 12529997/08	Date Samples Received	: 20-Aug-2020
Order number	: ----	Date Analysis Commenced	: 20-Aug-2020
C-O-C number	: ----	Issue Date	: 27-Aug-2020
Sampler	: [redacted]		
Site	: ----		
Quote number	: ME/458/20		
No. of samples received	: 1		
No. of samples analysed	: 1		

ilac-MRA NATA
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. 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*
[redacted]	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
[redacted]	Assistant Laboratory Manager	Melbourne Organics, Springvale, VIC
[redacted]	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
[redacted]	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	Senior Inorganic Instrument Chemist	WRG Subcontracting, Springvale, VIC
[redacted]	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

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

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	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 3215744)									
EM2014440-001	BH32	EA005-P: pH Value	----	0.01	pH Unit	7.73	7.71	0.259	0% - 20%
EM2014512-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	3.96	3.79	4.39	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3215742)									
EM2014440-001	BH32	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	12500	12400	0.883	0% - 20%
EM2014512-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	40900	40400	1.13	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3217409)									
EM2014459-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	210	183	13.5	0% - 20%
EM2014333-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2910	2880	1.04	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3217410)									
EM2014440-001	BH32	EA025H: Suspended Solids (SS)	----	5	mg/L	21	22	0.00	No Limit
EM2014333-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	32	30	5.67	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3215741)									
EM2014440-001	BH32	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	388	394	1.67	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	388	394	1.67	0% - 20%
EM2014512-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3212047)									
EM2014431-008	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	353	345	2.31	0% - 20%
EM2014280-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	90	90	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3212048)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 3212048) - continued									
EM2014407-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	70	71	0.00	0% - 20%
EM2014280-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	29	29	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3213625)									
EM2014371-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	71	71	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	195	196	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	333	332	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	13	13	0.00	0% - 50%
EM2014453-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	25	25	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	29	29	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	73	73	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3213627)									
EM2014371-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.016	0.016	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.078	0.080	1.63	0% - 50%
EM2014440-001	BH32	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0001	71.2	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.102	0.097	5.06	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.015	0.015	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.129	0.126	1.71	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 3213626)									
EM2014512-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2014371-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3211610)									
EM2014371-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.03	0.00	No Limit
EM2014425-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.05	0.08	55.4	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3212051)									
EM2014438-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.02	0.02	0.00	No Limit
EM2014459-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.03	0.03	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3211611)									
EM2014371-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.05	1.03	1.31	0% - 20%
EM2014425-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.07	0.07	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3213534)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3213534) - continued									
EM2014434-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.9	4.9	0.00	0% - 20%
EM2014454-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.8	14.2	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3213535)									
EM2014434-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	2.36	2.38	0.738	0% - 20%
EM2014454-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.14	0.13	0.00	0% - 50%
EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QC Lot: 3222731)									
EM2014371-001	Anonymous	EP026SP: Chemical Oxygen Demand	----	10	mg/L	14	14	0.00	No Limit
EM2014471-002	Anonymous	EP026SP: Chemical Oxygen Demand	----	10	mg/L	14	14	0.00	No Limit
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 3211827)									
EM2014350-001	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	8	8	0.00	No Limit
EM2014434-001	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	198	217	9.25	0% - 20%
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 3211907)									
EM2014440-001	BH32	EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 3211907)									
EM2014440-001	BH32	EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
EP074C: Sulfonated Compounds (QC Lot: 3211907)									
EM2014440-001	BH32	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EP074D: Fumigants (QC Lot: 3211907)									
EM2014440-001	BH32	EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 3211907)									
EM2014440-001	BH32	EP074: 1.1-Dichloroe hene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Methylene chloride	75-09-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074E: Halogenated Aliphatic Compounds (QC Lot: 3211907) - continued									
EM2014440-001	BH32	EP074: 1.1-Dichloroe hane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroe hane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 3211907)									
EM2014440-001	BH32	EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 3211907)									
EM2014440-001	BH32	EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3211908)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3211908) - continued									
EM2014476-017	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM2014440-001	BH32	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3211908)									
EM2014476-017	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM2014440-001	BH32	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3211908)									
EM2014476-017	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM2014440-001	BH32	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (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 Spike (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 Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 3215742)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.3	85.0	119
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3217409)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	93.7	107
				<10	293 mg/L	99.0	90.0	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3217410)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	94.7	90.3	109
				<5	1000 mg/L	99.9	90.3	109
ED037P: Alkalinity by PC Titrator (QCLot: 3215741)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	106	88.0	112
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3212047)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	85.8	117
				<1	100 mg/L	111	85.8	117
ED045G: Chloride by Discrete Analyser (QCLot: 3212048)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.6	85.0	122
				<1	1000 mg/L	104	85.0	122
ED093F: Dissolved Major Cations (QCLot: 3213625)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	106	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	101	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	104	86.7	111
EG020F: Dissolved Metals by ICP-MS (QCLot: 3213627)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	88.5	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	103	83.5	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100	83.2	105
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.5	83.1	106
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	84.6	107
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.6	84.3	108
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	86.3	111
EG035F: Dissolved Mercury by FIMS (QCLot: 3213626)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	71.1	112
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3211610)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	96.0	88.0	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3212051)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3212051) - continued								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	107	90.9	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3211611)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	90.0	117
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3213534)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	107	70.0	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3213535)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	98.4	71.9	114
EP020: Oil and Grease (O&G) (QCLot: 3219808)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	93.8	81.0	121
EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QCLot: 3222731)								
EP026SP: Chemical Oxygen Demand	----	10	mg/L	<10	50 mg/L	99.0	82.0	112
				<10	500 mg/L	100	83.0	113
EP030: Biochemical Oxygen Demand (BOD) (QCLot: 3211827)								
EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	198 mg/L	97.2	77.5	120
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3214752)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	69.1	47.7	124
EP068A: Organochlorine Pesticides (OC) (QCLot: 3214754)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	2.5 µg/L	76.1	50.6	119
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	2.5 µg/L	73.6	44.2	117
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	2.5 µg/L	77.6	53.7	119
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	2.5 µg/L	78.1	47.7	117
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	2.5 µg/L	76.8	50.1	117
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	2.5 µg/L	74.4	46.5	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	2.5 µg/L	74.5	48.0	115
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	2.5 µg/L	76.7	51.1	119
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	2.5 µg/L	75.3	46.1	120
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	2.5 µg/L	75.9	49.9	118
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	2.5 µg/L	75.8	50.0	118
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	2.5 µg/L	77.4	48.0	116
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	2.5 µg/L	75.4	47.8	116
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	2.5 µg/L	79.2	47.1	128
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	2.5 µg/L	77.2	51.4	118
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	2.5 µg/L	75.9	48.6	122
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	2.5 µg/L	105	49.4	128
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	2.5 µg/L	78.9	49.1	123
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	2.5 µg/L	78.9	45.6	126
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	2.5 µg/L	80.1	52.8	117
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	2.5 µg/L	77.6	47.1	126

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3211907)								
EP074: Styrene	100-42-5	5	µg/L	<5	20 µg/L	96.9	80.4	117
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	20 µg/L	91.4	75.0	118
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	20 µg/L	86.3	68.7	114
EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	20 µg/L	90.3	72.1	114
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	20 µg/L	90.3	69.6	115
EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	20 µg/L	94.7	72.4	113
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	20 µg/L	89.4	72.6	116
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	20 µg/L	86.2	69.2	115
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	20 µg/L	85.6	61.4	115
EP074B: Oxygenated Compounds (QCLot: 3211907)								
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	200 µg/L	116	71.3	125
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	200 µg/L	90.3	66.4	132
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	200 µg/L	125	75.2	132
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	200 µg/L	95.7	73.9	131
EP074C: Sulfonated Compounds (QCLot: 3211907)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	20 µg/L	116	58.2	124
EP074D: Fumigants (QCLot: 3211907)								
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	20 µg/L	87.7	68.7	120
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	20 µg/L	107	79.6	116
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	20 µg/L	106	76.2	114
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	20 µg/L	106	77.0	114
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	20 µg/L	103	80.1	118
EP074E: Halogenated Aliphatic Compounds (QCLot: 3211907)								
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	200 µg/L	112	53.4	140
EP074: Chloromethane	74-87-3	50	µg/L	<50	200 µg/L	122	63.8	134
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	200 µg/L	115	57.1	135
EP074: Bromomethane	74-83-9	50	µg/L	<50	200 µg/L	103	51.1	126
EP074: Chloroethane	75-00-3	50	µg/L	<50	200 µg/L	97.8	64.9	129
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	200 µg/L	102	65.7	127
EP074: 1.1-Dichloroe hene	75-35-4	5	µg/L	<5	20 µg/L	90.6	67.4	123
EP074: Iodomethane	74-88-4	5	µg/L	<5	20 µg/L	# 131	30.9	126
EP074: Methylene chloride	75-09-2	5	µg/L	<5	20 µg/L	114	83.5	126
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	20 µg/L	87.6	69.2	119
EP074: 1.1-Dichloroe hane	75-34-3	5	µg/L	<5	20 µg/L	88.4	76.7	120
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	20 µg/L	93.9	78.9	118
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	20 µg/L	89.7	69.2	120
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	20 µg/L	98.6	67.0	120
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	20 µg/L	88.2	63.7	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 3211907) - continued								
EP074: 1.2-Dichloroe hane	107-06-2	5	µg/L	<5	20 µg/L	116	82.0	116
EP074: Trichloroethene	79-01-6	5	µg/L	<5	20 µg/L	107	72.9	118
EP074: Dibromomethane	74-95-3	5	µg/L	<5	20 µg/L	109	81.0	116
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	20 µg/L	105	84.9	118
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	20 µg/L	104	83.4	119
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	20 µg/L	92.1	70.4	118
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	20 µg/L	95.3	77.9	113
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	20 µg/L	102	72.6	122
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	20 µg/L	94.0	67.8	119
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	20 µg/L	112	83.0	125
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	20 µg/L	109	82.4	123
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	20 µg/L	93.2	72.7	111
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	20 µg/L	106	75.4	114
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	20 µg/L	84.3	62.6	128
EP074F: Halogenated Aromatic Compounds (QCLot: 3211907)								
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	20 µg/L	97.8	81.7	116
EP074: Bromobenzene	108-86-1	5	µg/L	<5	20 µg/L	95.9	75.2	118
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	20 µg/L	94.9	75.0	114
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	20 µg/L	95.4	72.8	113
EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	20 µg/L	100	75.5	119
EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	20 µg/L	100	82.0	113
EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	20 µg/L	91.0	64.0	123
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	20 µg/L	98.8	75.5	119
EP074G: Trihalomethanes (QCLot: 3211907)								
EP074: Chloroform	67-66-3	5	µg/L	<5	20 µg/L	93.0	80.4	118
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	20 µg/L	104	78.6	115
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	20 µg/L	97.5	77.7	113
EP074: Bromoform	75-25-2	5	µg/L	<5	20 µg/L	95.2	74.2	113
EP075A: Phenolic Compounds (QCLot: 3214755)								
EP075: Phenol	108-95-2	2	µg/L	<2	10 µg/L	28.6	19.6	48.4
EP075: 2-Chlorophenol	95-57-8	2	µg/L	<2	10 µg/L	56.7	45.4	100
EP075: 2-Methylphenol	95-48-7	2	µg/L	<2	10 µg/L	54.8	41.6	93.8
EP075: 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2	10 µg/L	48.2	36.3	89.8
EP075: 2-Nitrophenol	88-75-5	2	µg/L	<2	10 µg/L	63.5	46.4	110
EP075: 2.4-Dimethylphenol	105-67-9	2	µg/L	<2	10 µg/L	61.5	48.6	108
EP075: 2.4-Dichlorophenol	120-83-2	2	µg/L	<2	10 µg/L	65.4	49.3	109
EP075: 2.6-Dichlorophenol	87-65-0	2	µg/L	<2	10 µg/L	64.2	50.6	108
EP075: 4-Chloro-3-methylphenol	59-50-7	2	µg/L	<2	10 µg/L	59.9	48.6	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075A: Phenolic Compounds (QCLot: 3214755) - continued								
EP075: 2.4.6-Trichlorophenol	88-06-2	2	µg/L	<2	10 µg/L	62.0	45.9	113
EP075: 2.4.5-Trichlorophenol	95-95-4	2	µg/L	<2	10 µg/L	58.5	46.0	113
EP075: Pentachlorophenol	87-86-5	4	µg/L	<4	10 µg/L	49.0	14.2	121
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3214755)								
EP075: Naphthalene	91-20-3	2	µg/L	<2	10 µg/L	61.4	52.2	109
EP075: 2-Methylnaphthalene	91-57-6	2	µg/L	<2	10 µg/L	61.0	52.2	112
EP075: 2-Chloronaphthalene	91-58-7	2	µg/L	<2	10 µg/L	63.1	50.9	113
EP075: Acenaphthylene	208-96-8	2	µg/L	<2	10 µg/L	61.1	53.3	113
EP075: Acenaphthene	83-32-9	2	µg/L	<2	10 µg/L	63.2	53.1	112
EP075: Fluorene	86-73-7	2	µg/L	<2	10 µg/L	61.7	56.0	113
EP075: Phenanthrene	85-01-8	2	µg/L	<2	10 µg/L	61.8	58.2	115
EP075: Anthracene	120-12-7	2	µg/L	<2	10 µg/L	62.5	57.8	115
EP075: Fluoranthene	206-44-0	2	µg/L	<2	10 µg/L	64.0	57.2	117
EP075: Pyrene	129-00-0	2	µg/L	<2	10 µg/L	64.9	52.3	119
EP075: N-2-Fluorenyl Acetamide	53-96-3	2	µg/L	<2	10 µg/L	62.7	52.2	122
EP075: Benz(a)anthracene	56-55-3	2	µg/L	<2	10 µg/L	63.5	56.2	118
EP075: Chrysene	218-01-9	2	µg/L	<2	10 µg/L	64.3	56.9	119
EP075: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	4	µg/L	<4	20 µg/L	64.9	56.9	115
EP075: 7.12-Dimethylbenz(a)anthracene	57-97-6	2	µg/L	<2	10 µg/L	61.6	55.7	122
EP075: Benzo(a)pyrene	50-32-8	2	µg/L	<2	10 µg/L	64.4	56.2	116
EP075: 3-Methylcholanthrene	56-49-5	2	µg/L	<2	10 µg/L	62.4	51.6	121
EP075: Indeno(1.2.3.cd)pyrene	193-39-5	2	µg/L	<2	10 µg/L	60.7	55.6	114
EP075: Dibenz(a.h)anthracene	53-70-3	2	µg/L	<2	10 µg/L	60.6	55.5	115
EP075: Benzo(g.h.i)perylene	191-24-2	2	µg/L	<2	10 µg/L	57.7	53.5	116
EP075C: Phthalate Esters (QCLot: 3214755)								
EP075: Dimethyl phthalate	131-11-3	2	µg/L	<2	10 µg/L	65.1	56.4	114
EP075: Diethyl phthalate	84-66-2	2	µg/L	<2	10 µg/L	65.3	58.1	114
EP075: Di-n-butyl phthalate	84-74-2	2	µg/L	<2	10 µg/L	66.0	61.7	120
EP075: Butyl benzyl phthalate	85-68-7	2	µg/L	<2	10 µg/L	65.2	57.3	119
EP075: bis(2-ethylhexyl) phthalate	117-81-7	10	µg/L	<10	10 µg/L	66.6	57.8	114
EP075: Di-n-octylphthalate	117-84-0	2	µg/L	<2	10 µg/L	65.9	58.4	115
EP075D: Nitrosamines (QCLot: 3214755)								
EP075: N-Nitrosomethylethylamine	10595-95-6	2	µg/L	<2	10 µg/L	47.7	23.9	106
EP075: N-Nitrosodiethylamine	55-18-5	2	µg/L	<2	10 µg/L	58.5	43.7	109
EP075: N-Nitrosopyrrolidine	930-55-2	4	µg/L	<4	10 µg/L	47.5	36.9	81.9
EP075: N-Nitrosomorpholine	59-89-2	2	µg/L	<2	10 µg/L	45.7	33.8	79.9
EP075: N-Nitrosodi-n-propylamine	621-64-7	2	µg/L	<2	10 µg/L	63.4	51.6	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075D: Nitrosamines (QCLot: 3214755) - continued								
EP075: N-Nitrosopiperidine	100-75-4	2	µg/L	<2	10 µg/L	60.5	48.9	110
EP075: N-Nitrosodibutylamine	924-16-3	2	µg/L	<2	10 µg/L	59.8	51.8	115
EP075: N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	4	µg/L	<4	10 µg/L	62.1	55.7	113
EP075: Methapyrilene	91-80-5	2	µg/L	<2	10 µg/L	84.2	10.0	147
EP075E: Nitroaromatics and Ketones (QCLot: 3214755)								
EP075: 2-Picoline	109-06-8	2	µg/L	<2	10 µg/L	46.5	18.8	106
EP075: Acetophenone	98-86-2	2	µg/L	<2	10 µg/L	60.7	52.2	110
EP075: Nitrobenzene	98-95-3	2	µg/L	<2	10 µg/L	58.9	48.9	110
EP075: Isophorone	78-59-1	2	µg/L	<2	10 µg/L	62.4	52.7	111
EP075: 2.6-Dinitrotoluene	606-20-2	4	µg/L	<4	10 µg/L	62.9	53.8	115
EP075: 2.4-Dinitrotoluene	121-14-2	4	µg/L	<4	10 µg/L	62.0	53.2	113
EP075: 1-Naphthylamine	134-32-7	2	µg/L	<2	10 µg/L	20.6	10.9	119
EP075: 4-Nitroquinoline-N-oxide	56-57-5	2	µg/L	<2	10 µg/L	60.4	27.3	148
EP075: 5-Nitro-o-toluidine	99-55-8	2	µg/L	<2	10 µg/L	71.7	49.3	119
EP075: Azobenzene	103-33-3	2	µg/L	<2	10 µg/L	62.0	55.4	114
EP075: 1.3.5-Trinitrobenzene	99-35-4	2	µg/L	<2	10 µg/L	62.9	38.2	122
EP075: Phenacetin	62-44-2	2	µg/L	<2	10 µg/L	57.7	45.5	104
EP075: 4-Aminobiphenyl	92-67-1	2	µg/L	<2	10 µg/L	80.3	24.0	149
EP075: Pentachloronitrobenzene	82-68-8	2	µg/L	<2	10 µg/L	63.6	54.0	114
EP075: Pronamide	23950-58-5	2	µg/L	<2	10 µg/L	63.1	58.8	116
EP075: Dimethylaminoazobenzene	60-11-7	2	µg/L	<2	10 µg/L	62.9	52.6	117
EP075: Chlorobenzilate	510-15-6	2	µg/L	<2	10 µg/L	66.1	55.9	118
EP075F: Haloethers (QCLot: 3214755)								
EP075: Bis(2-chloroethyl) ether	111-44-4	2	µg/L	<2	10 µg/L	58.4	48.0	109
EP075: Bis(2-chloroethoxy) methane	111-91-1	2	µg/L	<2	10 µg/L	61.4	51.8	111
EP075: 4-Chlorophenyl phenyl ether	7005-72-3	2	µg/L	<2	10 µg/L	64.7	55.5	113
EP075: 4-Bromophenyl phenyl ether	101-55-3	2	µg/L	<2	10 µg/L	62.5	54.1	114
EP075G: Chlorinated Hydrocarbons (QCLot: 3214755)								
EP075: 1.4-Dichlorobenzene	106-46-7	2	µg/L	<2	10 µg/L	57.5	45.6	105
EP075: 1.3-Dichlorobenzene	541-73-1	2	µg/L	<2	10 µg/L	58.7	45.5	104
EP075: 1.2-Dichlorobenzene	95-50-1	2	µg/L	<2	10 µg/L	56.9	46.4	106
EP075: Hexachloroethane	67-72-1	2	µg/L	<2	10 µg/L	57.4	43.8	106
EP075: 1.2.4-Trichlorobenzene	120-82-1	2	µg/L	<2	10 µg/L	59.4	45.9	109
EP075: Hexachloropropylene	1888-71-7	2	µg/L	<2	10 µg/L	60.5	41.8	112
EP075: Hexachlorobutadiene	87-68-3	2	µg/L	<2	10 µg/L	58.2	47.8	110
EP075: Hexachlorocyclopentadiene	77-47-4	10	µg/L	<10	10 µg/L	61.2	13.3	129
EP075: Pentachlorobenzene	608-93-5	2	µg/L	<2	10 µg/L	64.2	53.6	112

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075G: Chlorinated Hydrocarbons (QCLot: 3214755) - continued								
EP075: Hexachlorobenzene (HCB)	118-74-1	4	µg/L	<4	10 µg/L	61.4	54.8	114
EP075H: Anilines and Benzidines (QCLot: 3214755)								
EP075: Aniline	62-53-3	2	µg/L	<2	10 µg/L	62.6	30.2	108
EP075: 4-Chloroaniline	106-47-8	2	µg/L	<2	10 µg/L	56.1	14.5	126
EP075: 2-Nitroaniline	88-74-4	4	µg/L	<4	10 µg/L	59.0	50.8	111
EP075: 3-Nitroaniline	99-09-2	4	µg/L	<4	10 µg/L	71.8	34.2	119
EP075: Dibenzofuran	132-64-9	2	µg/L	<2	10 µg/L	62.6	55.3	112
EP075: 4-Nitroaniline	100-01-6	2	µg/L	<2	10 µg/L	77.5	40.9	116
EP075: Carbazole	86-74-8	2	µg/L	<2	10 µg/L	71.2	57.1	118
EP075: 3.3`-Dichlorobenzidine	91-94-1	2	µg/L	<2	10 µg/L	82.6	50.2	137
EP075I: Organochlorine Pesticides (QCLot: 3214755)								
EP075: alpha-BHC	319-84-6	2	µg/L	<2	10 µg/L	66.7	55.6	114
EP075: beta-BHC	319-85-7	2	µg/L	<2	10 µg/L	63.6	55.2	115
EP075: gamma-BHC	58-89-9	2	µg/L	<2	10 µg/L	65.2	56.0	115
EP075: delta-BHC	319-86-8	2	µg/L	<2	10 µg/L	63.2	56.3	117
EP075: Heptachlor	76-44-8	2	µg/L	<2	10 µg/L	63.8	54.1	117
EP075: Aldrin	309-00-2	2	µg/L	<2	10 µg/L	64.4	54.4	117
EP075: Heptachlor epoxide	1024-57-3	2	µg/L	<2	10 µg/L	58.5	53.9	119
EP075: alpha-Endosulfan	959-98-8	2	µg/L	<2	10 µg/L	77.5	55.8	120
EP075: 4.4`-DDE	72-55-9	2	µg/L	<2	10 µg/L	66.0	56.7	121
EP075: Dieldrin	60-57-1	2	µg/L	<2	10 µg/L	65.4	55.6	118
EP075: Endrin	72-20-8	2	µg/L	<2	10 µg/L	64.6	51.8	121
EP075: beta-Endosulfan	33213-65-9	2	µg/L	<2	10 µg/L	67.2	55.3	119
EP075: 4.4`-DDD	72-54-8	2	µg/L	<2	10 µg/L	63.1	56.4	120
EP075: Endosulfan sulfate	1031-07-8	2	µg/L	<2	10 µg/L	65.6	51.8	125
EP075: 4.4`-DDT	50-29-3	4	µg/L	<4	10 µg/L	64.4	42.7	127
EP075J: Organophosphorus Pesticides (QCLot: 3214755)								
EP075: Dichlorvos	62-73-7	2	µg/L	<2	10 µg/L	59.4	53.5	113
EP075: Dimethoate	60-51-5	2	µg/L	<2	10 µg/L	54.7	40.5	110
EP075: Diazinon	333-41-5	2	µg/L	<2	10 µg/L	66.3	57.9	118
EP075: Chlorpyrifos-methyl	5598-13-0	2	µg/L	<2	10 µg/L	61.6	54.9	118
EP075: Malathion	121-75-5	2	µg/L	<2	10 µg/L	63.7	56.3	126
EP075: Fenthion	55-38-9	2	µg/L	<2	10 µg/L	61.1	56.1	119
EP075: Chlorpyrifos	2921-88-2	2	µg/L	<2	10 µg/L	66.4	57.1	118
EP075: Pirimphos-ethyl	23505-41-1	2	µg/L	<2	10 µg/L	67.1	57.4	118
EP075: Chlorfenvinphos	470-90-6	2	µg/L	<2	10 µg/L	59.2	52.1	122
EP075: Prothiofos	34643-46-4	2	µg/L	<2	10 µg/L	65.0	56.8	118
EP075: Ethion	563-12-2	2	µg/L	<2	10 µg/L	70.7	56.4	121

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3211908)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	124	65.5	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3214751)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3330 µg/L	89.7	44.8	125
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16500 µg/L	85.0	51.3	135
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7800 µg/L	82.4	49.4	134
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3211908)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	122	64.3	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3214751)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5690 µg/L	80.6	47.3	129
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	20700 µg/L	83.9	50.4	133
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1510 µg/L	83.1	45.2	136
EP080: BTEXN (QCLot: 3211908)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	122	69.8	124
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	117	73.6	126
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	120	72.0	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	121	71.5	132
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	122	76.5	132
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	108	70.5	127

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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3212047)							
EM2014280-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	83.1	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3212048)							
EM2014280-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	110	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3213627)							
EM2014371-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	97.1	85.0	131
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	92 8	81.0	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	89 8	71.0	135
		EG020A-F: Copper	7440-50-8	0.2 mg/L	93 8	76.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	91.4	75.0	133

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG020F: Dissolved Metals by ICP-MS (QCLot: 3213627) - continued							
EM2014371-001	Anonymous	EG020A-F: Nickel	7440-02-0	0.2 mg/L	91.4	73.0	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	94.4	75.0	131
EG035F: Dissolved Mercury by FIMS (QCLot: 3213626)							
EM2014371-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	87 5	70.0	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3211610)							
EM2014371-002	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	121	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3212051)							
EM2014440-001	BH32	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	101	80.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3211611)							
EM2014371-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	74.7	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3213534)							
EM2014435-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	121	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3213535)							
EM2014435-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	84 2	70.0	130
EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QCLot: 3222731)							
EM2014371-001	Anonymous	EP026SP: Chemical Oxygen Demand	----	47.6 mg/L	111	70.0	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 3211907)							
EM2014476-017	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	20 µg/L	78.1	40.0	124
		EP074: Trichloroethene	79-01-6	20 µg/L	85 3	54.0	126
EP074F: Halogenated Aromatic Compounds (QCLot: 3211907)							
EM2014476-017	Anonymous	EP074: Chlorobenzene	108-90-7	20 µg/L	91.4	68.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3211908)							
EM2014476-017	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	95 2	43.0	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3211908)							
EM2014476-017	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	91 2	44.0	122
EP080: BTEXN (QCLot: 3211908)							
EM2014476-017	Anonymous	EP080: Benzene	71-43-2	20 µg/L	108	68.0	130
		EP080: Toluene	108-88-3	20 µg/L	111	72.0	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2014440**	Page	: 1 of 12
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 12529997/08	Date Samples Received	: 20-Aug-2020
Site	: ----	Issue Date	: 27-Aug-2020
Sampler	: [redacted]	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **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
Laboratory Control Spike (LCS) Recoveries							
EP074E: Halogenated Aliphatic Compounds	QC-3211907-001	----	**Iodomethane**	74-88-4	131 %	30.9-126%	**Recovery greater than upper control limit**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	18	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	18	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	19	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)							
BH32	**20-Aug-2020**	**----**	----	----	**20-Aug-2020**	20-Aug-2020	✓
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
BH32	**20-Aug-2020**	**----**	----	----	**24-Aug-2020**	17-Sep-2020	✓

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
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
BH32	20-Aug-2020	----	----	----	25-Aug-2020	27-Aug-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
BH32	20-Aug-2020	----	----	----	25-Aug-2020	27-Aug-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
BH32	20-Aug-2020	----	----	----	24-Aug-2020	03-Sep-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
BH32	20-Aug-2020	----	----	----	21-Aug-2020	17-Sep-2020	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
BH32	20-Aug-2020	----	----	----	21-Aug-2020	17-Sep-2020	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH32	20-Aug-2020	----	----	----	25-Aug-2020	17-Sep-2020	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH32	20-Aug-2020	----	----	----	21-Aug-2020	16-Feb-2021	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH32	20-Aug-2020	----	----	----	21-Aug-2020	17-Sep-2020	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH32	20-Aug-2020	----	----	----	21-Aug-2020	17-Sep-2020	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH32	20-Aug-2020	----	----	----	21-Aug-2020	22-Aug-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH32	20-Aug-2020	----	----	----	21-Aug-2020	17-Sep-2020	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH32	20-Aug-2020	21-Aug-2020	17-Sep-2020	✓	24-Aug-2020	17-Sep-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH32	20-Aug-2020	21-Aug-2020	17-Sep-2020	✓	24-Aug-2020	17-Sep-2020	✓

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
EP020: Oil and Grease (O&G)							
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)							
BH32	**20-Aug-2020**	**----**	----	----	**26-Aug-2020**	17-Sep-2020	✓
EP026SP: Chemical Oxygen Demand (Spectrophotometric)							
Clear Plastic Bottle - Sulfuric Acid (EP026SP)							
BH32	**20-Aug-2020**	**----**	----	----	**27-Aug-2020**	17-Sep-2020	✓
EP030: Biochemical Oxygen Demand (BOD)							
Clear Plastic Bottle - Natural (EP030)							
BH32	**20-Aug-2020**	**----**	----	----	**20-Aug-2020**	22-Aug-2020	✓
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
EP074A: Monocyclic Aromatic Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP074)							
BH32	**20-Aug-2020**	**21-Aug-2020**	03-Sep-2020	✓	**21-Aug-2020**	03-Sep-2020	✓
EP074B: Oxygenated Compounds							
Amber VOC Vial - Sulfuric Acid (EP074)							
BH32	**20-Aug-2020**	**21-Aug-2020**	03-Sep-2020	✓	**21-Aug-2020**	03-Sep-2020	✓
EP074C: Sulfonated Compounds							
Amber VOC Vial - Sulfuric Acid (EP074)							
BH32	**20-Aug-2020**	**21-Aug-2020**	03-Sep-2020	✓	**21-Aug-2020**	03-Sep-2020	✓
EP074D: Fumigants							
Amber VOC Vial - Sulfuric Acid (EP074)							
BH32	**20-Aug-2020**	**21-Aug-2020**	03-Sep-2020	✓	**21-Aug-2020**	03-Sep-2020	✓
EP074E: Halogenated Aliphatic Compounds							
Amber VOC Vial - Sulfuric Acid (EP074)							
BH32	**20-Aug-2020**	**21-Aug-2020**	03-Sep-2020	✓	**21-Aug-2020**	03-Sep-2020	✓
EP074F: Halogenated Aromatic Compounds							
Amber VOC Vial - Sulfuric Acid (EP074)							
BH32	**20-Aug-2020**	**21-Aug-2020**	03-Sep-2020	✓	**21-Aug-2020**	03-Sep-2020	✓
EP074G: Trihalomethanes							
Amber VOC Vial - Sulfuric Acid (EP074)							
BH32	**20-Aug-2020**	**21-Aug-2020**	03-Sep-2020	✓	**21-Aug-2020**	03-Sep-2020	✓
EP075A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓

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
EP075B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
EP075C: Phthalate Esters							
Amber Glass Bottle - Unpreserved (EP075)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
EP075D: Nitrosamines							
Amber Glass Bottle - Unpreserved (EP075)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
EP075E: Nitroaromatics and Ketones							
Amber Glass Bottle - Unpreserved (EP075)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
EP075F: Haloethers							
Amber Glass Bottle - Unpreserved (EP075)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
EP075G: Chlorinated Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
EP075H: Anilines and Benzidines							
Amber Glass Bottle - Unpreserved (EP075)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
EP075I: Organochlorine Pesticides							
Amber Glass Bottle - Unpreserved (EP075)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
EP075J: Organophosphorus Pesticides							
Amber Glass Bottle - Unpreserved (EP075)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH32	**20-Aug-2020**	**21-Aug-2020**	03-Sep-2020	✓	**21-Aug-2020**	03-Sep-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
BH32	**20-Aug-2020**	**24-Aug-2020**	27-Aug-2020	✓	**24-Aug-2020**	03-Oct-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH32	**20-Aug-2020**	**21-Aug-2020**	03-Sep-2020	✓	**21-Aug-2020**	03-Sep-2020	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH32	**20-Aug-2020**	**21-Aug-2020**	03-Sep-2020	✓	**21-Aug-2020**	03-Sep-2020	✓

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
MM514: E.coli & Total Coliforms MPN by Colilert							
Sterile Plastic Bottle - Sodium Thiosulfate (MM514)							
BH32	**20-Aug-2020**	**----**	----	----	**20-Aug-2020**	21-Aug-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within he 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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	18	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	3	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	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	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	19	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Oil and Grease	EP020	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	**5.00**	**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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	18	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**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	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	2	**50.00**	**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.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC 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 PC 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 f bre 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)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescr bed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. 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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
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.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, 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)
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 seperately 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)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM Schedule B(3)
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	WATER	In house: Referenced to APHA 5220 D. Samples are digested with a known excess of an acidic potassium dichromate solution using silver sulfate as a catalyst. The chromium is reduced from the Cr (VI) oxidation state to the Cr (III) state by the oxygen present in the organic material. Both of these chromium species are coloued and absorb in the visible region of (400nm & 600nm) the spectrum. The oxidisable organic matter can be calculated in terms of oxygen equivalents.
Biochemical Oxygen Demand (BOD)	EP030	WATER	In house: Referenced to APHA 5210 B. The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM Schedule B(3).

Analytical Methods	Method	Matrix	Method Descriptions
Polychlorinated Biphenyls (PCB)	EP066	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)
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 - Semivolatile 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-A kane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
Volatile Organic Compounds	EP074	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. This method is compliant with NEPM Schedule B(3)
Semivolatile Organic Compounds	EP075	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)
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)
E.coli & Total Coliforms by MPN Colilert	MM514	WATER	Microbiological analysis subcontracted to ALS Scoresby (NATA Accredited Laboratory No. 992).
Anionic Surfactants as MBAS	W-MBAS	WATER	APHA 5540 C. Analysis subcontracted to ALS Scoresby (NATA Accredited Laboratory No. 992).

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.
Separatory Funnel Extraction of Liquids	ORG14-EM	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 dichloromethane. The resultant extracts are combined, dehydrated, concentrated and exchanged into toluene 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 sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM2014440**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: 12529997/08	Page	: 1 of 3
Order number	: ----	Quote number	: EM2020GHDSER0037 (ME/458/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: [redacted]		

Dates

Date Samples Received	: 20-Aug-2020 15:30	Issue Date	: 20-Aug-2020
Client Requested Due Date	: 27-Aug-2020	Scheduled Reporting Date	: **27-Aug-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 5.3°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale, ALS Sydney and ALS Scoresby.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Preliminary results will be available on the scheduled reporting date listed in this report. However the final report with Oil and Grease and COD analysis will be complete on 31/08/2020.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Hexavalent Chromium by Discrete Analyser - Dissolved : EG050G-F		
BH32	- Clear Plastic Bottle - NaOH	- Clear Plastic Bottle - NaOH Filtered

Summary of Sample(s) and Requested Analysis

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

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - 448.3 Water VIC EPA IWRG621 - Water Equivalent Suite	WATER - EP020 Oil & Grease (O&G)	WATER - EP026SP Chemical Oxygen Demand (COD)	WATER - EP030 BOD	WATER - MM696 (Ec) E. coli by MF (Chromogenic Media)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P
EM2014440-001	20-Aug-2020 00:00	BH32	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA010P Electrical Conductivity (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - W-MBAS Anionic Surfactants as MBAS
EM2014440-001	20-Aug-2020 00:00	BH32	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- A4 - AU Tax Invoice (INV)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	[redacted]

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM2014440**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: 12529997/08	Page	: 1 of 3
Order number	: ----	Quote number	: EM2020GHDSER0037 (ME/458/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: [redacted]		

Dates

Date Samples Received	: 20-Aug-2020 15:30	Issue Date	: 21-Aug-2020
Client Requested Due Date	: 27-Aug-2020	Scheduled Reporting Date	: **27-Aug-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 5.3°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale, ALS Sydney and ALS Scoresby.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Preliminary results will be available on the scheduled reporting date listed in this report. However the final report with Oil and Grease and COD analysis will be complete on 31/08/2020.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - 448.3 Water VIC EPA IWRG621 - Water Equivalent Suite	WATER - EP020 Oil & Grease (O&G)	WATER - EP026SP Chemical Oxygen Demand (COD)	WATER - EP030 BOD	WATER - MM696 (Ec) E. coli by MF (Chromogenic Media)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P
EM2014440-001	20-Aug-2020 00:00	BH32	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA010P Electrical Conductivity (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EP068A (OC) OC Pesticides	WATER - W-23 minus BTEX SVOC/VOC without BTEX	WATER - W-MBAS Anionic Surfactants as MBAS
EM2014440-001	20-Aug-2020 00:00	BH32	✓	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- A4 - AU Tax Invoice (INV)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	[redacted]

Environmental Division
Melbourne
Work Order Reference
EM2014440

Telephone : +61-3-8549 9600

Shirley LeCornu

From: [redacted]
Sent: Friday, 21 August 2020 8:18 AM
To: [redacted]
Cc: [redacted]
Subject: [EXTERNAL] - FW: SRN for ALS Workorder : EM2014440 | Overall Description: APA WORM EES
Attachments: EM2014440_0_SRN_200820182009.pdf; EM2014440_ESRN_ESDAT_0.Header.xml; EM2014440_COC.pdf

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 [redacted]

Regarding EM2014440 (attached), can you please schedule groundwater sample ‚**BH32**' for the following analysis, as per quote **ME/458/20**:

- Salinity (mg/L TDS), EC, pH
- Major ions
- Ammonia (as N), nitrate (as N), nitrite (as N), total nitrogen, total kjeldahl nitrogen
- Sulfate as SO4
- Total phosphorous
- Metals screen
- E. Coli
- Total suspended solids, biological oxygen demand, chemical oxygen demand
- Oil and grease surfactants (MBAS)
- General environmental screen: pesticides (OCPs), semi-volatile and volatile organic compounds (SVOCs and VOCs), petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs)

Thank you

[redacted]

GHD
[redacted]
180 Lonsdale St Melbourne VIC 3000 Australia | www.ghd.com

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

Please consider our environment before printing this email

From: [redacted]
Sent: Thursday, August 20, 2020 6:21 PM
To: [redacted]
Subject: SRN for ALS Workorder : EM2014440 | Overall Description: APA WORM EES

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2014726**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 26-Aug-2020 16:15
Order number	: ----	Date Analysis Commenced	: 26-Aug-2020
C-O-C number	: ----	Issue Date	: 31-Aug-2020 11:32
Sampler	: MM		
Site	: ----		
Quote number	: ME/458/20		
No. of samples received	: 2		
No. of samples analysed	: 2		

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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. 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*
[redacted]	Non-Metals Team Leader	Me bourne Inorganics, Springvale, VIC
[redacted]	Senior Inorganic Instrument Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	Laboratory Manager	Me bourne Inorganics, Springvale, VIC

General Comments

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

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

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

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

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

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

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

- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- 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)				Client sample ID	BH11	BH16	----	----	----
				Client sampling date / time	26-Aug-2020 00:00	26-Aug-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2014726-001	EM2014726-002	--------	--------	--------
					Result	Result	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.54**	**7.05**	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**3830**	**2000**	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**1920**	**1180**	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**314**	**384**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**314**	**384**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**232**	**193**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**974**	**354**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**63**	**92**	----	----	----
Magnesium	7439-95-4	1	mg/L		**99**	**77**	----	----	----
Sodium	7440-23-5	1	mg/L		**521**	**195**	----	----	----
Potassium	7440-09-7	1	mg/L		**8**	**4**	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		**0.008**	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	**0.015**	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.024**	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.053**	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.08**	<0.01	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.02**	<0.01	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	BH16	----	----	----
				Client sampling date / time	26-Aug-2020 00:00	26-Aug-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2014726-001	EM2014726-002	--------	--------	--------
					Result	Result	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**1.44**	**0.01**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**1.46**	**0.01**	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.3**	**0.2**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.8**	**0.2**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	**1.13**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**38.6**	**21.7**	----	----	----
ø Total Cations	----	0.01	meq/L		**34.2**	**19.5**	----	----	----
ø Ionic Balance	----	0.01	%		**6.08**	**5.25**	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2014726**	Page	: 1 of 7
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 26-Aug-2020
Order number	: ----	Date Analysis Commenced	: 26-Aug-2020
C-O-C number	: ----	Issue Date	: 31-Aug-2020
Sampler	: MM		
Site	: ----		
Quote number	: ME/458/20		
No. of samples received	: 2		
No. of samples analysed	: 2		

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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. 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*
[redacted]	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
[redacted]	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	Laboratory Manager	Melbourne Inorganics, Springvale, VIC

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

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	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3222716)									
EM2014717-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.96	8.04	1.00	0% - 20%
EM2014732-008	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.08	6.03	0.826	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3222717)									
EM2014717-004	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	914	907	0.813	0% - 20%
EM2014732-008	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	40	40	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3226013)									
EM2014719-005	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	234	228	3.03	0% - 20%
EM2014732-008	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	24	25	5.40	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3222718)									
EM2014719-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	80	79	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	80	79	0.00	0% - 20%
EM2014722-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	433	429	1.06	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	433	429	1.06	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3222395)									
EM2014724-018	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2880	2790	3.27	0% - 20%
EM2014724-027	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2860	2870	0.472	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3222392)									
EM2014718-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.00	No Limit
EM2014703-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	50	52	4.10	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3222029)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3222029) - continued									
EM2014719-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	15	16	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	13	13	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	69	70	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
EM2014722-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	1	1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	284	287	0.798	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3222028)									
EM2014719-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.012	0.012	0.00	No Limit
EM2014722-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.005	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.028	0.028	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 3222027)									
EM2014719-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2014722-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3222283)									
EM2014724-014	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.05	0.00	No Limit
EM2014724-023	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3222396)									
EM2014724-028	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3222284)									
EM2014725-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.63	2.59	1.44	0% - 20%
EM2014732-010	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3221935)									
EM2014706-009	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EM2014722-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.2	2.4	9.97	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3221937)									
EM2014726-002	BH16	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3221936)									
EM2014717-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.02	79.2	No Limit
EM2014722-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.53	0.53	0.00	0% - 20%

Method Blank (MB) and Laboratory Control Spike (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 Spike (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 Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 3222717)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.6	85.0	119
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3226013)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	97.8	93.7	107
				<10	293 mg/L	95.2	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3222718)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	100	88.0	112
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3222395)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	95.5	85.8	117
				<1	100 mg/L	93.3	85.8	117
ED045G: Chloride by Discrete Analyser (QCLot: 3222392)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	108	85.0	122
				<1	1000 mg/L	104	85.0	122
ED093F: Dissolved Major Cations (QCLot: 3222029)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	108	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	100	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	86.7	111
EG020F: Dissolved Metals by ICP-MS (QCLot: 3222028)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	103	88.5	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	103	83.5	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.6	83.2	105
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.4	83.1	106
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	84.6	107
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	100	84.3	108
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	105	86.3	111
EG035F: Dissolved Mercury by FIMS (QCLot: 3222027)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	101	71.1	112
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3222283)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	108	88.0	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3222396)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	99.7	90.9	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3222284)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	102	90.0	117

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3221935)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	90.8	70.0	117
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3221937)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	89.3	70.0	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3221936)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	98.0	71.9	114

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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3222395)							
EM2014724-019	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3222392)							
EM2014708-004	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	109	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3222028)							
EM2014719-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	94 2	85.0	131
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	93 3	81.0	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	88 0	71.0	135
		EG020A-F: Copper	7440-50-8	0.2 mg/L	94.4	76.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	97.4	75.0	133
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	93 0	73.0	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	97.6	75.0	131
EG035F: Dissolved Mercury by FIMS (QCLot: 3222027)							
EM2014719-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	93 0	70.0	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3222283)							
EM2014724-015	Anonymous	EK055G: Ammonia as N	7664-41-7	0.5 mg/L	110	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3222396)							
EM2014724-029	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	95.6	80.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3222284)							
EM2014726-001	BH11	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	82 2	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3221935)							
EM2014714-001	Anonymous						

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3221935) - continued							
EM2014714-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	# Not Determined	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3221937)							
EM2014729-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	98.6	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3221936)							
EM2014717-004	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	79 8	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2014726**	Page	: 1 of 7
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 26-Aug-2020
Site	: ----	Issue Date	: 31-Aug-2020
Sampler	: MM	No. of samples received	: 2
Order number	: ----	No. of samples analysed	: 2

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.**
- **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

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EM2014724--019	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	EM2014714--001	Anonymous	**Total Kjeldahl Nitrogen as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

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; o hers 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)							
BH11, BH16	**26-Aug-2020**	**----**	----	----	**26-Aug-2020**	26-Aug-2020	✓
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
BH11, BH16	**26-Aug-2020**	**----**	----	----	**27-Aug-2020**	23-Sep-2020	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
BH11, BH16	**26-Aug-2020**	**----**	----	----	**28-Aug-2020**	02-Sep-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
BH11, BH16	**26-Aug-2020**	**----**	----	----	**27-Aug-2020**	09-Sep-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
BH11, BH16	**26-Aug-2020**	**----**	----	----	**27-Aug-2020**	23-Sep-2020	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
BH11, BH16	**26-Aug-2020**	**----**	----	----	**27-Aug-2020**	23-Sep-2020	✓

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
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
BH11	**26-Aug-2020**	**----**	----	----	**27-Aug-2020**	02-Sep-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH16	**26-Aug-2020**	**----**	----	----	**27-Aug-2020**	23-Sep-2020	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Natural (EG020A-F)							
BH11	**26-Aug-2020**	**----**	----	----	**27-Aug-2020**	22-Feb-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH16	**26-Aug-2020**	**----**	----	----	**27-Aug-2020**	22-Feb-2021	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Natural (EG035F)							
BH11	**26-Aug-2020**	**----**	----	----	**26-Aug-2020**	23-Sep-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH16	**26-Aug-2020**	**----**	----	----	**26-Aug-2020**	23-Sep-2020	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH11, BH16	**26-Aug-2020**	**----**	----	----	**28-Aug-2020**	23-Sep-2020	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH11, BH16	**26-Aug-2020**	**----**	----	----	**27-Aug-2020**	28-Aug-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH11, BH16	**26-Aug-2020**	**----**	----	----	**27-Aug-2020**	23-Sep-2020	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH11, BH16	**26-Aug-2020**	**26-Aug-2020**	23-Sep-2020	✓	**27-Aug-2020**	23-Sep-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH11, BH16	**26-Aug-2020**	**26-Aug-2020**	23-Sep-2020	✓	**27-Aug-2020**	23-Sep-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within he 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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	2	20	**10.00**	**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	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	24	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	1	20	**5.00**	**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	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	1	20	**5.00**	**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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**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	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	19	**5.26**	**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 PC 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 PC 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 f bre 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 PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. 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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
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 AS 3550, 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 seperately 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)

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)

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM2014726**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Facsimile	: [redacted]	Facsimile	: [redacted]
Project	: 12529997	Page	: 1 of 2
Order number	: ----	Quote number	: EM2020GHDSER0037 (ME/458/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: MM		

Dates

Date Samples Received	: 26-Aug-2020 16:15	Issue Date	: 26-Aug-2020
Client Requested Due Date	: 02-Sep-2020	Scheduled Reporting Date	: **02-Sep-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 3.2°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Dissolved Mercury by FIMS : EG035F		
BH11	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
BH11	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

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

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005P pH (PCT)	WATER - EA010P Electrical Conductivity (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - ED041G Sulfate (Turbidimetric) as SO4 2 by Discrete	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P	WATER - W-02 8 Metals
EM2014726-001	26-Aug-2020 00:00	BH11	✓	✓	✓	✓	✓	✓	✓
EM2014726-002	26-Aug-2020 00:00	BH16	✓	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV) — Email — accountspayableAU@ghd.com

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ENMRG (ENMRG) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]
- Electronic SRN for ESdat (ESRN_ESDAT) — Email — [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ENMRG (ENMRG) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]
- Electronic SRN for ESdat (ESRN_ESDAT) — Email — [redacted]

CALCULATIONS

Sheet ___ of ___
Job no. ___ Date ___
Calcs by ___ Checked by ___ Date ___
Client ___
Project ___
Subject ___

Chain of Custody Record

GHD Job: 12529997 Project: WORM Quote: ME/458/20 TAT: 5 days

Lab: ALS, 2-4 Westall Rd., Springvale VIC 3171

Environmental Division
Melbourne
Work Order Reference
EM2014726

Telephone : +61-3-8549 9600

GHD Pty Ltd ABN 39 008 488 373

	Sample ID	Date	Matrix	No.	Salinity (mg/L TDS), EC, pH	Major ions	Ammonia, Nitrate, Nitrite, Total Nitrogen, TKN	Sulfate as SO4	Total Phosphorous	Metals Screen	E. Coli	TSS, BOD, COD	Oil and Grease Surfactants (MBAS)	General Enviro. Screen *	Remarks
1	BH11	26.8.2020	GW	3	X	X	X	X	X	X					Please filter metals sample
2	BH16	26.8.2020	GW	3	X	X	X	X	X	X					

Received: 26/8/20 1615 Carrier:
C/note:
Temp: 3.2 °C Seal: (Y) / N
(Ice) / Icebricks / NA

*pesticides (OCPs), SVOCs and VOCs, TPH, MAH, PAHs, PCBs

Contact: [redacted]

Sampled by:	MM	26.08.2020	Relinquished by:	MM: 26.08.2020 : 15:15
Received by Courier				
Received by Lab:		ALS. 26/08/2020		

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2015294**	Page	: 1 of 8
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 03-Sep-2020 16:45
Order number	: ----	Date Analysis Commenced	: 07-Sep-2020
C-O-C number	: ----	Issue Date	: 10-Sep-2020 16:49
Sampler	: MM		
Site	: ----		
Quote number	: ME/458/20		
No. of samples received	: 4		
No. of samples analysed	: 2		

ilac-MRA NATA
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. 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.

Signatories	*Position*	*Accreditation Category*
[redacted]	Senior Inorganic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Me bourne Organics, Springvale, VIC
[redacted]	Senior Organic Chemist	Me bourne Organics, Springvale, VIC

General Comments

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

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

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

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

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

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

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

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of he 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.
- EP074-UT: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH07_0.1	BH07_0.5	----	----	----
			Client sampling date / time	03-Sep-2020 00:00	03-Sep-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2015294-001	EM2015294-002	--------	--------	--------
				Result	Result	----	----	----
EA001: pH in soil using 0.01M CaCl extract								
pH (CaCl2)	----	0.1	pH Unit	**4.4**	**4.5**	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**15.1**	**21.1**	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Copper	7440-50-8	5	mg/kg	<5	**6**	----	----	----
Lead	7439-92-1	5	mg/kg	**10**	**14**	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	<2	----	----	----
Nickel	7440-02-0	2	mg/kg	**3**	**6**	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	<5	----	----	----
Silver	7440-22-4	2	mg/kg	<2	<2	----	----	----
Tin	7440-31-5	5	mg/kg	<5	<5	----	----	----
Zinc	7440-66-6	5	mg/kg	<5	**6**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	----	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	----	----	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	**100**	**220**	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Sum of monocyclic aromatic hydrocarbons	----	0.2	mg/kg	<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH07_0.1	BH07_0.5	----	----	----
			Client sampling date / time	03-Sep-2020 00:00	03-Sep-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2015294-001	EM2015294-002	--------	--------	--------
				Result	Result	----	----	----
EP074H: Naphthalene								
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	----	----
EP074I: Volatile Halogenated Compounds								
Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	<0.02	----	----	----
1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	<0.01	----	----	----
Methylene chloride	75-09-2	0.4	mg/kg	<0.4	<0.4	----	----	----
trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	<0.02	----	----	----
cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	<0.01	----	----	----
Chloroform	67-66-3	0.02	mg/kg	<0.02	<0.02	----	----	----
1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	<0.01	----	----	----
Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	<0.01	----	----	----
1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	<0.02	----	----	----
Trichloroethene	79-01-6	0.02	mg/kg	<0.02	<0.02	----	----	----
1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	<0.04	----	----	----
Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	<0.02	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	<0.01	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	<0.02	----	----	----
Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	<0.02	----	----	----
Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	<0.02	----	----	----
1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	<0.02	----	----	----
1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	<0.02	----	----	----
1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	<0.01	----	----	----
^ Sum of volatile chlorinated hydrocarbons	----	0.01	mg/kg	<0.01	<0.01	----	----	----
^ Sum of other chlorinated hydrocarbons	----	0.01	mg/kg	<0.01	<0.01	----	----	----
EP075A: Phenolic Compounds (Halogenated)								
2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	<0.03	----	----	----
2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	<0.03	----	----	----
2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	<0.03	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	<0.03	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	<0.05	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	<0.05	----	----	----
2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	<0.03	----	----	----
2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg	<0.05	<0.05	----	----	----
Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	<0.2	----	----	----
^ Sum of Phenols (halogenated)	----	0.03	mg/kg	<0.03	<0.03	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH07_0.1	BH07_0.5	----	----	----
				Client sampling date / time	03-Sep-2020 00:00	03-Sep-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2015294-001	EM2015294-002	--------	--------	--------
					Result	Result	----	----	----
EP075A: Phenolic Compounds (Halogenated) - Continued									
EP075A: Phenolic Compounds (Non-halogenated)									
Phenol	108-95-2	1	mg/kg		<1	<1	----	----	----
2-Methylphenol	95-48-7	1	mg/kg		<1	<1	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	----	----	----
2-Nitrophenol	88-75-5	1	mg/kg		<1	<1	----	----	----
2.4-Dimethylphenol	105-67-9	1	mg/kg		<1	<1	----	----	----
2.4-Dinitrophenol	51-28-5	5	mg/kg		<5	<5	----	----	----
4-Nitrophenol	100-02-7	5	mg/kg		<5	<5	----	----	----
2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg		<5	<5	----	----	----
Dinoseb	88-85-7	5	mg/kg		<5	<5	----	----	----
2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg		<5	<5	----	----	----
^ **Sum of Phenols (non-halogenated)**	----	1	mg/kg		<1	<1	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg		<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	----	----	----
EP075I: Organochlorine Pesticides									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH07_0.1	BH07_0.5	----	----	----
				Client sampling date / time	03-Sep-2020 00:00	03-Sep-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2015294-001	EM2015294-002	--------	--------	--------
					Result	Result	----	----	----
EP075l: Organochlorine Pesticides - Continued									
alpha-BHC	319-84-6	0.03	mg/kg		<0.03	<0.03	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg		<0.03	<0.03	----	----	----
beta-BHC	319-85-7	0.03	mg/kg		<0.03	<0.03	----	----	----
gamma-BHC	58-89-9	0.03	mg/kg		<0.03	<0.03	----	----	----
delta-BHC	319-86-8	0.03	mg/kg		<0.03	<0.03	----	----	----
Heptachlor	76-44-8	0.03	mg/kg		<0.03	<0.03	----	----	----
Aldrin	309-00-2	0.03	mg/kg		<0.03	<0.03	----	----	----
Heptachlor epoxide	1024-57-3	0.03	mg/kg		<0.03	<0.03	----	----	----
cis-Chlordane	5103-71-9	0.03	mg/kg		<0.03	<0.03	----	----	----
trans-Chlordane	5103-74-2	0.03	mg/kg		<0.03	<0.03	----	----	----
Endosulfan 1	959-98-8	0.03	mg/kg		<0.03	<0.03	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	----	----	----
Dieldrin	60-57-1	0.03	mg/kg		<0.03	<0.03	----	----	----
Endrin aldehyde	7421-93-4	0.03	mg/kg		<0.03	<0.03	----	----	----
Endrin	72-20-8	0.03	mg/kg		<0.03	<0.03	----	----	----
Endosulfan 2	33213-65-9	0.03	mg/kg		<0.03	<0.03	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.03	mg/kg		<0.03	<0.03	----	----	----
4.4`-DDT	50-29-3	0.05	mg/kg		<0.05	<0.05	----	----	----
Methoxychlor	72-43-5	0.03	mg/kg		<0.03	<0.03	----	----	----
^ Sum of organochlorine pesticides	----	0.03	mg/kg		<0.03	<0.03	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.03	mg/kg		<0.03	<0.03	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	----	----	----
^ Chlordane	57-74-9	0.03	mg/kg		<0.03	<0.03	----	----	----
^ Sum of other organochlorine pesticides	----	0.03	mg/kg		<0.03	<0.03	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH07_0.1	BH07_0.5	----	----	----
				Client sampling date / time	03-Sep-2020 00:00	03-Sep-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2015294-001	EM2015294-002	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	----	----
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**100**	**95.1**	----	----	----
EP074S: VOC Surrogates (Ultra-Trace)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**88.7**	**88.2**	----	----	----
Toluene-D8	2037-26-5	0.1	%		**88.4**	**81.9**	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		**95.4**	**91.5**	----	----	----
EP075S: Acid Extractable Surrogates (Waste Classification)									
Phenol-d6	13127-88-3	0.025	%		**98.8**	**92.0**	----	----	----
2-Chlorophenol-D4	93951-73-6	0.025	%		**94.9**	**87.7**	----	----	----
2.4.6-Tribromophenol	118-79-6	0.025	%		**102**	**96.6**	----	----	----
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)									
Nitrobenzene-D5	4165-60-0	0.025	%		**104**	**99.6**	----	----	----
1.2-Dichlorobenzene-D4	2199-69-1	0.025	%		**91.7**	**89.0**	----	----	----
2-Fluorobiphenyl	321-60-8	0.025	%		**97.8**	**95.2**	----	----	----
Anthracene-d10	1719-06-8	0.025	%		**93.1**	**90.2**	----	----	----
4-Terphenyl-d14	1718-51-0	0.025	%		**84.9**	**82.7**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	41	122
EP074S: VOC Surrogates (Ultra-Trace)			
1.2-Dichloroethane-D4	17060-07-0	59	119
Toluene-D8	2037-26-5	55	117
4-Bromofluorobenzene	460-00-4	59	123
EP075S: Acid Extractable Surrogates (Waste Classification)			
Phenol-d6	13127-88-3	28	134
2-Chlorophenol-D4	93951-73-6	27	123
2.4.6-Tribromophenol	118-79-6	25	149
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)			
Nitrobenzene-D5	4165-60-0	29	125
1.2-Dichlorobenzene-D4	2199-69-1	31	117
2-Fluorobiphenyl	321-60-8	44	136
Anthracene-d10	1719-06-8	53	133
4-Terphenyl-d14	1718-51-0	59	141

ALS Environmental

Automated Guideline Comparison Report

EPA Victoria Publication IWRG 621 (2009) - Table 2: Soil Hazard Categorisation

Work Order	: **EM2015294**	Page	: 1 of 8
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]		
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: 12529997	Date Received	: 03-Sep-2020 16:45
Order number	: ----	Date Analysed	: 07-Sep-2020
C-O-C number	: ----	Date Issued	: 10-Sep-2020 16:48
No. of samples received	: 4		
No. of samples analysed	: 2	Quote number	: ME/458/20

General Comments

This guideline comparison report **only** provides comparison of total concentration data against upper limit thresholds for the 'Fill Material', 'C', 'B' Categories in Table 2 of EPA Publication IWRG621.
This guideline comparison report is **NOT** a soil classification report. Classification of soils as Fill Material, Category C, Category B or Category A requires consideration of a number of other factors including preliminary site investigation, sampling density and statistical calculations, as set out in EPA Publication IWRG 702 and measurement uncertainty.
This guideline comparison report only provides comparison data for parameters, specifically listed within the IWRG621 (2009) guideline, that are analysed by ALS.
Only results in the 'Analytical Results' section have been compared to the guideline.

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

Summary of Thresholds Reached or Exceeded

Results for all samples detailed in this report are below the upper threshold limits for Fill Material.

Analytical Results

Soil Hazard Categorisation and Management

Table 2: Soil Hazard Categorisation Thresholds : Category B: Table 2: Soil Hazard Categorisation Thresholds : Category B

Sub-Matrix: **SOIL**

Compound	*Method*	*LOR*	*Unit*	Guideline Lower Limit	Guideline Upper Limit	**BH07_0.1** 03-Sep-2020 15:00 **EM2015294-001** MU	**BH07_0.5** 03-Sep-2020 15:00 **EM2015294-002** MU	---- ----	---- ----	---- ----
EA001: pH in soil using 0.01M CaCl extract										
pH (CaCl2)	EA001	0.1	pH Unit	2	12.5	**4.4** ± 0.10	**4.5** ± 0.10	----	----	----
EG005(ED093)T: Total Metals by ICP-AES										
Arsenic	EG005T	5	mg/kg	----	2000	<5 --	<5 --	----	----	----
Cadmium	EG005T	1	mg/kg	----	400	<1 --	<1 --	----	----	----
Copper	EG005T	5	mg/kg	----	20000	<5 --	**6** ± 0.9	----	----	----
Lead	EG005T	5	mg/kg	----	6000	**10** ± 1	**14** ± 2	----	----	----
Molybdenum	EG005T	2	mg/kg	----	4000	<2 --	<2 --	----	----	----
Nickel	EG005T	2	mg/kg	----	12000	**3** ± 0.4	**6** ± 0.7	----	----	----
Selenium	EG005T	5	mg/kg	----	200	<5 --	<5 --	----	----	----
Silver	EG005T	2	mg/kg	----	720	<2 --	<2 --	----	----	----
Zinc	EG005T	5	mg/kg	----	140000	<5 --	**6** ± 2	----	----	----
EG035T: Total Recoverable Mercury by FIMS										
Mercury	EG035T	0.1	mg/kg	----	300	<0.1 --	<0.1 --	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)										
Hexavalent Chromium	EG048G	0.5	mg/kg	----	2000	<0.5 --	<0.5 --	----	----	----
EK026SF: Total CN by Segmented Flow Analyser										
Total Cyanide	EK026SF	1	mg/kg	----	10000	<1 --	<1 --	----	----	----
EK040T: Fluoride Total										
Fluoride	EK040T	40	mg/kg	----	40000	**100** ± 30	**220** ± 40	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons										
Benzene	EP074-UT	0.2	mg/kg	----	16	<0.2 --	<0.2 --	----	----	----
Sum of monocyclic aromatic hydrocarbons	EP074-UT-SUM	0.2	mg/kg	----	240	<0.2 --	<0.2 --	----	----	----
EP074I: Volatile Halogenated Compounds										
Vinyl chloride	EP074-UT	0.02	mg/kg	----	4.8	<0.02 --	<0.02 --	----	----	----
Hexachlorobutadiene	EP074-UT	0.02	mg/kg	----	11	<0.02 --	<0.02 --	----	----	----
Sum of other chlorinated hydrocarbons	EP074-UT-SUM	0.01	mg/kg	----	50	<0.01 --	<0.01 --	----	----	----
EP075A: Phenolic Compounds (Halogenated)										
Sum of Phenols (halogenated)	EP075-EM-SUM	0.03	mg/kg	----	320	<0.03 --	<0.03 --	----	----	----
EP075A: Phenolic Compounds (Non-halogenated)										
Sum of Phenols (non-halogenated)	EP075-EM-SUM	1	mg/kg	----	2200	<1 --	<1 --	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons										
Benzo(a)pyrene	EP075-EM	0.5	mg/kg	----	20	<0.5 --	<0.5 --	----	----	----
Sum of polycyclic aromatic hydrocarbons	EP075-EM-SUM	0.5	mg/kg	----	400	<0.5 --	<0.5 --	----	----	----

Soil Hazard Categorisation and Management

Table 2: Soil Hazard Categorisation Thresholds : Category B: Table 2: Soil Hazard Categorisation Thresholds : Category B

Sub-Matrix: **SOIL**

Compound	*Method*	*LOR*	*Unit*	Guideline Lower Limit	Guideline Upper Limit	*Client sample ID* **BH07_0.1**	**BH07_0.5**	**----**	**----**	**----**
						Sampling date/time 03-Sep-2020 15:00	03-Sep-2020 15:00	----	----	----
						EM2015294-001 MU	**EM2015294-002** MU			
EP075l: Organochlorine Pesticides										
Heptachlor	EP075-EM	0.03	mg/kg	----	4.8	<0.03	<0.03	**----**	**----**	**----**
Sum of Aldrin + Dieldrin	EP075-EM-SUM	0.03	mg/kg	----	4.8	<0.03	<0.03	**----**	**----**	**----**
Sum of DDD + DDE + DDT	EP075-EM-SUM	0.05	mg/kg	----	50	<0.05	<0.05	**----**	**----**	**----**
Chlordane	EP075-EM-SUM	0.03	mg/kg	----	16	<0.03	<0.03	**----**	**----**	**----**
Sum of other organochlorine pesticides	EP075-EM-SUM	0.03	mg/kg	----	50	<0.03	<0.03	**----**	**----**	**----**
EP080/071: Total Petroleum Hydrocarbons										
C6 - C9 Fraction	EP074-UT	10	mg/kg	----	2600	<10	<10	**----**	**----**	**----**
C10 - C36 Fraction (sum)	EP071-EM	50	mg/kg	----	40000	<50	<50	**----**	**----**	**----**

Soil Hazard Categorisation and Management

Table 2: Soil Hazard Categorisation Thresholds : Category C: Table 2: Soil Hazard Categorisation Thresholds : Category C

Sub-Matrix: **SOIL**

Compound	*Method*	*LOR*	*Unit*	Guideline Lower Limit	Guideline Upper Limit	*Client sample ID* **BH07_0.1** *Sampling date/time* 03-Sep-2020 15:00 **EM2015294-001** MU	**BH07_0.5** 03-Sep-2020 15:00 **EM2015294-002** MU	----	----	----
EA001: pH in soil using 0.01M CaCl extract										
pH (CaCl2)	EA001	0.1	pH Unit	4	9	**4.4** ± 0.10	**4.5** ± 0.10	----	----	----
EG005(ED093)T: Total Metals by ICP-AES										
Arsenic	EG005T	5	mg/kg	----	500	<5 --	<5 --	----	----	----
Cadmium	EG005T	1	mg/kg	----	100	<1 --	<1 --	----	----	----
Copper	EG005T	5	mg/kg	----	5000	<5 --	**6** ± 0.9	----	----	----
Lead	EG005T	5	mg/kg	----	1500	**10** ± 1	**14** ± 2	----	----	----
Molybdenum	EG005T	2	mg/kg	----	1000	<2 --	<2 --	----	----	----
Nickel	EG005T	2	mg/kg	----	3000	**3** ± 0.4	**6** ± 0.7	----	----	----
Selenium	EG005T	5	mg/kg	----	50	<5 --	<5 --	----	----	----
Silver	EG005T	2	mg/kg	----	180	<2 --	<2 --	----	----	----
Tin	EG005T	5	mg/kg	----	500	<5 --	<5 --	----	----	----
Zinc	EG005T	5	mg/kg	----	35000	<5 --	**6** ± 2	----	----	----
EG035T: Total Recoverable Mercury by FIMS										
Mercury	EG035T	0.1	mg/kg	----	75	<0.1 --	<0.1 --	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)										
Hexavalent Chromium	EG048G	0.5	mg/kg	----	500	<0.5 --	<0.5 --	----	----	----
EK026SF: Total CN by Segmented Flow Analyser										
Total Cyanide	EK026SF	1	mg/kg	----	2500	<1 --	<1 --	----	----	----
EK040T: Fluoride Total										
Fluoride	EK040T	40	mg/kg	----	10000	**100** ± 30	**220** ± 40	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons										
Benzene	EP074-UT	0.2	mg/kg	----	4	<0.2 --	<0.2 --	----	----	----
Sum of monocyclic aromatic hydrocarbons	EP074-UT-SUM	0.2	mg/kg	----	70	<0.2 --	<0.2 --	----	----	----
EP074I: Volatile Halogenated Compounds										
Vinyl chloride	EP074-UT	0.02	mg/kg	----	1.2	<0.02 --	<0.02 --	----	----	----
Hexachlorobutadiene	EP074-UT	0.02	mg/kg	----	2.8	<0.02 --	<0.02 --	----	----	----
Sum of other chlorinated hydrocarbons	EP074-UT-SUM	0.01	mg/kg	----	10	<0.01 --	<0.01 --	----	----	----
EP075A: Phenolic Compounds (Halogenated)										
Sum of Phenols (halogenated)	EP075-EM-SUM	0.03	mg/kg	----	10	<0.03 --	<0.03 --	----	----	----
EP075A: Phenolic Compounds (Non-halogenated)										
Sum of Phenols (non-halogenated)	EP075-EM-SUM	1	mg/kg	----	560	<1 --	<1 --	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons										
Benzo(a)pyrene	EP075-EM	0.5	mg/kg	----	5	<0.5 --	<0.5 --	----	----	----
Sum of polycyclic aromatic hydrocarbons	EP075-EM-SUM	0.5	mg/kg	----	100	<0.5 --	<0.5 --	----	----	----

Soil Hazard Categorisation and Management

Table 2: Soil Hazard Categorisation Thresholds : Category C: Table 2: Soil Hazard Categorisation Thresholds : Category C

Sub-Matrix: **SOIL**

Compound	*Method*	*LOR*	*Unit*	Guideline Lower Limit	Guideline Upper Limit	*Client sample ID* **BH07_0.1**	**BH07_0.5**	**----**	**----**	**----**
						Sampling date/time 03-Sep-2020 15:00	03-Sep-2020 15:00	----	----	----
						EM2015294-001 MU	**EM2015294-002** MU			
EP075l: Organochlorine Pesticides										
Heptachlor	EP075-EM	0.03	mg/kg	----	1.2	<0.03	<0.03	**----**	**----**	**----**
Sum of Aldrin + Dieldrin	EP075-EM-SUM	0.03	mg/kg	----	1.2	<0.03	<0.03	**----**	**----**	**----**
Sum of DDD + DDE + DDT	EP075-EM-SUM	0.05	mg/kg	----	50	<0.05	<0.05	**----**	**----**	**----**
Chlordane	EP075-EM-SUM	0.03	mg/kg	----	4	<0.03	<0.03	**----**	**----**	**----**
Sum of other organochlorine pesticides	EP075-EM-SUM	0.03	mg/kg	----	10	<0.03	<0.03	**----**	**----**	**----**
EP080/071: Total Petroleum Hydrocarbons										
C6 - C9 Fraction	EP074-UT	10	mg/kg	----	650	<10	<10	**----**	**----**	**----**
C10 - C36 Fraction (sum)	EP071-EM	50	mg/kg	----	10000	<50	<50	**----**	**----**	**----**

Soil Hazard Categorisation and Management

Table 2: Soil Hazard Categorisation Thresholds : Fill Material: Table 2: Soil Hazard Categorisation Thresholds : Fill Material

Sub-Matrix: **SOIL**

Compound	*Method*	*LOR*	*Unit*	Guideline Lower Limit	Guideline Upper Limit	*Client sample ID* **BH07_0.1**	**BH07_0.5**	----	----	----
						Sampling date/time 03-Sep-2020 15:00	03-Sep-2020 15:00	----	----	----
						EM2015294-001 MU	**EM2015294-002** MU			
EA001: pH in soil using 0.01M CaCl extract										
pH (CaCl2)	EA001	0.1	pH Unit	4	9	**4.4** ± 0.10	**4.5** ± 0.10	----	----	----
EG005(ED093)T: Total Metals by ICP-AES										
Arsenic	EG005T	5	mg/kg	----	20	<5 --	<5 --	----	----	----
Cadmium	EG005T	1	mg/kg	----	3	<1 --	<1 --	----	----	----
Copper	EG005T	5	mg/kg	----	100	<5 --	**6** ± 0.9	----	----	----
Lead	EG005T	5	mg/kg	----	300	**10** ± 1	**14** ± 2	----	----	----
Molybdenum	EG005T	2	mg/kg	----	40	<2 --	<2 --	----	----	----
Nickel	EG005T	2	mg/kg	----	60	**3** ± 0.4	**6** ± 0.7	----	----	----
Selenium	EG005T	5	mg/kg	----	10	<5 --	<5 --	----	----	----
Silver	EG005T	2	mg/kg	----	10	<2 --	<2 --	----	----	----
Tin	EG005T	5	mg/kg	----	50	<5 --	<5 --	----	----	----
Zinc	EG005T	5	mg/kg	----	200	<5 --	**6** ± 2	----	----	----
EG035T: Total Recoverable Mercury by FIMS										
Mercury	EG035T	0.1	mg/kg	----	1	<0.1 --	<0.1 --	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)										
Hexavalent Chromium	EG048G	0.5	mg/kg	----	1	<0.5 --	<0.5 --	----	----	----
EK026SF: Total CN by Segmented Flow Analyser										
Total Cyanide	EK026SF	1	mg/kg	----	50	<1 --	<1 --	----	----	----
EK040T: Fluoride Total										
Fluoride	EK040T	40	mg/kg	----	450	**100** ± 30	**220** ± 40	----	----	----
EP066: Polychlorinated Biphenyls (PCB)										
Total Polychlorinated biphenyls	EP066-EM	0.1	mg/kg	----	2	<0.1 --	<0.1 --	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons										
Benzene	EP074-UT	0.2	mg/kg	----	1	<0.2 --	<0.2 --	----	----	----
Sum of monocyclic aromatic hydrocarbons	EP074-UT-SUM	0.2	mg/kg	----	7	<0.2 --	<0.2 --	----	----	----
EP074I: Volatile Halogenated Compounds										
Sum of volatile chlorinated hydrocarbons	EP074-UT-SUM	0.01	mg/kg	----	1	<0.01 --	<0.01 --	----	----	----
EP075A: Phenolic Compounds (Halogenated)										
Sum of Phenols (halogenated)	EP075-EM-SUM	0.03	mg/kg	----	1	<0.03 --	<0.03 --	----	----	----
EP075A: Phenolic Compounds (Non-halogenated)										
Sum of Phenols (non-halogenated)	EP075-EM-SUM	1	mg/kg	----	60	<1 --	<1 --	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons										
Benzo(a)pyrene	EP075-EM	0.5	mg/kg	----	1	<0.5 --	<0.5 --	----	----	----
Sum of polycyclic aromatic hydrocarbons	EP075-EM-SUM	0.5	mg/kg	----	20	<0.5 --	<0.5 --	----	----	----

Soil Hazard Categorisation and Management

Table 2: Soil Hazard Categorisation Thresholds : Fill Material: Table 2: Soil Hazard Categorisation Thresholds : Fill Material

Sub-Matrix: **SOIL**

Compound	*Method*	*LOR*	*Unit*	*Client sample ID* / *Sampling date/time*	Guideline Lower Limit	Guideline Upper Limit	**BH07_0.1** 03-Sep-2020 15:00 **EM2015294-001** MU	**BH07_0.5** 03-Sep-2020 15:00 **EM2015294-002** MU	---- ----	---- ----	---- ----
EP075l: Organochlorine Pesticides											
Sum of organochlorine pesticides	EP075-EM-SUM	0.03	mg/kg		----	1	<0.03	<0.03	----	----	----
EP080/071: Total Petroleum Hydrocarbons											
C6 - C9 Fraction	EP074-UT	10	mg/kg		----	100	<10	<10	----	----	----
C10 - C36 Fraction (sum)	EP071-EM	50	mg/kg		----	1000	<50	<50	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2015294**	Page	: 1 of 13
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 03-Sep-2020
Order number	: ----	Date Analysis Commenced	: 07-Sep-2020
C-O-C number	: ----	Issue Date	: 10-Sep-2020
Sampler	: MM		
Site	: ----		
Quote number	: ME/458/20		
No. of samples received	: 4		
No. of samples analysed	: 2		

ilac-MRA NATA
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. 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*
[redacted]	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
[redacted]	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

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

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	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3243122)									
EM2014893-021	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	28	23	20.9	0% - 50%
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	22	13	49.6	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	26	12	70.0	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	76	65	16.2	0% - 50%
EM2015106-006	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	17	16	6.65	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	6	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	19	15	23.1	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	8	11	25.7	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	38	33	12.3	No Limit
EA001: pH in soil using 0.01M CaCl extract (QC Lot: 3243977)									
EM2015279-006	Anonymous	EA001: pH (CaCl2)	----	0.1	pH Unit	8.3	8.3	0.00	0% - 20%
EM2015304-001	Anonymous	EA001: pH (CaCl2)	----	0.1	pH Unit	7.6	7.6	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3241748)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3241748) - continued									
EM2015279-002	Anonymous	EA055: Moisture Content	----	0.1	%	13.5	14.0	3.25	0% - 50%
EM2015294-001	BH07_0.1	EA055: Moisture Content	----	0.1	%	15.1	15.4	1.80	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3243121)									
EM2014893-021	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM2015106-006	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 3243984)									
EM2015294-001	BH07_0.1	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM2015309-003	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 3244105)									
EM2015243-005	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EM2015279-007	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EK040T: Fluoride Total (QC Lot: 3243948)									
EM2015279-004	Anonymous	EK040T: Fluoride	16984-48-8	40	mg/kg	400	370	8.06	0% - 50%
EM2015294-002	BH07_0.5	EK040T: Fluoride	16984-48-8	40	mg/kg	220	180	20.6	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3241300)									
EM2015167-026	Anonymous	EP066-EM: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM2015219-056	Anonymous	EP066-EM: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 3240779)									
EM2015199-001	Anonymous	EP074-UT: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP074-UT: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM2015309-005	Anonymous	EP074-UT: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP074-UT: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074-UT: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074H: Naphthalene (QC Lot: 3240779)									
EM2015199-001	Anonymous	EP074-UT: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM2015309-005	Anonymous	EP074-UT: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP074I: Volatile Halogenated Compounds (QC Lot: 3240779)									
EM2015199-001	Anonymous	EP074-UT: 1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074I: Volatile Halogenated Compounds (QC Lot: 3240779) - continued									
EM2015199-001	Anonymous	EP074-UT: Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chloroform	67-66-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Trichloroethene	79-01-6	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	<0.04	0.00	No Limit
		EP074-UT: Methylene chloride	75-09-2	0.4	mg/kg	<0.4	<0.4	0.00	No Limit
EM2015309-005	Anonymous	EP074-UT: 1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: 1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
		EP074-UT: Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chloroform	67-66-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Trichloroethene	79-01-6	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	<0.02	0.00	No Limit
		EP074-UT: 1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	<0.04	0.00	No Limit
		EP074-UT: Methylene chloride	75-09-2	0.4	mg/kg	<0.4	<0.4	0.00	No Limit
EP075A: Phenolic Compounds (Halogenated) (QC Lot: 3241301)									
EM2015167-026	Anonymous	EP075-EM: 2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075A: Phenolic Compounds (Halogenated) (QC Lot: 3241301) - continued									
EM2015167-026	Anonymous	EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EM2015219-056	Anonymous	EP075-EM: 2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP075A: Phenolic Compounds (Non-halogenated) (QC Lot: 3241301)									
EM2015167-026	Anonymous	EP075-EM: Phenol	108-95-2	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Methylphenol	95-48-7	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Nitrophenol	88-75-5	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dimethylphenol	105-67-9	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dinitrophenol	51-28-5	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 4-Nitrophenol	100-02-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: Dinoseb	88-85-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg	<5	<5	0.00	No Limit
EM2015219-056	Anonymous	EP075-EM: Phenol	108-95-2	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Methylphenol	95-48-7	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2-Nitrophenol	88-75-5	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dimethylphenol	105-67-9	1	mg/kg	<1	<1	0.00	No Limit
		EP075-EM: 2.4-Dinitrophenol	51-28-5	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 4-Nitrophenol	100-02-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: Dinoseb	88-85-7	5	mg/kg	<5	<5	0.00	No Limit
		EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg	<5	<5	0.00	No Limit
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3241301)									
EM2015167-026	Anonymous	EP075-EM: Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3241301) - continued									
EM2015167-026	Anonymous	EP075-EM: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1.0	<1.0	0.00	No Limit
EM2015219-056	Anonymous	EP075-EM: Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075-EM: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1.0	<1.0	0.00	No Limit
EP075I: Organochlorine Pesticides (QC Lot: 3241301)									
EM2015167-026	Anonymous	EP075-EM: alpha-BHC	319-84-6	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: beta-BHC	319-85-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: gamma-BHC	58-89-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: delta-BHC	319-86-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor	76-44-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Aldrin	309-00-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075I: Organochlorine Pesticides (QC Lot: 3241301) - continued									
EM2015167-026	Anonymous	EP075-EM: trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Dieldrin	60-57-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin	72-20-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Methoxychlor	72-43-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
EM2015219-056	Anonymous	EP075-EM: alpha-BHC	319-84-6	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: beta-BHC	319-85-7	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: gamma-BHC	58-89-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: delta-BHC	319-86-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor	76-44-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Aldrin	309-00-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Dieldrin	60-57-1	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endrin	72-20-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: Methoxychlor	72-43-5	0.03	mg/kg	<0.03	<0.03	0.00	No Limit
		EP075-EM: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP075-EM: 4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3240779)									
EM2015199-001	Anonymous	EP074-UT: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM2015309-005	Anonymous	EP074-UT: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3241302)									
EM2015167-026	Anonymous	EP071-EM: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EM2015219-056	Anonymous	EP071-EM: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3241302) - continued									
EM2015219-056	Anonymous	EP071-EM: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3240779)									
EM2015199-001	Anonymous	EP074-UT: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
		EP074-UT: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	0.00	No Limit
EM2015309-005	Anonymous	EP074-UT: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
		EP074-UT: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3241302)									
EM2015167-026	Anonymous	EP071-EM: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EM2015219-056	Anonymous	EP071-EM: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071-EM: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (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 Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3243122)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	106	78.5	107
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	100	76.2	108
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	102	78.1	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	104	78.4	106
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	7.9 mg/kg	93.8	78.0	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	106	79.9	109
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	107	92.0	110
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.1 mg/kg	81.2	80.0	108
EG005T: Tin	7440-31-5	5	mg/kg	<5	5.2 mg/kg	94.1	78.4	117
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	109	79.1	110
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3243121)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	103	76.9	110
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3243984)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	20 mg/kg	83.9	70.0	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 3244105)								
EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	20 mg/kg	83.0	70.0	130
EK040T: Fluoride Total (QCLot: 3243948)								
EK040T: Fluoride	16984-48-8	40	mg/kg	<40	400 mg/kg	90.2	75.2	110
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3241300)								
EP066-EM: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	97.8	70.8	136
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3240779)								
EP074-UT: Benzene	71-43-2	0.2	mg/kg	<0.2	2.1 mg/kg	102	69.2	116
EP074-UT: Toluene	108-88-3	0.5	mg/kg	<0.5	2.1 mg/kg	102	67.7	116
EP074-UT: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2.1 mg/kg	98.4	66.6	115
EP074-UT: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4.2 mg/kg	93.9	65.2	112
EP074-UT: Styrene	100-42-5	0.5	mg/kg	<0.5	2.1 mg/kg	94.7	69.4	111
EP074-UT: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2.1 mg/kg	94.8	68.4	110
EP074H: Naphthalene (QCLot: 3240779)								
EP074-UT: Naphthalene	91-20-3	1	mg/kg	<1	0.6 mg/kg	96.0	72.3	114
EP074I: Volatile Halogenated Compounds (QCLot: 3240779)								
EP074-UT: Vinyl chloride	75-01-4	0.02	mg/kg	<0.02	0.1 mg/kg	111	47.0	138
EP074-UT: 1.1-Dichloroethene	75-35-4	0.01	mg/kg	<0.01	0.1 mg/kg	107	57.6	125

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074I: Volatile Halogenated Compounds (QCLot: 3240779) - continued								
EP074-UT: Methylene chloride	75-09-2	0.4	mg/kg	<0.4	2.1 mg/kg	98.9	72.3	115
EP074-UT: trans-1.2-Dichloroethene	156-60-5	0.02	mg/kg	<0.02	0.1 mg/kg	102	60.5	122
EP074-UT: cis-1.2-Dichloroethene	156-59-2	0.01	mg/kg	<0.01	0.1 mg/kg	93.8	70.3	112
EP074-UT: Chloroform	67-66-3	0.02	mg/kg	<0.02	0.1 mg/kg	90.8	66.6	115
EP074-UT: 1.1.1-Trichloroethane	71-55-6	0.01	mg/kg	<0.01	0.1 mg/kg	90.2	64.4	122
EP074-UT: Carbon Tetrachloride	56-23-5	0.01	mg/kg	<0.01	0.1 mg/kg	87.2	58.4	127
EP074-UT: 1.2-Dichloroethane	107-06-2	0.02	mg/kg	<0.02	0.1 mg/kg	99.7	72.9	114
EP074-UT: Trichloroethene	79-01-6	0.02	mg/kg	<0.02	0.1 mg/kg	96.2	64.7	115
EP074-UT: 1.1.2-Trichloroethane	79-00-5	0.04	mg/kg	<0.04	0.1 mg/kg	103	72.6	116
EP074-UT: Tetrachloroethene	127-18-4	0.02	mg/kg	<0.02	0.1 mg/kg	99.7	60.0	119
EP074-UT: 1.1.1.2-Tetrachloroethane	630-20-6	0.01	mg/kg	<0.01	0.1 mg/kg	93.6	71.8	116
EP074-UT: 1.1.2.2-Tetrachloroethane	79-34-5	0.02	mg/kg	<0.02	0.1 mg/kg	93.2	66.1	116
EP074-UT: Hexachlorobutadiene	87-68-3	0.02	mg/kg	<0.02	0.1 mg/kg	49.0	39.8	128
EP074-UT: Chlorobenzene	108-90-7	0.02	mg/kg	<0.02	0.1 mg/kg	98.0	70.3	113
EP074-UT: 1.4-Dichlorobenzene	106-46-7	0.02	mg/kg	<0.02	0.1 mg/kg	91.1	62.6	113
EP074-UT: 1.2-Dichlorobenzene	95-50-1	0.02	mg/kg	<0.02	0.1 mg/kg	90.9	70.8	110
EP074-UT: 1.2.4-Trichlorobenzene	120-82-1	0.01	mg/kg	<0.01	0.1 mg/kg	70.9	48.4	120
EP075A: Phenolic Compounds (Halogenated) (QCLot: 3241301)								
EP075-EM: 2-Chlorophenol	95-57-8	0.03	mg/kg	<0.03	2 mg/kg	96.5	71.4	123
EP075-EM: 2.4-Dichlorophenol	120-83-2	0.03	mg/kg	<0.03	2 mg/kg	92.2	73.1	132
EP075-EM: 2.6-Dichlorophenol	87-65-0	0.03	mg/kg	<0.03	2 mg/kg	91.2	72.2	132
EP075-EM: 4-Chloro-3-methylphenol	59-50-7	0.03	mg/kg	<0.03	2 mg/kg	87.0	70.8	128
EP075-EM: 2.4.5-Trichlorophenol	95-95-4	0.05	mg/kg	<0.05	2 mg/kg	87.4	70.9	134
EP075-EM: 2.4.6-Trichlorophenol	88-06-2	0.05	mg/kg	<0.05	2 mg/kg	93.3	70.9	126
EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	0.03	mg/kg	<0.03	2 mg/kg	88.4	61.9	126
EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/5 8-90-2	0.05	mg/kg	<0.05	4 mg/kg	94.6	47.2	128
EP075-EM: Pentachlorophenol	87-86-5	0.2	mg/kg	<0.2	4 mg/kg	73.1	44.0	135
EP075A: Phenolic Compounds (Non-halogenated) (QCLot: 3241301)								
EP075-EM: Phenol	108-95-2	1	mg/kg	<1	2 mg/kg	98.2	71.5	127
EP075-EM: 2-Methylphenol	95-48-7	1	mg/kg	<1	2 mg/kg	98.4	70.2	129
EP075-EM: 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	4 mg/kg	97.1	74.0	130
EP075-EM: 2-Nitrophenol	88-75-5	1	mg/kg	<1	2 mg/kg	95.7	70.9	133
EP075-EM: 2.4-Dimethylphenol	105-67-9	1	mg/kg	<1	2 mg/kg	92.6	64.8	132
EP075-EM: 2.4-Dinitrophenol	51-28-5	5	mg/kg	<5	10 mg/kg	96.8	41.0	156
EP075-EM: 4-Nitrophenol	100-02-7	5	mg/kg	<5	10 mg/kg	102	52.6	128
EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	5	mg/kg	<5	10 mg/kg	85.3	42.6	125
EP075-EM: Dinoseb	88-85-7	5	mg/kg	<5	10 mg/kg	88.6	47.3	128
EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	5	mg/kg	<5	10 mg/kg	# 6.10	34.5	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3241301)								
EP075-EM: Naphthalene	91-20-3	0.5	mg/kg	<0.5	2 mg/kg	94.0	73.0	131
EP075-EM: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	2 mg/kg	95.7	70.8	130
EP075-EM: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	2 mg/kg	93.5	72.0	135
EP075-EM: Fluorene	86-73-7	0.5	mg/kg	<0.5	2 mg/kg	96.8	74.4	131
EP075-EM: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	2 mg/kg	96.2	73.3	130
EP075-EM: Anthracene	120-12-7	0.5	mg/kg	<0.5	2 mg/kg	95.5	59.4	127
EP075-EM: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	2 mg/kg	99.6	75.3	132
EP075-EM: Pyrene	129-00-0	0.5	mg/kg	<0.5	2 mg/kg	99.2	75.4	130
EP075-EM: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	2 mg/kg	100	69.6	133
EP075-EM: Chrysene	218-01-9	0.5	mg/kg	<0.5	2 mg/kg	102	75.0	133
EP075-EM: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1.0	4 mg/kg	99.6	75.8	133
EP075-EM: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	2 mg/kg	98.4	65.1	130
EP075-EM: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	2 mg/kg	98.5	72.1	134
EP075-EM: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	2 mg/kg	100.0	72.9	135
EP075-EM: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	2 mg/kg	99.1	71.3	134
EP075I: Organochlorine Pesticides (QCLot: 3241301)								
EP075-EM: alpha-BHC	319-84-6	0.03	mg/kg	<0.03	2 mg/kg	98.0	71.0	129
EP075-EM: Hexachlorobenzene (HCB)	118-74-1	0.03	mg/kg	<0.03	2 mg/kg	98.1	65.9	125
EP075-EM: beta-BHC	319-85-7	0.03	mg/kg	<0.03	2 mg/kg	97.6	66.2	130
EP075-EM: gamma-BHC	58-89-9	0.03	mg/kg	<0.03	2 mg/kg	102	70.8	130
EP075-EM: delta-BHC	319-86-8	0.03	mg/kg	<0.03	2 mg/kg	96.9	68.7	134
EP075-EM: Heptachlor	76-44-8	0.03	mg/kg	<0.03	2 mg/kg	96.8	67.2	131
EP075-EM: Aldrin	309-00-2	0.03	mg/kg	<0.03	2 mg/kg	97.3	70.2	130
EP075-EM: Heptachlor epoxide	1024-57-3	0.03	mg/kg	<0.03	2 mg/kg	98.2	65.6	130
EP075-EM: cis-Chlordane	5103-71-9	0.03	mg/kg	<0.03	2 mg/kg	101	65.3	133
EP075-EM: trans-Chlordane	5103-74-2	0.03	mg/kg	<0.03	2 mg/kg	101	66.7	131
EP075-EM: Endosulfan 1	959-98-8	0.03	mg/kg	<0.03	2 mg/kg	98.7	67.9	135
EP075-EM: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	2 mg/kg	100.0	70.9	132
EP075-EM: Dieldrin	60-57-1	0.03	mg/kg	<0.03	2 mg/kg	99.4	70.0	133
EP075-EM: Endrin aldehyde	7421-93-4	0.03	mg/kg	<0.03	2 mg/kg	105	49.6	157
EP075-EM: Endrin	72-20-8	0.03	mg/kg	<0.03	2 mg/kg	90.4	55.4	148
EP075-EM: Endosulfan 2	33213-65-9	0.03	mg/kg	<0.03	2 mg/kg	100	71.4	135
EP075-EM: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	2 mg/kg	103	74.8	134
EP075-EM: Endosulfan sulfate	1031-07-8	0.03	mg/kg	<0.03	2 mg/kg	102	70.2	135
EP075-EM: 4.4`-DDT	50-29-3	0.05	mg/kg	<0.05	2 mg/kg	101	67.1	133
EP075-EM: Methoxychlor	72-43-5	0.03	mg/kg	<0.03	2 mg/kg	103	63.6	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3240779)								
EP074-UT: C6 - C9 Fraction	----	10	mg/kg	<10	39.6 mg/kg	95.4	61.1	119

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3241302)								
EP071-EM: C10 - C14 Fraction	----	50	mg/kg	<50	900 mg/kg	84.9	69.9	128
EP071-EM: C15 - C28 Fraction	----	100	mg/kg	<100	3030 mg/kg	91.5	83.0	124
EP071-EM: C29 - C36 Fraction	----	100	mg/kg	<100	1520 mg/kg	90.7	76.9	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3240779)								
EP074-UT: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	48.9 mg/kg	93.7	59.9	119
EP074-UT: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3241302)								
EP071-EM: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	87.4	70.2	126
EP071-EM: >C16 - C34 Fraction	----	100	mg/kg	<100	4020 mg/kg	90.6	81.4	120
EP071-EM: >C34 - C40 Fraction	----	100	mg/kg	<100	280 mg/kg	90.6	53.4	129

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	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3243122)							
EM2014893-022	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	99 5	78.0	124
		EG005T: Cadmium	7440-43-9	50 mg/kg	97 2	84.0	116
		EG005T: Copper	7440-50-8	250 mg/kg	101	80.0	120
		EG005T: Lead	7439-92-1	250 mg/kg	98.1	80.0	120
		EG005T: Nickel	7440-02-0	50 mg/kg	97 3	78.0	120
		EG005T: Zinc	7440-66-6	250 mg/kg	94 0	80.0	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3243121)							
EM2014893-022	Anonymous	EG035T: Mercury	7439-97-6	0.5 mg/kg	112	76.0	116
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 3243984)							
EM2015294-002	BH07_0.5	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	63.4	58.0	114
EM2015294-002	BH07_0.5	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	68.1	58.0	114
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 3244105)							
EM2015243-011	Anonymous	EK026SF: Total Cyanide	57-12-5	20 mg/kg	79 8	70.0	130
EK040T: Fluoride Total (QCLot: 3243948)							
EM2015279-005	Anonymous	EK040T: Fluoride	16984-48-8	400 mg/kg	97 5	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3241300)							
EM2015167-046	Anonymous	EP066-EM: Total Polychlorinated biphenyls	----	1 mg/kg	92.4	36.0	152

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3240779)							
EM2015294-001	BH07_0.1	EP074-UT: Benzene	71-43-2	2 mg/kg	99 2	50.0	138
		EP074-UT: Toluene	108-88-3	2 mg/kg	99 2	56.0	134
EP074I: Volatile Halogenated Compounds (QCLot: 3240779)							
EM2015294-001	BH07_0.1	EP074-UT: 1.1-Dichloroethene	75-35-4	2 mg/kg	111	26.0	141
		EP074-UT: Trichloroethene	79-01-6	2 mg/kg	91.4	50.0	134
		EP074-UT: Chlorobenzene	108-90-7	2 mg/kg	92 9	28.0	134
EP075A: Phenolic Compounds (Halogenated) (QCLot: 3241301)							
EM2015167-026	Anonymous	EP075-EM: 2-Chlorophenol	95-57-8	3 mg/kg	105	34.0	118
		EP075-EM: 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	94.1	41.0	139
		EP075-EM: Pentachlorophenol	87-86-5	3 mg/kg	80.1	10.0	144
EP075A: Phenolic Compounds (Non-halogenated) (QCLot: 3241301)							
EM2015167-026	Anonymous	EP075-EM: Phenol	108-95-2	3 mg/kg	110	31.5	134
		EP075-EM: 2-Nitrophenol	88-75-5	3 mg/kg	109	13.0	129
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3241301)							
EM2015167-026	Anonymous	EP075-EM: Acenaphthene	83-32-9	3 mg/kg	99.6	46.0	138
		EP075-EM: Pyrene	129-00-0	3 mg/kg	101	26.5	169
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3240779)							
EM2015294-001	BH07_0.1	EP074-UT: C6 - C9 Fraction	----	28 mg/kg	69 8	43.0	111
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3241302)							
EM2015167-036	Anonymous	EP071-EM: C10 - C14 Fraction	----	900 mg/kg	94.4	53.0	123
		EP071-EM: C15 - C28 Fraction	----	3030 mg/kg	96.6	70.0	124
		EP071-EM: C29 - C36 Fraction	----	1520 mg/kg	95 2	64.0	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3240779)							
EM2015294-001	BH07_0.1	EP074-UT: C6 - C10 Fraction	C6_C10	33 mg/kg	72 0	42.0	106
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3241302)							
EM2015167-036	Anonymous	EP071-EM: >C10 - C16 Fraction	----	1160 mg/kg	94 2	65.0	123
		EP071-EM: >C16 - C34 Fraction	----	4020 mg/kg	95.4	67.0	121
		EP071-EM: >C34 - C40 Fraction	----	280 mg/kg	97.1	44.0	126

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2015294**	Page	: 1 of 7
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 03-Sep-2020
Site	: ----	Issue Date	: 10-Sep-2020
Sampler	: MM	No. of samples received	: 4
Order number	: ----	No. of samples analysed	: 2

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP075A: Phenolic Compounds (Non-halogenated)	QC-3241301-001	----	**2-Cyclohexyl-4.6-Dinitro phenol**	131-89-5	6.10 %	34.5-137%	**Recovery less than lower control limit**

Analysis Holding Time Compliance

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

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

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

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; o hers 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
EA001: pH in soil using 0.01M CaCl extract							
Soil Glass Jar - Unpreserved (EA001)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**09-Sep-2020**	10-Sep-2020	✓	**09-Sep-2020**	09-Sep-2020	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**----**	----	----	**07-Sep-2020**	17-Sep-2020	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**08-Sep-2020**	02-Mar-2021	✓	**08-Sep-2020**	02-Mar-2021	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**08-Sep-2020**	01-Oct-2020	✓	**09-Sep-2020**	01-Oct-2020	✓
EG048: Hexavalent Chromium (Alkaline Digest)							
Soil Glass Jar - Unpreserved (EG048G)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**08-Sep-2020**	01-Oct-2020	✓	**09-Sep-2020**	15-Sep-2020	✓
EK026SF: Total CN by Segmented Flow Analyser							
Soil Glass Jar - Unpreserved (EK026SF)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**08-Sep-2020**	17-Sep-2020	✓	**09-Sep-2020**	22-Sep-2020	✓
EK040T: Fluoride Total							
Soil Glass Jar - Unpreserved (EK040T)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**08-Sep-2020**	01-Oct-2020	✓	**10-Sep-2020**	01-Oct-2020	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066-EM)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**07-Sep-2020**	17-Sep-2020	✓	**08-Sep-2020**	17-Oct-2020	✓

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
EP074A: Monocyclic Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP074-UT)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**07-Sep-2020**	10-Sep-2020	✓	**07-Sep-2020**	10-Sep-2020	✓
EP074H: Naphthalene							
Soil Glass Jar - Unpreserved (EP074-UT)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**07-Sep-2020**	10-Sep-2020	✓	**07-Sep-2020**	10-Sep-2020	✓
EP074I: Volatile Halogenated Compounds							
Soil Glass Jar - Unpreserved (EP074-UT)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**07-Sep-2020**	10-Sep-2020	✓	**07-Sep-2020**	10-Sep-2020	✓
EP075A: Phenolic Compounds (Halogenated)							
Soil Glass Jar - Unpreserved (EP075-EM)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**07-Sep-2020**	17-Sep-2020	✓	**08-Sep-2020**	17-Oct-2020	✓
EP075A: Phenolic Compounds (Non-halogenated)							
Soil Glass Jar - Unpreserved (EP075-EM)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**07-Sep-2020**	17-Sep-2020	✓	**08-Sep-2020**	17-Oct-2020	✓
EP075B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075-EM)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**07-Sep-2020**	17-Sep-2020	✓	**08-Sep-2020**	17-Oct-2020	✓
EP075I: Organochlorine Pesticides							
Soil Glass Jar - Unpreserved (EP075-EM)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**07-Sep-2020**	17-Sep-2020	✓	**08-Sep-2020**	17-Oct-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP074-UT)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**07-Sep-2020**	10-Sep-2020	✓	**07-Sep-2020**	10-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP071-EM)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**07-Sep-2020**	17-Sep-2020	✓	**08-Sep-2020**	17-Oct-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP074-UT)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**07-Sep-2020**	10-Sep-2020	✓	**07-Sep-2020**	10-Sep-2020	✓
Soil Glass Jar - Unpreserved (EP071-EM)							
BH07_0.1, BH07_0.5	**03-Sep-2020**	**07-Sep-2020**	17-Sep-2020	✓	**08-Sep-2020**	17-Oct-2020	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH in soil using a 0.01M CaCl2 extract	EA001	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB - VIC EPA 448.3 Screen	EP066-EM	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Fluoride	EK040T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071-EM	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds - Ultra-trace	EP074-UT	1	20	**5.00**	**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.

Analytical Methods	Method	Matrix	Method Descriptions
pH in soil using a 0.01M CaCl2 extract	EA001	SOIL	In house: Referenced to Rayment and Lyons 4B3 (mod.) or 4B4 (mod.) 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
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 AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (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 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)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3)
Total Cyanide by Segmented Flow Analyser	EK026SF	SOIL	In house: Referenced to APHA 4500-CN C / ASTM D7511. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM Schedule B(3).
Total Fluoride	EK040T	SOIL	(In-house) Total fluoride is determined by ion specific electrode (ISE) in a solution obtained after a Sodium Carbonate / Potassium Carbonate fusion dissolution.
PCB - VIC EPA 448.3 Screen	EP066-EM	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 method is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071-EM	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against a kane standards over the range C10 - C40.
Volatile Organic Compounds - Ultra-trace	EP074-UT	SOIL	In house: Referenced to USEPA SW 846 - 8260 Extracts are analysed by Purge and Trap, Capillary GC/MS in partial SIM/Scan mode. Quantification is by comparison against an established multi-point calibration curves. This method is compliant with NEPM Schedule B(3).

Analytical Methods	Method	Matrix	Method Descriptions
Volatile Organic Compounds - Ultra-trace - Summations	EP074-UT-SUM	SOIL	Summation of MAHs and VHCs
Semivolatile Organic Compounds - Waste Classification	EP075-EM	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).
SVOC - Waste Classification (Sums)	EP075-EM-SUM	SOIL	Summations for EP075 (EM variation)

Preparation Methods	Method	Matrix	Method Descriptions
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
pH in soil using a 0.01M CaCl2 extract	EA001-PR	SOIL	In house: Referenced to Rayment and Lyons 4B1, 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM Schedule B(3).
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
Total Fluoride	EK040T-PR	SOIL	In house: Samples are fused with Sodium Carbonate / Potassium Carbonate flux.
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).
Methanolic Extraction of Soils - Ultra-trace.	ORG16-UT	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 - VIC EPA Screen	ORG17-EM	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.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM2015294**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: 12529997	Page	: 1 of 2
Order number	: ----	Quote number	: EM2020GHDSER0037 (ME/458/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: MM		

Dates

Date Samples Received	: 03-Sep-2020 16:45	Issue Date	: 05-Sep-2020
Client Requested Due Date	: 10-Sep-2020	Scheduled Reporting Date	: **10-Sep-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 1.8°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - P-16 WRG 621
EM2015294-001	03-Sep-2020 00:00	BH07_0.1		✓	✓
EM2015294-002	03-Sep-2020 00:00	BH07_0.5		✓	✓
EM2015294-003	03-Sep-2020 00:00	BH07_1.0	✓		
EM2015294-004	03-Sep-2020 00:00	BH07_2.0	✓		

Proactive Holding Time Report

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

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	[redacted]
- EPA Waste Classification & Categorisation Guideline Report (COA_GL_EPA_WASTE)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	[redacted]
- EPA Waste Classification & Categorisation Guideline Report (COA_GL_EPA_WASTE)	Email	[redacted]

CALCULATIONS

Sheet of Date

Job no. Calcs by Checked by Date

Client Project Subject

Chain of Custody Record

GHD Job: 12529997 Project: WORM Quote: ME/458/20 TAT: 5 days

Lab: ALS, 2-4 Westall Rd., Springvale VIC 3171

GHD Pty Ltd ABN 39 008 488 373

Environmental Division
Melbourne
Work Order Reference
EM2015294

Telephone : +61-3-8549 9600

	Sample ID	Date	Matrix	No.	NSRG (P-16)	Hold
1	BH07_0.1	3.9.2020	Soil	1	X	
2	BH07_0.5	↓	↓	↓	X	
3	BH07_1.0	↓	↓	↓		X
4	BH07_2.0	↓	↓	↓		X

Received: MM 3/9/20 C 16.45

Carrier:

C/note:

Temp: 1-8 °C Seal (Y) N

Ice / Icebricks / NA

ALS

Contact: [redacted] [redacted]

Sampled by:	MM 3.9.2020	Relinquished by:	MM 3.9.2020 15:45
Received by courier	MM	3/9/20C 16.45	
Received by lab			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2015525**	Page	: 1 of 3
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997/08	Date Samples Received	: 17-Aug-2020 12:10
Order number	: 12529997/08	Date Analysis Commenced	: 14-Sep-2020
C-O-C number	: ----	Issue Date	: 15-Sep-2020 14:08
Sampler	: ----		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 2		
No. of samples analysed	: 2		

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. 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*
[redacted]	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

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

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

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

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

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

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

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

- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- This is a rebatch of EM2014250.
- 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)			Client sample ID	BH9_0.1	BH9_0.5	----	----	----
			Client sampling date / time	14-Aug-2020 00:00	14-Aug-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2015525-001	EM2015525-002	--------	--------	--------
				Result	Result	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.0**	**6.3**	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**6**	<2	----	----	----
sulfidic Titratable Actual Acidity (s 23F)	----	0.02	% pyrite S	<0.02	<0.02			
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.018**	**0.014**	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**11**	<10	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	**0.03**	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	**17**	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	**1**	<1	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.03**	<0.02	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**17**	<10	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	<1	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2015525**	Page	: 1 of 3
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997/08	Date Samples Received	: 17-Aug-2020
Order number	: 12529997/08	Date Analysis Commenced	: 14-Sep-2020
C-O-C number	: ----	Issue Date	: 15-Sep-2020
Sampler	: ----		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 2		
No. of samples analysed	: 2		

ilac-MRA NATA
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. 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*
[redacted]	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

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

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	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 3251796)									
EB2023806-001	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	3	3	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.2	6.2	0.00	0% - 20%
EA033-B: Potential Acidity (QC Lot: 3251796)									
EB2023806-001	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.016	0.018	11.8	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	10	11	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (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 Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 3251796)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.4 pH Unit	100	91.0	107
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	15 mole H+ / t	118	70.0	124
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 3251796)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.198 % S	90.9	77.0	121
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----

Matrix Spike (MS) Report

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

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

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2015525**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	[redacted]	Telephone	[redacted]
Project	: 12529997/08	Date Samples Received	: 17-Aug-2020
Site	: ----	Issue Date	: 15-Sep-2020
Sampler	: ----	No. of samples received	: 2
Order number	: 12529997/08	No. of samples analysed	: 2

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; o hers 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen (EA033)							
BH9_0.1, BH9_0.5	**14-Aug-2020**	**14-Sep-2020**	14-Aug-2021	✓	**14-Sep-2020**	13-Dec-2020	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen (EA033)							
BH9_0.1, BH9_0.5	**14-Aug-2020**	**14-Sep-2020**	14-Aug-2021	✓	**14-Sep-2020**	13-Dec-2020	✓
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA033)							
BH9_0.1, BH9_0.5	**14-Aug-2020**	**14-Sep-2020**	14-Aug-2021	✓	**14-Sep-2020**	13-Dec-2020	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen (EA033)							
BH9_0.1, BH9_0.5	**14-Aug-2020**	**14-Sep-2020**	14-Aug-2021	✓	**14-Sep-2020**	13-Dec-2020	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen (EA033)							
BH9_0.1, BH9_0.5	**14-Aug-2020**	**14-Sep-2020**	14-Aug-2021	✓	**14-Sep-2020**	13-Dec-2020	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	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
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.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM2015525**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Facsimile	: [redacted]	Facsimile	: [redacted]
Project	: 12529997/08	Page	: 1 of 2
Order number	: 12529997/08	Quote number	: EM2018GHDSER0037 (EN/005/17 (Victoria Primary Quote))
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 17-Aug-2020 12:10	Issue Date	: 09-Sep-2020
Client Requested Due Date	: 15-Sep-2020	Scheduled Reporting Date	: **15-Sep-2020**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: ----
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Brisbane.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- This is a rebatch of EM2014250.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EM2015525-001	14-Aug-2020 00:00	BH9_0.1	✓
EM2015525-002	14-Aug-2020 00:00	BH9_0.5	✓

Proactive Holding Time Report

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

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

GHD LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)	Email	ghdlabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ghdlabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ghdlabreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ghdlabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ghdlabreports@ghd.com

[redacted]

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

Rebatch

Client / Client code: GHD
Project: 12529997/08
Project Manger: [redacted]
Date /time sample rec: 17/8 @ 12:10pm
Date/time Instructions rec: 9/9 @ 11:41am
Due date: BEST AVAILABLE TAT
Due date surcharge:

URGENT

CS Contact: [redacted]
Additional Information:

Environmental Division
Melbourne
Work Order Reference
EM2015525

Telephone : + 61-3-8549 9600

New Lab ID	Sample information						Number of Containers	Analysis										
													Leach					
	Client ID	Sampling Date / Time	Previous Work Order Reference	Previous ALS ID	Tray Number(s)	Container		CHROMIUM SUITE										
1	BH09_0.1	14/08/2020 0:00	EM2014250	1	FB T1			X										
2	BH09_0.5	14/08/2020 0:00	EM2014250	2	FB T1			X										

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EnviroMail™ 00 – All EnviroMails™ in one convenient library.



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From: [redacted]
Sent: Wednesday, 9 September 2020 11:41 AM
To: [redacted]
Subject: [EXTERNAL] - Chromium suite for EM2014250

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 [redacted]

How are you. I was away last week so catching up on this now – I hope I am not too late.

Is it possible to re batch the following samples for the chromium suite please?

- BH09_0.1
- BH09_0.5.

What TAT can you do?

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH9_0.1	BH
			Client sampling date / time	14-Aug-2020 00:00	14-Aug-2
Compound	CAS Number	LOR	Unit	EM2014250-001	EM201
				Result	R
EA001: pH in soil using 0.01M CaCl extract					
pH (CaCl2)	---	0.1	pH Unit	6.5	7.
EA037: Ass Field Screening Analysis					
ø pH (F)	---	0.1	pH Unit	7.7	8.
ø pH (Fox)	---	0.1	pH Unit	5.2	6.
ø Reaction Rate	---	1	-	3	4

Regards,

[redacted]
Hydrogeologist

GHD
Proudly employee owned
[redacted]

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ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2015608**	Page	: 1 of 13
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 10-Sep-2020 16:30
Order number	: ----	Date Analysis Commenced	: 10-Sep-2020
C-O-C number	: ----	Issue Date	: 16-Sep-2020 11:12
Sampler	: MM		
Site	: ----		
Quote number	: ME/458/20		
No. of samples received	: 5		
No. of samples analysed	: 5		

ilac-MRA NATA
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. 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.

Signatories	*Position*	*Accreditation Category*
[redacted]	Senior Inorganic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	Laboratory Manager - Inorganics	Sydney Inorganics, Smithfield, NSW
[redacted]	Laboratory Coordinator	WRG Subcontracting, Springvale, VIC
[redacted]	Senior Organic Chemist	Me bourne Organics, Springvale, VIC

General Comments

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

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

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

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

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

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

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

- EA010-P: Electrical Conductivity @ 25°C was analysed by manual method (EA010).
- EP075: 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.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP074: Where reported, Total Trihalomethanes is the sum of the reported concentrations of all Trihalomethanes at or above the LOR.
- EP074: Where reported, Total Trimethylbenzenes is the sum of the reported concentrations of 1.2.3-Trimethylbenzene, 1.2.4-Trimethylbenzene and 1.3.5-Trimethylbenzene at or above the LOR.
- EP026SP: EM2015608 #1 Sample required dilution prior to analysis of COD due to matrix interference. LOR has been raised accordingly.
- EP030: The DO depletion for EM2015608 #1 is less than 2mg/L, this indicates that the sample has been over diluted and the BOD is less than 8 mg/L. The BOD result reported was estimated from the lowest dilution
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- EP075: Where reported, 'Sum of PAH' is the sum of the USEPA 16 priority PAHs
- E.coli & Total Coliforms by MPN (MM514) is conducted by ALS Scoresby NATA accreditation no. 992, site no. 989.
- MBAS (W-MBAS)is conducted by ALS Scoresby NATA accreditation no. 992, site no. 989.
- 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)				Client sample ID	BH22	BH09	QC01	QC03	QC04
				Client sampling date / time	10-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00
Compound	CAS Number	LOR	Unit		EM2015608-001	EM2015608-002	EM2015608-003	EM2015608-004	EM2015608-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.93**	**7.12**	**7.14**	**6.47**	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**7040**	**10300**	**10300**	**1**	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**3960**	**5300**	**5280**	<10	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**30**	----	----	----	----
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		**348**	**478**	**480**	**2**	----
Total Alkalinity as CaCO3	----	1	mg/L		**348**	**478**	**480**	**2**	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**508**	**312**	**310**	<1	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**1950**	**3440**	**3430**	<1	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**124**	**87**	**86**	<1	----
Magnesium	7439-95-4	1	mg/L		**253**	**413**	**406**	<1	----
Sodium	7440-23-5	1	mg/L		**930**	**1340**	**1320**	<1	----
Potassium	7440-09-7	1	mg/L		**24**	**11**	**11**	<1	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.003**	**0.003**	----	----
Copper	7440-50-8	0.001	mg/L		**0.020**	**0.014**	**0.012**	----	----
Nickel	7440-02-0	0.001	mg/L		**0.031**	**0.011**	**0.009**	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		**0.086**	**0.042**	**0.036**	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		----	----	----	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	----	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		----	----	----	<0.001	----
Copper	7440-50-8	0.001	mg/L		----	----	----	<0.001	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH22	BH09	QC01	QC03	QC04
				Client sampling date / time	10-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00
Compound	CAS Number	LOR	Unit		EM2015608-001	EM2015608-002	EM2015608-003	EM2015608-004	EM2015608-005
					Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS - Continued									
Nickel	7440-02-0	0.001	mg/L		----	----	----	<0.001	----
Lead	7439-92-1	0.001	mg/L		----	----	----	<0.001	----
Zinc	7440-66-6	0.005	mg/L		----	----	----	<0.005	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	----	<0.0001	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.42**	**0.02**	**0.02**	<0.01	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	**0.92**	**0.93**	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	**0.92**	**0.93**	<0.01	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	**0.2**	**0.3**	<0.1	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.4**	**1.1**	**1.2**	<0.1	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.01**	**0.39**	**0.37**	<0.01	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**72.5**	**113**	**113**	**0.04**	----
ø Total Cations	----	0.01	meq/L		**68.1**	**96.9**	**95.4**	<0.01	----
ø Ionic Balance	----	0.01	%		**3.17**	**7.71**	**8.36**	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	----	----	----	----
EP026SP: Chemical Oxygen Demand (Spectrophotometric)									
Chemical Oxygen Demand	----	10	mg/L		<50	----	----	----	----
EP030: Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	----	2	mg/L		<8	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH22	BH09	QC01	QC03	QC04
				Client sampling date / time	10-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00
Compound	CAS Number	LOR	Unit		EM2015608-001	EM2015608-002	EM2015608-003	EM2015608-004	EM2015608-005
					Result	Result	Result	Result	Result
EP074A: Monocyclic Aromatic Hydrocarbons									
Benzene	71-43-2	1	µg/L		----	----	----	----	<1
Toluene	108-88-3	2	µg/L		----	----	----	----	<2
Ethylbenzene	100-41-4	2	µg/L		----	----	----	----	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		----	----	----	----	<2
Styrene	100-42-5	5	µg/L		<5				<5
ortho-Xylene	95-47-6	2	µg/L		----	----	----	----	<2
Isopropylbenzene	98-82-8	5	µg/L		<5				<5
n-Propylbenzene	103-65-1	5	µg/L		<5	----	----	----	<5
1 3 5 Trimethylbenzene	108-67-8	5	µg/L		<5				<5
sec-Butylbenzene	135-98-8	5	µg/L		<5	----	----	----	<5
1 2 4 Trimethylbenzene	95-63-6	5	µg/L		<5				<5
tert-Butylbenzene	98-06-6	5	µg/L		<5	----	----	----	<5
p Isopropyltoluene	99-87-6	5	µg/L		<5				<5
n-Butylbenzene	104-51-8	5	µg/L		<5	----	----	----	<5
EP074B: Oxygenated Compounds									
Vinyl Acetate	108-05-4	50	µg/L		<50	----	----	----	<50
2-Butanone (MEK)	78-93-3	50	µg/L		<50	----	----	----	<50
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L		<50	----	----	----	<50
2-Hexanone (MBK)	591-78-6	50	µg/L		<50	----	----	----	<50
EP074C: Sulfonated Compounds									
Carbon disulfide	75-15-0	5	µg/L		<5	----	----	----	<5
EP074D: Fumigants									
2.2-Dichloropropane	594-20-7	5	µg/L		<5	----	----	----	<5
1.2-Dichloropropane	78-87-5	5	µg/L		<5	----	----	----	<5
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L		<5	----	----	----	<5
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L		<5	----	----	----	<5
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L		<5	----	----	----	<5
EP074E: Halogenated Aliphatic Compounds									
Dichlorodifluoromethane	75-71-8	50	µg/L		<50	----	----	----	<50
Chloromethane	74-87-3	50	µg/L		<50	----	----	----	<50
Vinyl chloride	75-01-4	50	µg/L		<50	----	----	----	<50
Bromomethane	74-83-9	50	µg/L		<50	----	----	----	<50
Chloroethane	75-00-3	50	µg/L		<50	----	----	----	<50
Trichlorofluoromethane	75-69-4	50	µg/L		<50	----	----	----	<50

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH22	BH09	QC01	QC03	QC04
				Client sampling date / time	10-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00
Compound	CAS Number	LOR	Unit		EM2015608-001	EM2015608-002	EM2015608-003	EM2015608-004	EM2015608-005
					Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued									
1.1-Dichloroethene	75-35-4	5	µg/L		<5	----	----	----	<5
Iodomethane	74-88-4	5	µg/L		<5	----	----	----	<5
trans-1.2-Dichloroethene	156-60-5	5	µg/L		<5	----	----	----	<5
1.1-Dichloroethane	75-34-3	5	µg/L		<5	----	----	----	<5
cis-1.2-Dichloroethene	156-59-2	5	µg/L		<5	----	----	----	<5
1.1.1-Trichloroethane	71-55-6	5	µg/L		<5	----	----	----	<5
1.1-Dichloropropylene	563-58-6	5	µg/L		<5	----	----	----	<5
Carbon Tetrachloride	56-23-5	5	µg/L		<5	----	----	----	<5
1.2-Dichloroethane	107-06-2	5	µg/L		<5	----	----	----	<5
Trichloroethene	79-01-6	5	µg/L		<5	----	----	----	<5
Dibromomethane	74-95-3	5	µg/L		<5	----	----	----	<5
1.1.2-Trichloroethane	79-00-5	5	µg/L		<5	----	----	----	<5
1.3-Dichloropropane	142-28-9	5	µg/L		<5	----	----	----	<5
Tetrachloroethene	127-18-4	5	µg/L		<5	----	----	----	<5
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L		<5	----	----	----	<5
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L		<5	----	----	----	<5
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L		<5	----	----	----	<5
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L		<5	----	----	----	<5
1.2.3-Trichloropropane	96-18-4	5	µg/L		<5	----	----	----	<5
Pentachloroethane	76-01-7	5	µg/L		<5	----	----	----	<5
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L		<5	----	----	----	<5
Hexachlorobutadiene	87-68-3	5	µg/L		----	----	----	----	<5
EP074F: Halogenated Aromatic Compounds									
Chlorobenzene	108-90-7	5	µg/L		<5	----	----	----	<5
Bromobenzene	108-86-1	5	µg/L		<5	----	----	----	<5
2-Chlorotoluene	95-49-8	5	µg/L		<5	----	----	----	<5
4-Chlorotoluene	106-43-4	5	µg/L		<5	----	----	----	<5
1.3-Dichlorobenzene	541-73-1	5	µg/L		----	----	----	----	<5
1.4-Dichlorobenzene	106-46-7	5	µg/L		----	----	----	----	<5
1.2-Dichlorobenzene	95-50-1	5	µg/L		----	----	----	----	<5
1.2.4-Trichlorobenzene	120-82-1	5	µg/L		----	----	----	----	<5
1.2.3-Trichlorobenzene	87-61-6	5	µg/L		<5	----	----	----	<5
EP074G: Trihalomethanes									
Chloroform	67-66-3	5	µg/L		<5	----	----	----	<5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH22	BH09	QC01	QC03	QC04
				Client sampling date / time	10-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00
Compound	CAS Number	LOR	Unit		EM2015608-001	EM2015608-002	EM2015608-003	EM2015608-004	EM2015608-005
					Result	Result	Result	Result	Result
EP074G: Trihalomethanes - Continued									
Bromodichloromethane	75-27-4	5	µg/L		<5	----	----	----	<5
Dibromochloromethane	124-48-1	5	µg/L		<5	----	----	----	<5
Bromoform	75-25-2	5	µg/L		<5	----	----	----	<5
EP074H: Naphthalene									
Naphthalene	91-20-3	5	µg/L		----	----	----	----	<5
EP075A: Phenolic Compounds									
Phenol	108-95-2	2	µg/L		<2	----	----	----	----
2-Chlorophenol	95-57-8	2	µg/L		<2	----	----	----	----
2-Methylphenol	95-48-7	2	µg/L		<2	----	----	----	----
3- & 4-Methylphenol	1319-77-3	4	µg/L		<4	----	----	----	----
2-Nitrophenol	88-75-5	2	µg/L		<2	----	----	----	----
2.4-Dimethylphenol	105-67-9	2	µg/L		<2	----	----	----	----
2.4-Dichlorophenol	120-83-2	2	µg/L		<2	----	----	----	----
2.6-Dichlorophenol	87-65-0	2	µg/L		<2	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	2	µg/L		<2	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	2	µg/L		<2	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	2	µg/L		<2	----	----	----	----
Pentachlorophenol	87-86-5	4	µg/L		<4	----	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	2	µg/L		<2	----	----	----	----
2-Methylnaphthalene	91-57-6	2	µg/L		<2	----	----	----	----
2-Chloronaphthalene	91-58-7	2	µg/L		<2	----	----	----	----
Acenaphthylene	208-96-8	2	µg/L		<2	----	----	----	----
Acenaphthene	83-32-9	2	µg/L		<2	----	----	----	----
Fluorene	86-73-7	2	µg/L		<2	----	----	----	----
Phenanthrene	85-01-8	2	µg/L		<2	----	----	----	----
Anthracene	120-12-7	2	µg/L		<2	----	----	----	----
Fluoranthene	206-44-0	2	µg/L		<2	----	----	----	----
Pyrene	129-00-0	2	µg/L		<2	----	----	----	----
N-2-Fluorenyl Acetamide	53-96-3	2	µg/L		<2	----	----	----	----
Benz(a)anthracene	56-55-3	2	µg/L		<2	----	----	----	----
Chrysene	218-01-9	2	µg/L		<2	----	----	----	----
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	4	µg/L		<4	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH22	BH09	QC01	QC03	QC04
				Client sampling date / time	10-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00
Compound	CAS Number	LOR	Unit		EM2015608-001	EM2015608-002	EM2015608-003	EM2015608-004	EM2015608-005
					Result	Result	Result	Result	Result
EP075B: Polynuclear Aromatic Hydrocarbons - Continued									
7.12-Dimethylbenz(a)anthracene	57-97-6	2	µg/L		<2	----	----	----	----
Benzo(a)pyrene	50-32-8	2	µg/L		<2	----	----	----	----
3-Methylcholanthrene	56-49-5	2	µg/L		<2	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	2	µg/L		<2	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	2	µg/L		<2	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	2	µg/L		<2	----	----	----	----
^ Sum of PAHs	----	2	µg/L		<2	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	2	µg/L		<2	----	----	----	----
EP075C: Phthalate Esters									
Dimethyl phthalate	131-11-3	2	µg/L		<2	----	----	----	----
Diethyl phthalate	84-66-2	2	µg/L		<2	----	----	----	----
Di-n-butyl phthalate	84-74-2	2	µg/L		<2	----	----	----	----
Butyl benzyl phthalate	85-68-7	2	µg/L		<2	----	----	----	----
bis(2-ethylhexyl) phthalate	117-81-7	10	µg/L		<10	----	----	----	----
Di-n-octylphthalate	117-84-0	2	µg/L		<2	----	----	----	----
EP075D: Nitrosamines									
N-Nitrosomethylethylamine	10595-95-6	2	µg/L		<2	----	----	----	----
N-Nitrosodiethylamine	55-18-5	2	µg/L		<2	----	----	----	----
N-Nitrosopyrrolidine	930-55-2	4	µg/L		<4	----	----	----	----
N-Nitrosomorpholine	59-89-2	2	µg/L		<2	----	----	----	----
N-Nitrosodi-n-propylamine	621-64-7	2	µg/L		<2	----	----	----	----
N-Nitrosopiperidine	100-75-4	2	µg/L		<2	----	----	----	----
N-Nitrosodibutylamine	924-16-3	2	µg/L		<2	----	----	----	----
N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	4	µg/L		<4	----	----	----	----
Methapyrilene	91-80-5	2	µg/L		<2	----	----	----	----
EP075E: Nitroaromatics and Ketones									
2-Picoline	109-06-8	2	µg/L		<2	----	----	----	----
Acetophenone	98-86-2	2	µg/L		<2	----	----	----	----
Nitrobenzene	98-95-3	2	µg/L		<2	----	----	----	----
Isophorone	78-59-1	2	µg/L		<2	----	----	----	----
2.6-Dinitrotoluene	606-20-2	4	µg/L		<4	----	----	----	----
2.4-Dinitrotoluene	121-14-2	4	µg/L		<4	----	----	----	----
1-Naphthylamine	134-32-7	2	µg/L		<2	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH22	BH09	QC01	QC03	QC04
				Client sampling date / time	10-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00
Compound	CAS Number	LOR	Unit		EM2015608-001	EM2015608-002	EM2015608-003	EM2015608-004	EM2015608-005
					Result	Result	Result	Result	Result
EP075E: Nitroaromatics and Ketones - Continued									
4-Nitroquinoline-N-oxide	56-57-5	2	µg/L		<2	----	----	----	----
5-Nitro-o-toluidine	99-55-8	2	µg/L		<2	----	----	----	----
Azobenzene	103-33-3	2	µg/L		<2	----	----	----	----
1.3.5-Trinitrobenzene	99-35-4	2	µg/L		<2	----	----	----	----
Phenacetin	62-44-2	2	µg/L		<2	----	----	----	----
4-Aminobiphenyl	92-67-1	2	µg/L		<2	----	----	----	----
Pentachloronitrobenzene	82-68-8	2	µg/L		<2	----	----	----	----
Pronamide	23950-58-5	2	µg/L		<2	----	----	----	----
Dimethylaminoazobenzene	60-11-7	2	µg/L		<2	----	----	----	----
Chlorobenzilate	510-15-6	2	µg/L		<2	----	----	----	----
EP075F: Haloethers									
Bis(2-chloroethyl) ether	111-44-4	2	µg/L		<2	----	----	----	----
Bis(2-chloroethoxy) methane	111-91-1	2	µg/L		<2	----	----	----	----
4-Chlorophenyl phenyl ether	7005-72-3	2	µg/L		<2	----	----	----	----
4-Bromophenyl phenyl ether	101-55-3	2	µg/L		<2	----	----	----	----
EP075G: Chlorinated Hydrocarbons									
1.3-Dichlorobenzene	541-73-1	2	µg/L		<2	----	----	----	----
1.4-Dichlorobenzene	106-46-7	2	µg/L		<2	----	----	----	----
1.2-Dichlorobenzene	95-50-1	2	µg/L		<2	----	----	----	----
Hexachloroethane	67-72-1	2	µg/L		<2	----	----	----	----
1.2.4-Trichlorobenzene	120-82-1	2	µg/L		<2	----	----	----	----
Hexachloropropylene	1888-71-7	2	µg/L		<2	----	----	----	----
Hexachlorobutadiene	87-68-3	2	µg/L		<2	----	----	----	----
Hexachlorocyclopentadiene	77-47-4	10	µg/L		<10	----	----	----	----
Pentachlorobenzene	608-93-5	2	µg/L		<2	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	4	µg/L		<4	----	----	----	----
EP075H: Anilines and Benzidines									
Aniline	62-53-3	2	µg/L		<2	----	----	----	----
4-Chloroaniline	106-47-8	2	µg/L		<2	----	----	----	----
2-Nitroaniline	88-74-4	4	µg/L		<4	----	----	----	----
3-Nitroaniline	99-09-2	4	µg/L		<4	----	----	----	----
Dibenzofuran	132-64-9	2	µg/L		<2	----	----	----	----
4-Nitroaniline	100-01-6	2	µg/L		<2	----	----	----	----
Carbazole	86-74-8	2	µg/L		<2	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH22	BH09	QC01	QC03	QC04
				Client sampling date / time	10-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00
Compound	CAS Number	LOR	Unit		EM2015608-001	EM2015608-002	EM2015608-003	EM2015608-004	EM2015608-005
					Result	Result	Result	Result	Result
EP075H: Anilines and Benzidines - Continued									
3.3`-Dichlorobenzidine	91-94-1	2	µg/L		<2	----	----	----	----
EP075I: Organochlorine Pesticides									
alpha-BHC	319-84-6	2	µg/L		<2	----	----	----	----
beta-BHC	319-85-7	2	µg/L		<2	----	----	----	----
gamma-BHC	58-89-9	2	µg/L		<2	----	----	----	----
delta-BHC	319-86-8	2	µg/L		<2	----	----	----	----
Heptachlor	76-44-8	2	µg/L		<2	----	----	----	----
Aldrin	309-00-2	2	µg/L		<2	----	----	----	----
Heptachlor epoxide	1024-57-3	2	µg/L		<2	----	----	----	----
alpha-Endosulfan	959-98-8	2	µg/L		<2	----	----	----	----
4.4`-DDE	72-55-9	2	µg/L		<2	----	----	----	----
Dieldrin	60-57-1	2	µg/L		<2	----	----	----	----
Endrin	72-20-8	2	µg/L		<2	----	----	----	----
beta-Endosulfan	33213-65-9	2	µg/L		<2	----	----	----	----
4.4`-DDD	72-54-8	2	µg/L		<2	----	----	----	----
Endosulfan sulfate	1031-07-8	2	µg/L		<2	----	----	----	----
4.4`-DDT	50-29-3	4	µg/L		<4	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	4	µg/L		<4	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	4	µg/L		<4	----	----	----	----
EP075J: Organophosphorus Pesticides									
Dichlorvos	62-73-7	2	µg/L		<2	----	----	----	----
Dimethoate	60-51-5	2	µg/L		<2	----	----	----	----
Diazinon	333-41-5	2	µg/L		<2	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	2	µg/L		<2	----	----	----	----
Malathion	121-75-5	2	µg/L		<2	----	----	----	----
Fenthion	55-38-9	2	µg/L		<2	----	----	----	----
Chlorpyrifos	2921-88-2	2	µg/L		<2	----	----	----	----
Pirimphos-ethyl	23505-41-1	2	µg/L		<2	----	----	----	----
Chlorfenvinphos	470-90-6	2	µg/L		<2	----	----	----	----
Prothiofos	34643-46-4	2	µg/L		<2	----	----	----	----
Ethion	563-12-2	2	µg/L		<2	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH22	BH09	QC01	QC03	QC04
				Client sampling date / time	10-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00
Compound	CAS Number	LOR	Unit		EM2015608-001	EM2015608-002	EM2015608-003	EM2015608-004	EM2015608-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ Total Xylenes	----	2	µg/L		<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
MM514: E.coli & Total Coliforms MPN by Colilert									
Escherichia coli (Colilert)	----	1	orgs/100mL		**0**	----	----	----	----
Subcontracted Analysis: MBAS									
Anionic Surfactants as MBAS	----	0.05	mg/L		<0.05	----	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		**78.0**	----	----	----	----
EP074S: VOC Surrogates									
1.2-Dichloroethane-D4	17060-07-0	5	%		**98.9**	----	----	----	**104**
Toluene-D8	2037-26-5	5	%		**96.6**	----	----	----	**99.7**
4-Bromofluorobenzene	460-00-4	5	%		**99.7**	----	----	----	**105**
EP075S: Acid Extractable Surrogates									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH22	BH09	QC01	QC03	QC04
				Client sampling date / time	10-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00	09-Sep-2020 00:00
Compound	CAS Number	LOR	Unit		EM2015608-001	EM2015608-002	EM2015608-003	EM2015608-004	EM2015608-005
					Result	Result	Result	Result	Result
EP075S: Acid Extractable Surrogates - Continued									
2-Fluorophenol	367-12-4	2	%		13.7	----	----	----	----
Phenol-d6	13127-88-3	2	%		12.1	----	----	----	----
2 Chlorophenol D4	93951-73-6	2	%		42 0				
2.4.6-Tribromophenol	118-79-6	2	%		69.5	----	----	----	----
EP075T: Base/Neutral Extractable Surrogates									
Nitrobenzene-D5	4165-60-0	2	%		80.6	----	----	----	----
1.2-Dichlorobenzene-D4	2199-69-1	2	%		61.1	----	----	----	----
2-Fluorobiphenyl	321-60-8	2	%		65.7	----	----	----	----
Anthracene-d10	1719-06-8	2	%		83.9	----	----	----	----
4-Terphenyl-d14	1718-51-0	2	%		79.8	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		98.2	----	----	----	----
Toluene-D8	2037-26-5	2	%		101	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		122	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	41	125
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72	132
Toluene-D8	2037-26-5	77	132
4-Bromofluorobenzene	460-00-4	67	131
EP075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	10	75
Phenol-d6	13127-88-3	10	65
2-Chlorophenol-D4	93951-73-6	21	103
2.4.6-Tribromophenol	118-79-6	22	120
EP075T: Base/Neutral Extractable Surrogates			
Nitrobenzene-D5	4165-60-0	24	116
1.2-Dichlorobenzene-D4	2199-69-1	23	99
2-Fluorobiphenyl	321-60-8	32	114
Anthracene-d10	1719-06-8	47	119
4-Terphenyl-d14	1718-51-0	44	124
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2015608**	Page	: 1 of 17
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 10-Sep-2020
Order number	: ----	Date Analysis Commenced	: 10-Sep-2020
C-O-C number	: ----	Issue Date	: 16-Sep-2020
Sampler	: MM		
Site	: ----		
Quote number	: ME/458/20		
No. of samples received	: 5		
No. of samples analysed	: 5		

ilac-MRA NATA
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. 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*
[redacted]	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	Laboratory Manager - Inorganics	Sydney Inorganics, Smithfield, NSW
[redacted]	Laboratory Coordinator	WRG Subcontracting, Springvale, VIC
[redacted]	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

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

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	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 3250812)									
EM2015576-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	3.32	3.33	0.301	0% - 20%
EM2015606-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.10	5.98	1.99	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3250818)									
EM2015617-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.22	7.24	0.277	0% - 20%
EM2015648-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.48	6.70	11.0	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3250810)									
EM2015576-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1730	1720	0.696	0% - 20%
EM2015606-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2	2	0.00	No Limit
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3250550)									
EM2015608-004	QC03	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	<10	0.00	No Limit
EM2015581-005	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	283	285	0.704	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3250549)									
EM2015583-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	26	23	12.1	No Limit
EM2015581-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	14	11	25.7	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3250817)									
EM2015609-011	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	426	423	0.719	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	426	423	0.719	0% - 20%
EM2015606-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3250710)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3250710) - continued									
EM2015608-004	QC03	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3250708)									
EM2015596-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2100	2250	6.52	0% - 20%
EM2015454-025	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	50	52	3.09	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3250711)									
EM2015608-004	QC03	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3250944)									
EM2015596-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	126	125	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	439	437	0.375	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1870	1860	0.673	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	55	55	0.00	0% - 20%
EM2015578-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	79	79	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	24	24	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	318	317	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	15	15	0.00	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 3250947)									
EM2015637-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	211	225	6.43	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	460	491	6.56	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2680	2880	7.33	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	67	71	6.31	0% - 20%
EM2015609-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	585	563	3.80	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	920	887	3.60	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	3640	3490	4.22	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	67	65	3.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3250946)									
EM2015606-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.085	0.086	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.007	0.007	0.00	No Limit
EM2015609-006	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.056	0.056	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.153	0.151	1.42	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.007	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 3250478)									
EM2015235-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.059	0.058	0.00	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.122	0.125	2.34	0% - 20%
EM2015563-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0002	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.016	0.016	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.016	0.016	0.00	0% - 50%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.662	0.660	0.345	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 3250945)									
EM2015608-001	BH22	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2015578-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	0.0005	0.0005	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3252252)									
EM2015604-002	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2015655-077	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3250520)									
EM2015606-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.26	1.17	6.85	0% - 20%
EM2015459-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	6.12	6.07	0.925	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3250706)									
EM2015596-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.70	0.70	0.00	0% - 20%
EM2015454-025	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3250519)									
EM2015596-005	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.91	0.91	0.00	0% - 20%
EM2015459-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3252397)									
EM2015597-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EM2015608-004	QC03	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3252396)									
EM2015597-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	0.02	0.00	No Limit
EM2015608-004	QC03	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QC Lot: 3252098)									
EM2015596-001	Anonymous	EP026SP: Chemical Oxygen Demand	----	10	mg/L	265	251	5.43	0% - 20%
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 3250382)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 3250382) - continued									
EM2015589-001	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	393	403	2.41	0% - 20%
EM2015608-001	BH22	EP030: Biochemical Oxygen Demand	----	2	mg/L	<8	<8	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 3250593)									
EM2015608-001	BH22	EP074: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP074: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP074: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP074: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP074: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 3250593)									
EM2015608-001	BH22	EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
EP074C: Sulfonated Compounds (QC Lot: 3250593)									
EM2015608-001	BH22	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EP074D: Fumigants (QC Lot: 3250593)									
EM2015608-001	BH22	EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 3250593)									
EM2015608-001	BH22	EP074: 1.1-Dichloroe hene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroe hane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074E: Halogenated Aliphatic Compounds (QC Lot: 3250593) - continued									
EM2015608-001	BH22	EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroe hane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 3250593)									
EM2015608-001	BH22	EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 3250593)									
EM2015608-001	BH22	EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
EP074H: Naphthalene (QC Lot: 3250593)									
EM2015608-001	BH22	EP074: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3250508)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3250508) - continued									
EM2015452-002	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3250594)									
EM2015608-001	BH22	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3250508)									
EM2015452-002	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3250594)									
EM2015608-001	BH22	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3250594)									
EM2015608-001	BH22	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (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 Spike (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 Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 3250810)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	85.0	119
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3250550)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	96.8	93.7	107
				<10	293 mg/L	105	90.0	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3250549)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	101	90.3	109
				<5	1000 mg/L	106	90.3	109
ED037P: Alkalinity by PC Titrator (QCLot: 3250817)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	99.7	88.0	112
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3250710)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.6	85.8	117
				<1	100 mg/L	96.2	85.8	117
ED045G: Chloride by Discrete Analyser (QCLot: 3250708)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	112	85.0	122
				<1	1000 mg/L	102	85.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 3250711)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	85.0	122
				<1	1000 mg/L	103	85.0	122
ED093F: Dissolved Major Cations (QCLot: 3250944)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	109	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	103	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	114	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	104	86.7	111
ED093F: Dissolved Major Cations (QCLot: 3250947)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	103	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	98.6	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	109	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	101	86.7	111
EG020F: Dissolved Metals by ICP-MS (QCLot: 3250946)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	88.5	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.3	83.5	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.8	83.2	105
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.5	83.1	106

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3250946) - continued								
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.8	84.6	107
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	99.9	84.3	108
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	107	86.3	111
EG020T: Total Metals by ICP-MS (QCLot: 3250478)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	103	89.2	113
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	102	86.4	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.8	86.9	110
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.6	86.9	109
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.1	88.3	110
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.2	87.9	111
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	108	86.7	114
EG035F: Dissolved Mercury by FIMS (QCLot: 3250945)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	89.1	71.1	112
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3252252)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	85.4	72.6	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3250520)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	115	88.0	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3250706)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	107	90.9	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3250519)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	114	90.0	117
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3252397)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	98.6	70.0	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3252396)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	89.7	71.9	114
EP020: Oil and Grease (O&G) (QCLot: 3257265)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	99.7	81.0	121
EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QCLot: 3252098)								
EP026SP: Chemical Oxygen Demand	----	10	mg/L	<10	500 mg/L	109	89.7	111
EP030: Biochemical Oxygen Demand (BOD) (QCLot: 3250382)								
EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	198 mg/L	86.4	77.5	120
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3250512)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	80.3	47.7	124
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3250593)								
EP074: Benzene	71-43-2	1	µg/L	<1	20 µg/L	99.8	77.8	120
EP074: Toluene	108-88-3	2	µg/L	<2	20 µg/L	88.7	77.7	118
EP074: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	93.2	78.0	118

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3250593) - continued								
EP074: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	91.4	76.8	119
EP074: Styrene	100-42-5	5	µg/L	<5	20 µg/L	92.5	80.4	117
EP074: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	91.8	81.5	119
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	20 µg/L	90.5	75.0	118
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	20 µg/L	91.1	68.7	114
EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	20 µg/L	93.4	72.1	114
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	20 µg/L	92.5	69.6	115
EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	20 µg/L	93.6	72.4	113
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	20 µg/L	91.3	72.6	116
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	20 µg/L	89.0	69.2	115
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	20 µg/L	85.8	61.4	115
EP074B: Oxygenated Compounds (QCLot: 3250593)								
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	200 µg/L	101	71.3	125
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	200 µg/L	83.3	66.4	132
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	200 µg/L	112	75.2	132
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	200 µg/L	83.3	73.9	131
EP074C: Sulfonated Compounds (QCLot: 3250593)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	20 µg/L	96.2	58.2	124
EP074D: Fumigants (QCLot: 3250593)								
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	20 µg/L	90.6	68.7	120
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	20 µg/L	97.8	79.6	116
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	20 µg/L	97.4	76.2	114
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	20 µg/L	93.7	77.0	114
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	20 µg/L	89.6	80.1	118
EP074E: Halogenated Aliphatic Compounds (QCLot: 3250593)								
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	200 µg/L	100	53.4	140
EP074: Chloromethane	74-87-3	50	µg/L	<50	200 µg/L	104	63.8	134
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	200 µg/L	103	57.1	135
EP074: Bromomethane	74-83-9	50	µg/L	<50	200 µg/L	98.0	51.1	126
EP074: Chloroethane	75-00-3	50	µg/L	<50	200 µg/L	97.3	64.9	129
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	200 µg/L	96.0	65.7	127
EP074: 1.1-Dichloroe hene	75-35-4	5	µg/L	<5	20 µg/L	96.8	67.4	123
EP074: Iodomethane	74-88-4	5	µg/L	<5	20 µg/L	81.3	30.9	126
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	20 µg/L	96.4	69.2	119
EP074: 1.1-Dichloroe hane	75-34-3	5	µg/L	<5	20 µg/L	99.0	76.7	120
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	20 µg/L	99.3	78.9	118
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	20 µg/L	96.0	69.2	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 3250593) - continued								
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	20 µg/L	97.5	67.0	120
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	20 µg/L	90.7	63.7	120
EP074: 1.2-Dichloroe hane	107-06-2	5	µg/L	<5	20 µg/L	109	82.0	116
EP074: Trichloroethene	79-01-6	5	µg/L	<5	20 µg/L	99.9	72.9	118
EP074: Dibromomethane	74-95-3	5	µg/L	<5	20 µg/L	95.4	81.0	116
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	20 µg/L	97.0	84.9	118
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	20 µg/L	92.4	83.4	119
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	20 µg/L	87.4	70.4	118
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	20 µg/L	85.6	77.9	113
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	20 µg/L	91.3	72.6	122
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	20 µg/L	78.8	67.8	119
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	20 µg/L	101	83.0	125
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	20 µg/L	94.4	82.4	123
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	20 µg/L	84.5	72.7	111
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	20 µg/L	89.0	75.4	114
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	20 µg/L	87.8	62.6	128
EP074F: Halogenated Aromatic Compounds (QCLot: 3250593)								
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	20 µg/L	92.0	81.7	116
EP074: Bromobenzene	108-86-1	5	µg/L	<5	20 µg/L	94.2	75.2	118
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	20 µg/L	96.3	75.0	114
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	20 µg/L	95.2	72.8	113
EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	20 µg/L	99.4	74.7	116
EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	20 µg/L	99.7	75.5	119
EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	20 µg/L	93.8	82.0	113
EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	20 µg/L	93.0	64.0	123
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	20 µg/L	91.7	75.5	119
EP074G: Trihalomethanes (QCLot: 3250593)								
EP074: Chloroform	67-66-3	5	µg/L	<5	20 µg/L	98.1	80.4	118
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	20 µg/L	100	78.6	115
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	20 µg/L	85.6	77.7	113
EP074: Bromoform	75-25-2	5	µg/L	<5	20 µg/L	80.4	74.2	113
EP074H: Naphthalene (QCLot: 3250593)								
EP074: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	89.9	81.6	116
EP075A: Phenolic Compounds (QCLot: 3250511)								
EP075: Phenol	108-95-2	2	µg/L	<2	10 µg/L	29.9	19.6	48.4
EP075: 2-Chlorophenol	95-57-8	2	µg/L	<2	10 µg/L	63.6	45.4	100
EP075: 2-Methylphenol	95-48-7	2	µg/L	<2	10 µg/L	61.7	41.6	93.8
EP075: 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2	10 µg/L	59.2	36.3	89.8

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075A: Phenolic Compounds (QCLot: 3250511) - continued								
EP075: 2-Nitrophenol	88-75-5	2	µg/L	<2	10 µg/L	81.1	46.4	110
EP075: 2.4-Dimethylphenol	105-67-9	2	µg/L	<2	10 µg/L	62.3	48.6	108
EP075: 2.4-Dichlorophenol	120-83-2	2	µg/L	<2	10 µg/L	72.5	49.3	109
EP075: 2.6-Dichlorophenol	87-65-0	2	µg/L	<2	10 µg/L	61.2	50.6	108
EP075: 4-Chloro-3-methylphenol	59-50-7	2	µg/L	<2	10 µg/L	76.3	48.6	110
EP075: 2.4.6-Trichlorophenol	88-06-2	2	µg/L	<2	10 µg/L	71.1	45.9	113
EP075: 2.4.5-Trichlorophenol	95-95-4	2	µg/L	<2	10 µg/L	72.9	46.0	113
EP075: Pentachlorophenol	87-86-5	4	µg/L	<4	10 µg/L	73.7	14.2	121
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 3250511)								
EP075: Naphthalene	91-20-3	2	µg/L	<2	10 µg/L	66.9	52.2	109
EP075: 2-Methylnaphthalene	91-57-6	2	µg/L	<2	10 µg/L	69.3	52.2	112
EP075: 2-Chloronaphthalene	91-58-7	2	µg/L	<2	10 µg/L	68.5	50.9	113
EP075: Acenaphthylene	208-96-8	2	µg/L	<2	10 µg/L	66.7	53.3	113
EP075: Acenaphthene	83-32-9	2	µg/L	<2	10 µg/L	71.6	53.1	112
EP075: Fluorene	86-73-7	2	µg/L	<2	10 µg/L	82.9	56.0	113
EP075: Phenanthrene	85-01-8	2	µg/L	<2	10 µg/L	86.5	58.2	115
EP075: Anthracene	120-12-7	2	µg/L	<2	10 µg/L	87.3	57.8	115
EP075: Fluoranthene	206-44-0	2	µg/L	<2	10 µg/L	87.2	57.2	117
EP075: Pyrene	129-00-0	2	µg/L	<2	10 µg/L	86.9	52.3	119
EP075: N-2-Fluorenyl Acetamide	53-96-3	2	µg/L	<2	10 µg/L	92.0	52.2	122
EP075: Benz(a)anthracene	56-55-3	2	µg/L	<2	10 µg/L	88.4	56.2	118
EP075: Chrysene	218-01-9	2	µg/L	<2	10 µg/L	88.8	56.9	119
EP075: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	4	µg/L	<4	20 µg/L	87.2	56.9	115
EP075: 7.12-Dimethylbenz(a)anthracene	57-97-6	2	µg/L	<2	10 µg/L	86.2	55.7	122
EP075: Benzo(a)pyrene	50-32-8	2	µg/L	<2	10 µg/L	83.1	56.2	116
EP075: 3-Methylcholanthrene	56-49-5	2	µg/L	<2	10 µg/L	95.8	51.6	121
EP075: Indeno(1.2.3.cd)pyrene	193-39-5	2	µg/L	<2	10 µg/L	86.5	55.6	114
EP075: Dibenz(a.h)anthracene	53-70-3	2	µg/L	<2	10 µg/L	83.5	55.5	115
EP075: Benzo(g.h.i)perylene	191-24-2	2	µg/L	<2	10 µg/L	83.0	53.5	116
EP075C: Phthalate Esters (QCLot: 3250511)								
EP075: Dimethyl phthalate	131-11-3	2	µg/L	<2	10 µg/L	84.8	56.4	114
EP075: Diethyl phthalate	84-66-2	2	µg/L	<2	10 µg/L	86.1	58.1	114
EP075: Di-n-butyl phthalate	84-74-2	2	µg/L	<2	10 µg/L	90.6	61.7	120
EP075: Butyl benzyl phthalate	85-68-7	2	µg/L	<2	10 µg/L	92.4	57.3	119
EP075: bis(2-ethylhexyl) phthalate	117-81-7	10	µg/L	<10	10 µg/L	89.8	57.8	114
EP075: Di-n-octylphthalate	117-84-0	2	µg/L	<2	10 µg/L	90.9	58.4	115
EP075D: Nitrosamines (QCLot: 3250511)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075D: Nitrosamines (QCLot: 3250511) - continued								
EP075: N-Nitrosomethylethylamine	10595-95-6	2	µg/L	<2	10 µg/L	52.2	23.9	106
EP075: N-Nitrosodiethylamine	55-18-5	2	µg/L	<2	10 µg/L	65.9	43.7	109
EP075: N-Nitrosopyrrolidine	930-55-2	4	µg/L	<4	10 µg/L	52.4	36.9	81.9
EP075: N-Nitrosomorpholine	59-89-2	2	µg/L	<2	10 µg/L	49.0	33.8	79.9
EP075: N-Nitrosodi-n-propylamine	621-64-7	2	µg/L	<2	10 µg/L	72.2	51.6	113
EP075: N-Nitrosopiperidine	100-75-4	2	µg/L	<2	10 µg/L	81.1	48.9	110
EP075: N-Nitrosodibutylamine	924-16-3	2	µg/L	<2	10 µg/L	61.2	51.8	115
EP075: N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	4	µg/L	<4	10 µg/L	80.9	55.7	113
EP075: Methapyrilene	91-80-5	2	µg/L	<2	10 µg/L	12.7	10.0	147
EP075E: Nitroaromatics and Ketones (QCLot: 3250511)								
EP075: 2-Picoline	109-06-8	2	µg/L	<2	10 µg/L	53.0	18.8	106
EP075: Acetophenone	98-86-2	2	µg/L	<2	10 µg/L	71.2	52.2	110
EP075: Nitrobenzene	98-95-3	2	µg/L	<2	10 µg/L	71.4	48.9	110
EP075: Isophorone	78-59-1	2	µg/L	<2	10 µg/L	70.0	52.7	111
EP075: 2.6-Dinitrotoluene	606-20-2	4	µg/L	<4	10 µg/L	80.3	53.8	115
EP075: 2.4-Dinitrotoluene	121-14-2	4	µg/L	<4	10 µg/L	87.0	53.2	113
EP075: 1-Naphthylamine	134-32-7	2	µg/L	<2	10 µg/L	16.3	10.9	119
EP075: 4-Nitroquinoline-N-oxide	56-57-5	2	µg/L	<2	10 µg/L	28.3	27.3	148
EP075: 5-Nitro-o-toluidine	99-55-8	2	µg/L	<2	10 µg/L	65.2	49.3	119
EP075: Azobenzene	103-33-3	2	µg/L	<2	10 µg/L	82.7	55.4	114
EP075: 1.3.5-Trinitrobenzene	99-35-4	2	µg/L	<2	10 µg/L	94.8	38.2	122
EP075: Phenacetin	62-44-2	2	µg/L	<2	10 µg/L	78.1	45.5	104
EP075: 4-Aminobiphenyl	92-67-1	2	µg/L	<2	10 µg/L	49.9	24.0	149
EP075: Pentachloronitrobenzene	82-68-8	2	µg/L	<2	10 µg/L	83.9	54.0	114
EP075: Pronamide	23950-58-5	2	µg/L	<2	10 µg/L	86.8	58.8	116
EP075: Dimethylaminoazobenzene	60-11-7	2	µg/L	<2	10 µg/L	82.6	52.6	117
EP075: Chlorobenzilate	510-15-6	2	µg/L	<2	10 µg/L	87.8	55.9	118
EP075F: Haloethers (QCLot: 3250511)								
EP075: Bis(2-chloroethyl) ether	111-44-4	2	µg/L	<2	10 µg/L	67.7	48.0	109
EP075: Bis(2-chloroethoxy) methane	111-91-1	2	µg/L	<2	10 µg/L	71.1	51.8	111
EP075: 4-Chlorophenyl phenyl ether	7005-72-3	2	µg/L	<2	10 µg/L	81.1	55.5	113
EP075: 4-Bromophenyl phenyl ether	101-55-3	2	µg/L	<2	10 µg/L	77.5	54.1	114
EP075G: Chlorinated Hydrocarbons (QCLot: 3250511)								
EP075: 1.4-Dichlorobenzene	106-46-7	2	µg/L	<2	10 µg/L	58.7	45.6	105
EP075: 1.3-Dichlorobenzene	541-73-1	2	µg/L	<2	10 µg/L	67.6	45.5	104
EP075: 1.2-Dichlorobenzene	95-50-1	2	µg/L	<2	10 µg/L	63.8	46.4	106
EP075: Hexachloroethane	67-72-1	2	µg/L	<2	10 µg/L	68.4	43.8	106

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075G: Chlorinated Hydrocarbons (QCLot: 3250511) - continued								
EP075: 1.2.4-Trichlorobenzene	120-82-1	2	µg/L	<2	10 µg/L	67.2	45.9	109
EP075: Hexachloropropylene	1888-71-7	2	µg/L	<2	10 µg/L	70.0	41.8	112
EP075: Hexachlorobutadiene	87-68-3	2	µg/L	<2	10 µg/L	61.8	47.8	110
EP075: Hexachlorocyclopentadiene	77-47-4	10	µg/L	<10	10 µg/L	58.4	13.3	129
EP075: Pentachlorobenzene	608-93-5	2	µg/L	<2	10 µg/L	69.1	53.6	112
EP075: Hexachlorobenzene (HCB)	118-74-1	4	µg/L	<4	10 µg/L	81.0	54.8	114
EP075H: Anilines and Benzidines (QCLot: 3250511)								
EP075: Aniline	62-53-3	2	µg/L	<2	10 µg/L	54.1	30.2	108
EP075: 4-Chloroaniline	106-47-8	2	µg/L	<2	10 µg/L	40.9	14.5	126
EP075: 2-Nitroaniline	88-74-4	4	µg/L	<4	10 µg/L	72.9	50.8	111
EP075: 3-Nitroaniline	99-09-2	4	µg/L	<4	10 µg/L	66.8	34.2	119
EP075: Dibenzofuran	132-64-9	2	µg/L	<2	10 µg/L	75.2	55.3	112
EP075: 4-Nitroaniline	100-01-6	2	µg/L	<2	10 µg/L	69.2	40.9	116
EP075: Carbazole	86-74-8	2	µg/L	<2	10 µg/L	85.7	57.1	118
EP075: 3.3`-Dichlorobenzidine	91-94-1	2	µg/L	<2	10 µg/L	112	50.2	137
EP075I: Organochlorine Pesticides (QCLot: 3250511)								
EP075: alpha-BHC	319-84-6	2	µg/L	<2	10 µg/L	80.1	55.6	114
EP075: beta-BHC	319-85-7	2	µg/L	<2	10 µg/L	55.2	55.2	115
EP075: gamma-BHC	58-89-9	2	µg/L	<2	10 µg/L	82.6	56.0	115
EP075: delta-BHC	319-86-8	2	µg/L	<2	10 µg/L	87.8	56.3	117
EP075: Heptachlor	76-44-8	2	µg/L	<2	10 µg/L	91.3	54.1	117
EP075: Aldrin	309-00-2	2	µg/L	<2	10 µg/L	90.0	54.4	117
EP075: Heptachlor epoxide	1024-57-3	2	µg/L	<2	10 µg/L	87.8	53.9	119
EP075: alpha-Endosulfan	959-98-8	2	µg/L	<2	10 µg/L	90.4	55.8	120
EP075: 4.4`-DDE	72-55-9	2	µg/L	<2	10 µg/L	86.8	56.7	121
EP075: Dieldrin	60-57-1	2	µg/L	<2	10 µg/L	86.8	55.6	118
EP075: Endrin	72-20-8	2	µg/L	<2	10 µg/L	94.6	51.8	121
EP075: beta-Endosulfan	33213-65-9	2	µg/L	<2	10 µg/L	85.8	55.3	119
EP075: 4.4`-DDD	72-54-8	2	µg/L	<2	10 µg/L	89.4	56.4	120
EP075: Endosulfan sulfate	1031-07-8	2	µg/L	<2	10 µg/L	96.7	51.8	125
EP075: 4.4`-DDT	50-29-3	4	µg/L	<4	10 µg/L	106	42.7	127
EP075J: Organophosphorus Pesticides (QCLot: 3250511)								
EP075: Dichlorvos	62-73-7	2	µg/L	<2	10 µg/L	78.7	53.5	113
EP075: Dimethoate	60-51-5	2	µg/L	<2	10 µg/L	87.9	40.5	110
EP075: Diazinon	333-41-5	2	µg/L	<2	10 µg/L	86.5	57.9	118
EP075: Chlorpyrifos-methyl	5598-13-0	2	µg/L	<2	10 µg/L	88.1	54.9	118
EP075: Malathion	121-75-5	2	µg/L	<2	10 µg/L	92.2	56.3	126
EP075: Fenthion	55-38-9	2	µg/L	<2	10 µg/L	85.4	56.1	119

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075J: Organophosphorus Pesticides (QCLot: 3250511) - continued								
EP075: Chlorpyrifos	2921-88-2	2	µg/L	<2	10 µg/L	86.4	57.1	118
EP075: Pirimphos-ethyl	23505-41-1	2	µg/L	<2	10 µg/L	88.7	57.4	118
EP075: Chlorfenvinphos	470-90-6	2	µg/L	<2	10 µg/L	92.5	52.1	122
EP075: Prothiofos	34643-46-4	2	µg/L	<2	10 µg/L	92.5	56.8	118
EP075: Ethion	563-12-2	2	µg/L	<2	10 µg/L	94.1	56.4	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3250508)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3330 µg/L	95.2	44.8	125
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16500 µg/L	88.0	51.3	135
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7800 µg/L	90.3	49.4	134
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3250594)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	103	65.5	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3250508)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5690 µg/L	81.6	47.3	129
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	20700 µg/L	92.0	50.4	133
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1510 µg/L	92.6	45.2	136
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3250594)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	100	64.3	126
EP080: BTEXN (QCLot: 3250594)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	107	69.8	124
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	102	73.6	126
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	110	72.0	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	107	71.5	132
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	106	76.5	132
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	102	70.5	127

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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3250710)							
EM2015606-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	91 2	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3250708)							
EM2015581-004	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	110	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3250946)							
EM2015606-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	98 8	85.0	131
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	87.4	81.0	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	91.4	71.0	135
		EG020A-F: Copper	7440-50-8	0.2 mg/L	98 8	76.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	91.4	75.0	133
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	96 9	73.0	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	100	75.0	131
EG020T: Total Metals by ICP-MS (QCLot: 3250478)							
EM2015235-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	103	82.0	118
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	102	75.0	129
		EG020A-T: Chromium	7440-47-3	1 mg/L	90.4	80.0	118
		EG020A-T: Copper	7440-50-8	1 mg/L	97.6	81.0	115
		EG020A-T: Lead	7439-92-1	1 mg/L	96 5	83.0	121
		EG020A-T: Nickel	7440-02-0	1 mg/L	95 9	80.0	118
		EG020A-T: Zinc	7440-66-6	1 mg/L	100	74.0	116
EG035F: Dissolved Mercury by FIMS (QCLot: 3250945)							
EM2015578-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	# 62.6	70.0	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3252252)							
EM2015604-004	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	90.6	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3250520)							
EM2015459-002	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	# Not Determined	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3250706)							
EM2015596-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	101	80.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3250519)							
EM2015459-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	84.6	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3252397)							
EM2015597-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	104	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3252396)							
EM2015597-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	73.6	70.0	130
EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QCLot: 3252098)							
EM2015596-002	Anonymous	EP026SP: Chemical Oxygen Demand	----	250 mg/L	89 8	70.0	130
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3250593)							
EM2015619-001	Anonymous	EP074: Benzene	71-43-2	20 µg/L	116	60.0	128
		EP074: Toluene	108-88-3	20 µg/L	88 2	64.0	132

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP074E: Halogenated Aliphatic Compounds (QCLot: 3250593)							
EM2015619-001	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	20 µg/L	78.6	40.0	124
		EP074: Trichloroethene	79-01-6	20 µg/L	95 9	54.0	126
EP074F: Halogenated Aromatic Compounds (QCLot: 3250593)							
EM2015619-001	Anonymous	EP074: Chlorobenzene	108-90-7	20 µg/L	98.4	68.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3250508)							
EM2015452-002	Anonymous	EP071: C10 - C14 Fraction	----	3330 µg/L	94 0	50.0	130
		EP071: C15 - C28 Fraction	----	16500 µg/L	81.4	54.0	136
		EP071: C29 - C36 Fraction	----	7800 µg/L	82.7	50.0	142
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3250594)							
EM2015619-001	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	93.7	43.0	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3250508)							
EM2015452-002	Anonymous	EP071: >C10 - C16 Fraction	----	5690 µg/L	78 2	50.0	128
		EP071: >C16 - C34 Fraction	----	20700 µg/L	84 8	50.0	150
		EP071: >C34 - C40 Fraction	----	1510 µg/L	84 8	51.0	159
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3250594)							
EM2015619-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	90 5	44.0	122
EP080: BTEXN (QCLot: 3250594)							
EM2015619-001	Anonymous	EP080: Benzene	71-43-2	20 µg/L	107	68.0	130
		EP080: Toluene	108-88-3	20 µg/L	106	72.0	132

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2015608**	Page	: 1 of 13
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 10-Sep-2020
Site	: ----	Issue Date	: 16-Sep-2020
Sampler	: MM	No. of samples received	: 5
Order number	: ----	No. of samples analysed	: 5

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.**
- **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 D	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG035F: Dissolved Mercury by FIMS	EM2015578--002	Anonymous	**Mercury**	7439-97-6	62.6 %	70.0-120%	**Recovery less than lower data quality objective**
EK055G: Ammonia as N by Discrete Analyser	EM2015459--002	Anonymous	**Ammonia as N**	7664-41-7	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample D(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						
BH09, QC01, QC03	----	----	----	11-Sep-2020	09-Sep-2020	**2**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Polychlorinated Biphenyls (PCB)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	20	5.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Chloride by Discrete Analyser	1	21	4.76	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	0	1	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; o hers 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

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) BH09, QC01, QC03	**09-Sep-2020**	**----**	----	----	**11-Sep-2020**	09-Sep-2020	×
Clear Plastic Bottle - Natural (EA005-P) BH22	**10-Sep-2020**	**----**	----	----	**10-Sep-2020**	10-Sep-2020	✓
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) BH09, QC01, QC03	**09-Sep-2020**	**----**	----	----	**11-Sep-2020**	07-Oct-2020	✓
Clear Plastic Bottle - Natural (EA010-P) BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	08-Oct-2020	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) BH09, QC01, QC03	**09-Sep-2020**	**----**	----	----	**11-Sep-2020**	16-Sep-2020	✓
Clear Plastic Bottle - Natural (EA015H) BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	17-Sep-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H) BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	17-Sep-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) BH09, QC01, QC03	**09-Sep-2020**	**----**	----	----	**11-Sep-2020**	23-Sep-2020	✓
Clear Plastic Bottle - Natural (ED037-P) BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	24-Sep-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) BH09, QC01, QC03	**09-Sep-2020**	**----**	----	----	**11-Sep-2020**	07-Oct-2020	✓
Clear Plastic Bottle - Natural (ED041G) BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	08-Oct-2020	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) BH09, QC01, QC03	**09-Sep-2020**	**----**	----	----	**11-Sep-2020**	07-Oct-2020	✓
Clear Plastic Bottle - Natural (ED045G) BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	08-Oct-2020	✓

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
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
QC03	**09-Sep-2020**	**----**	----	----	**14-Sep-2020**	16-Sep-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH09, QC01	**09-Sep-2020**	**----**	----	----	**14-Sep-2020**	07-Oct-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH22	**10-Sep-2020**	**----**	----	----	**14-Sep-2020**	08-Oct-2020	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH09, QC01	**09-Sep-2020**	**----**	----	----	**11-Sep-2020**	08-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	09-Mar-2021	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
QC03	**09-Sep-2020**	**11-Sep-2020**	08-Mar-2021	✓	**11-Sep-2020**	08-Mar-2021	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH09, QC01	**09-Sep-2020**	**----**	----	----	**11-Sep-2020**	07-Oct-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	08-Oct-2020	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)							
QC03	**09-Sep-2020**	**----**	----	----	**11-Sep-2020**	07-Oct-2020	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH09, QC01, QC03	**09-Sep-2020**	**----**	----	----	**11-Sep-2020**	07-Oct-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	08-Oct-2020	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH09, QC01, QC03	**09-Sep-2020**	**----**	----	----	**11-Sep-2020**	11-Sep-2020	✓
Clear Plastic Bottle - Natural (EK057G)							
BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	12-Sep-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH09, QC01, QC03	**09-Sep-2020**	**----**	----	----	**11-Sep-2020**	07-Oct-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	08-Oct-2020	✓

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
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH09, QC01, QC03	**09-Sep-2020**	**11-Sep-2020**	07-Oct-2020	✓	**14-Sep-2020**	07-Oct-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH22	**10-Sep-2020**	**11-Sep-2020**	08-Oct-2020	✓	**14-Sep-2020**	08-Oct-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH09, QC01, QC03	**09-Sep-2020**	**11-Sep-2020**	07-Oct-2020	✓	**14-Sep-2020**	07-Oct-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH22	**10-Sep-2020**	**11-Sep-2020**	08-Oct-2020	✓	**14-Sep-2020**	08-Oct-2020	✓
EP020: Oil and Grease (O&G)							
Amber Glass Bottle - Sulfuric Acid (EP020)							
BH22	**10-Sep-2020**	**----**	----	----	**15-Sep-2020**	08-Oct-2020	✓
EP026SP: Chemical Oxygen Demand (Spectrophotometric)							
Clear Plastic Bottle - Sulfuric Acid (EP026SP)							
BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	08-Oct-2020	✓
EP030: Biochemical Oxygen Demand (BOD)							
Clear Plastic Bottle - Natural (EP030)							
BH22	**10-Sep-2020**	**----**	----	----	**10-Sep-2020**	12-Sep-2020	✓
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066)							
BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓
EP074A: Monocyclic Aromatic Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP074)							
QC04	**09-Sep-2020**	**11-Sep-2020**	23-Sep-2020	✓	**11-Sep-2020**	23-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074)							
BH22	**10-Sep-2020**	**11-Sep-2020**	24-Sep-2020	✓	**11-Sep-2020**	24-Sep-2020	✓
EP074B: Oxygenated Compounds							
Amber VOC Vial - Sulfuric Acid (EP074)							
QC04	**09-Sep-2020**	**11-Sep-2020**	23-Sep-2020	✓	**11-Sep-2020**	23-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074)							
BH22	**10-Sep-2020**	**11-Sep-2020**	24-Sep-2020	✓	**11-Sep-2020**	24-Sep-2020	✓
EP074C: Sulfonated Compounds							
Amber VOC Vial - Sulfuric Acid (EP074)							
QC04	**09-Sep-2020**	**11-Sep-2020**	23-Sep-2020	✓	**11-Sep-2020**	23-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074)							
BH22	**10-Sep-2020**	**11-Sep-2020**	24-Sep-2020	✓	**11-Sep-2020**	24-Sep-2020	✓

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
EP074D: Fumigants							
Amber VOC Vial - Sulfuric Acid (EP074) QC04	**09-Sep-2020**	**11-Sep-2020**	23-Sep-2020	✓	**11-Sep-2020**	23-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074) BH22	**10-Sep-2020**	**11-Sep-2020**	24-Sep-2020	✓	**11-Sep-2020**	24-Sep-2020	✓
EP074E: Halogenated Aliphatic Compounds							
Amber VOC Vial - Sulfuric Acid (EP074) QC04	**09-Sep-2020**	**11-Sep-2020**	23-Sep-2020	✓	**11-Sep-2020**	23-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074) BH22	**10-Sep-2020**	**11-Sep-2020**	24-Sep-2020	✓	**11-Sep-2020**	24-Sep-2020	✓
EP074F: Halogenated Aromatic Compounds							
Amber VOC Vial - Sulfuric Acid (EP074) QC04	**09-Sep-2020**	**11-Sep-2020**	23-Sep-2020	✓	**11-Sep-2020**	23-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074) BH22	**10-Sep-2020**	**11-Sep-2020**	24-Sep-2020	✓	**11-Sep-2020**	24-Sep-2020	✓
EP074G: Trihalomethanes							
Amber VOC Vial - Sulfuric Acid (EP074) QC04	**09-Sep-2020**	**11-Sep-2020**	23-Sep-2020	✓	**11-Sep-2020**	23-Sep-2020	✓
Amber VOC Vial - Sulfuric Acid (EP074) BH22	**10-Sep-2020**	**11-Sep-2020**	24-Sep-2020	✓	**11-Sep-2020**	24-Sep-2020	✓
EP074H: Naphthalene							
Amber VOC Vial - Sulfuric Acid (EP074) QC04	**09-Sep-2020**	**11-Sep-2020**	23-Sep-2020	✓	**11-Sep-2020**	23-Sep-2020	✓
EP075A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075) BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓
EP075B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075) BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓
EP075C: Phthalate Esters							
Amber Glass Bottle - Unpreserved (EP075) BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓
EP075D: Nitrosamines							
Amber Glass Bottle - Unpreserved (EP075) BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓
EP075E: Nitroaromatics and Ketones							
Amber Glass Bottle - Unpreserved (EP075) BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓
EP075F: Haloethers							
Amber Glass Bottle - Unpreserved (EP075) BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓

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
EP075G: Chlorinated Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075)							
BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓
EP075H: Anilines and Benzidines							
Amber Glass Bottle - Unpreserved (EP075)							
BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓
EP075I: Organochlorine Pesticides							
Amber Glass Bottle - Unpreserved (EP075)							
BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓
EP075J: Organophosphorus Pesticides							
Amber Glass Bottle - Unpreserved (EP075)							
BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH22	**10-Sep-2020**	**11-Sep-2020**	24-Sep-2020	✓	**11-Sep-2020**	24-Sep-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
BH22	**10-Sep-2020**	**11-Sep-2020**	17-Sep-2020	✓	**14-Sep-2020**	21-Oct-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH22	**10-Sep-2020**	**11-Sep-2020**	24-Sep-2020	✓	**11-Sep-2020**	24-Sep-2020	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH22	**10-Sep-2020**	**11-Sep-2020**	24-Sep-2020	✓	**11-Sep-2020**	24-Sep-2020	✓
MM514: E.coli & Total Coliforms MPN by Colilert							
Sterile Plastic Bottle - Sodium Thiosulfate (MM514)							
BH22	**10-Sep-2020**	**----**	----	----	**11-Sep-2020**	11-Sep-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within he 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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	11	**18.18**	**10.00**	✓	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 Mercury by FIMS	EG035T	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	21	**19.05**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Oil and Grease	EP020	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	7	**28.57**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	11	**18.18**	**10.00**	✓	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 Mercury by FIMS	EG035T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	11	**9.09**	**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 Mercury by FIMS	EG035T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	7	**14.29**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Chloride by Discrete Analyser	ED045G	1	21	**4.76**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	**14.29**	**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 Mercury by FIMS	EG035T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	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 by PC 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 PC 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 f bre 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)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescr bed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. 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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
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.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. 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.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, 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).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered 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)
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 seperately 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)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM Schedule B(3)
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	WATER	In house: Referenced to APHA 5220 D. Samples are digested with a known excess of an acidic potassium dichromate solution using silver sulfate as a catalyst. The chromium is reduced from the Cr (VI) oxidation state to the Cr (III) state by the oxygen present in the organic material. Both of these chromium species are coloued and absorb in the visible region of (400nm & 600nm) the spectrum. The oxidisable organic matter can be calculated in terms of oxygen equivalents.

Analytical Methods	Method	Matrix	Method Descriptions
Biochemical Oxygen Demand (BOD)	EP030	WATER	In house: Referenced to APHA 5210 B. The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM Schedule B(3).
Polychlorinated Biphenyls (PCB)	EP066	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 - Semivolatile 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-A kane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
Volatile Organic Compounds	EP074	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. This method is compliant with NEPM Schedule B(3)
Semivolatile Organic Compounds	EP075	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 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)
E.coli & Total Coliforms by MPN Colilert	MM514	WATER	Microbiological analysis subcontracted to ALS Scoresby (NATA Accredited Laboratory No. 992).
Anionic Surfactants as MBAS	W-MBAS	WATER	APHA 5540 C. Analysis subcontracted to ALS Scoresby (NATA Accredited Laboratory No. 992).

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)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. 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 sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EM2015608**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Me bourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Facsimile	: [redacted]	Facsimile	: [redacted]
Project	: 12529997	Page	: 1 of 3
Order number	: ----	Quote number	: EM2020GHDSER0037 (ME/458/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: MM		

Dates

Date Samples Received	: 10-Sep-2020 16:30	Issue Date	: 10-Sep-2020
Client Requested Due Date	: 15-Sep-2020	Scheduled Reporting Date	: **15-Sep-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 2.2°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 5 / 5

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale, ALS Sydney, and ALS Scoresby.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Preliminary results will be available on the scheduled reporting date listed in this report. However the final report with E. coli, O&G, and MBAS analysis will be complete on 18/09/20.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA025H Suspended Solids - Standard Level	WATER - EP020 Oil & Grease (O&G)	WATER - EP026SP Chemical Oxygen Demand (COD)	WATER - EP030 BOD	WATER - MM514 E.coli & Total Coliforms by MPN Colilert	WATER - W-05 TRH/BTEXN/8 Metals	WATER - W-MBAS Anionic Surfactants as MBAS
EM2015608-001	10-Sep-2020 00:00	BH22	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005P pH (PCT)	WATER - EA010P Electrical Conductivity (PCT)	WATER - EA015H Total Dissolved Solids - S andard Level	WATER - EP066-PCB-WA Polychlorinated Biphenyls (PCB)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P	WATER - W-23 minus BTEX SVOC/VOC without BTEX
EM2015608-001	10-Sep-2020 00:00	BH22	✓	✓	✓	✓	✓	✓	✓
EM2015608-002	09-Sep-2020 00:00	BH09	✓	✓	✓		✓	✓	
EM2015608-003	09-Sep-2020 00:00	QC01	✓	✓	✓		✓	✓	
EM2015608-004	09-Sep-2020 00:00	QC03	✓	✓	✓		✓	✓	

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EP074 (water) Volatile Organ c Compounds	WATER - W-02 8 Metals	WATER - W-02T 8 metals (Total)
EM2015608-002	09-Sep-2020 00:00	BH09		✓	
EM2015608-003	09-Sep-2020 00:00	QC01		✓	
EM2015608-004	09-Sep-2020 00:00	QC03			✓
EM2015608 005	09 ep 2020 00 00	QC04	✓		

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

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

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
BH09	Clear Plastic Bottle - Natural	----	09-Sep-2020	10-Sep-2020	✘	----	----
QC01	Clear Plastic Bottle - Natural	----	09-Sep-2020	10-Sep-2020	✘	----	----
QC03	Clear Plastic Bottle - Natural	----	09-Sep-2020	10-Sep-2020	✘	----	----

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV) Email accountspayableAU@ghd.com

[redacted]

- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ENMRG (ENMRG) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]
- Electronic SRN for ESdat (ESRN_ESDAT) Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ENMRG (ENMRG) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]
- Electronic SRN for ESdat (ESRN_ESDAT) Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ENMRG (ENMRG) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]
- Electronic SRN for ESdat (ESRN_ESDAT) Email [redacted]

CHAIN OF CUSTODY

GHD

GHD Melbourne
180 Lonsdale Street, Melbourne 3000
Telephone: 61 3 8687 8000 Facsimile: 61 3 8687 8111

Page

Environmental Division
Melbourne
Work Order Reference
EM2015608

Telephone : + 61-3-8549 9600

Job Number	GHD Office	Laboratory:	ALS Springvale
12529997	Melbourne	Address:	2 - 4 Westall Rd, Springavale
Project: WORM		Lab Contact:	[redacted]
GHD Contact: [redacted]	Contact Email: [redacted]		
TAT: ~~Normal~~ 3 days	Quote No./GHD Reference: ME/458/20		

PLEASE NOT
- Sign white c
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- On receipt of s white copy anc
- On completion Pink copy is retu
- E-mail results to the GHD Contact with the GHD Job Number in the e-mail subject line
Results to be provided in ESDAT compatible format

Sample I.D.		Date	Time	Composite Sample	Sample Matrix (Solid, Water, Oil, Sludge, Soil, Air, Biota)	Preservative	Container Type (Plastic, Glass, Bag, Bottle, Vial, Jar)	Number	Routine (Yes)	Analyses Required: E coli; TSS, BOD, COD; Asbestos*; Oil and Grease Surfactants (MBAS); General Enviro. Screen*; pH, EC; Salinity (mg/L TDS); Major Ions; Sulfate as SO4; Total phosphorus; Metals, screen; Ammonia, Nitrate; Nitrite, TKN; Total nitrogen	Remarks
BH22	1	10.9.2020			GW			10		X X X X X X X X X X X X	
BH09	2	9.9.2020						3		X X X X X X X X	
QC01	3										
QC02	—										Please forward onto Eurofins, MGT
QC03	4				RB						
QC04	5				TB			1		X	

Received: Fri 10/9/20 C 16:30
Carrier
Cnote:
Temp: 2.2 °C Seal: Y / N
Ice / Icebricks / NA

ALS

NOTES:

Sampled by:	MM	Date/Time:	9-10.9.2020	Relinquished by:	MM	Date/Time:	10.9.2020, 15:30
Received by:		Date/Time:		Relinquished by:		Date/Time:	
Received by Courier:		Date/Time:		Relinquished by:		Date/Time:	
Received by Lab:		Date/Time:					
Remarks:	*pesticides (OCPs), SVOCs and VOCs, TPH, MAH, PAHs, PCBs						

Fri 10/9/20 16:30.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2019188**	Page	: 1 of 13
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 1252999708	Date Samples Received	: 30-Oct-2020 15:40
Order number	: 1252999708	Date Analysis Commenced	: 30-Oct-2020
C-O-C number	: ----	Issue Date	: 05-Nov-2020 17:12
Sampler	: ADW		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 6		
No. of samples analysed	: 6		

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. 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.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
[redacted]	Senior Inorganic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	Laboratory Coordinator	WRG Subcontracting, Springvale, VIC
[redacted]	Senior Organic Chemist	Me bourne Organics, Springvale, VIC

General Comments

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

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

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

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

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

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

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

- EP231X-LL: Particular sample (EM2019188-002), LOR has been raised for 6:2 FTS due to laboratory background level.
- EP231X-LL: Particular sample (EM2019188-003), LOR has been raised for PFHxS due to laboratory background level.
- EG050G-F: EM2019188 #5 Hexavalent chromium results may be biased high compared to Dissolved Chromium filtered as sample were not field filtered prior to sample preservation.
- EP026SP - EM2019188#5 ; sample required dilution prior to analyse due to matrix interfernces. LOR values have bee adjusted accoridingly.
- EA010-P: Electrical Conductivity @ 25°C was analysed by manual method (EA010).
- 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.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of he 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.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP074: Where reported, Total Trihalomethanes is the sum of the reported concentrations of all Trihalomethanes at or above the LOR.
- EP074: Where reported, Total Trimethylbenzenes is the sum of the reported concentrations of 1.2.3-Trimethylbenzene, 1.2.4-Trimethylbenzene and 1.3.5-Trimethylbenzene 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.
- EP030: The DO depletion for EM2019188 #5 is less than 2mg/L, this indicates that the sample has been over diluted and the BOD is less than 8 mg/L. The BOD result reported was estimated from the lowest dilution.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- E.coli & Total Coliforms by MPN (MM514) is conducted by ALS Scoresby NATA accreditation no. 992, site no. 989.
- MBAS (W-MBAS)is conducted by ALS Scoresby NATA accreditation no. 992, site no. 989.
- 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.

- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at ini ial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WORMBH23a	WORMBH22	Deep Creek	Jacksons Ck	WORMBH15
			Client sampling date / time	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00
Compound	CAS Number	LOR	Unit	EM2019188-001	EM2019188-002	EM2019188-003	EM2019188-004	EM2019188-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.22	7.26	7.75	7.54	6.83
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	7030	7350	731	540	8560
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	4570	4780	475	351	5560
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	----	----	----	----	5
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	578	414	107	86	1660
Total Alkalinity as CaCO3	----	1	mg/L	578	414	107	86	1660
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	403	563	8	22	11
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	1660	1780	165	103	1900
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	105	114	13	9	185
Magnesium	7439-95-4	1	mg/L	225	268	25	14	316
Sodium	7440-23-5	1	mg/L	935	1040	76	66	1100
Potassium	7440-09-7	1	mg/L	31	25	3	6	49
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	----	----	----	0.001
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	----	0.0001
Chromium	7440-47-3	0.001	mg/L	----	----	----	----	<0.001
Copper	7440-50-8	0.001	mg/L	----	----	----	----	0.018
Lead	7439-92-1	0.001	mg/L	----	----	----	----	<0.001
Molybdenum	7439-98-7	0.001	mg/L	----	----	----	----	0.002
Nickel	7440-02-0	0.001	mg/L	----	----	----	----	0.083
Selenium	7782-49-2	0.01	mg/L	----	----	----	----	<0.01
Silver	7440-22-4	0.001	mg/L	----	----	----	----	<0.001
Tin	7440-31-5	0.001	mg/L	----	----	----	----	0.001
Zinc	7440-66-6	0.005	mg/L	----	----	----	----	0.118
EG035F: Dissolved Mercury by FIMS								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WORMBH23a	WORMBH22	Deep Creek	Jacksons Ck	WORMBH15
				Client sampling date / time	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00
Compound	CAS Number	LOR	Unit		EM2019188-001	EM2019188-002	EM2019188-003	EM2019188-004	EM2019188-005
					Result	Result	Result	Result	Result
EG035F: Dissolved Mercury by FIMS - Continued									
Mercury	7439-97-6	0.0001	mg/L		----	----	----	----	<0.0001
EG050F: Dissolved Hexavalent Chromium									
Hexavalent Chromium	18540-29-9	0.01	mg/L		----	----	----	----	<0.01
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		----	----	----	----	**0.4**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		----	----	**0.01**	**0.03**	**1.87**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		----	----	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		----	----	**0.05**	**0.51**	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		----	----	**0.05**	**0.51**	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	----	**0.7**	**0.7**	**1.9**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		----	----	**0.8**	**1.2**	**1.9**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		----	----	**0.07**	**0.11**	**0.09**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**66.8**	**70.2**	**6.96**	**5.08**	**87.0**
ø Total Cations	----	0.01	meq/L		**65.2**	**73.6**	**6.09**	**4.62**	**84.3**
ø Ionic Balance	----	0.01	%		**1.17**	**2.38**	**6.67**	**4.70**	**1.55**
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		----	----	----	----	<5
EP026SP: Chemical Oxygen Demand (Spectrophotometric)									
Chemical Oxygen Demand	----	10	mg/L		----	----	----	----	<20
EP030: Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	----	2	mg/L		----	----	----	----	<8
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		----	----	----	----	<1
EP074A: Monocyclic Aromatic Hydrocarbons									
Styrene	100-42-5	5	µg/L		----	----	----	----	<5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WORMBH23a	WORMBH22	Deep Creek	Jacksons Ck	WORMBH15
				Client sampling date / time	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00
Compound	CAS Number	LOR	Unit		EM2019188-001	EM2019188-002	EM2019188-003	EM2019188-004	EM2019188-005
					Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds									
Vinyl chloride	75-01-4	50	µg/L		----	----	----	----	<50
1.1-Dichloroethene	75-35-4	5	µg/L		----	----	----	----	<5
Methylene chloride	75-09-2	5	µg/L		----	----	----	----	<5
trans-1.2-Dichloroethene	156-60-5	5	µg/L		----	----	----	----	<5
cis-1.2-Dichloroethene	156-59-2	5	µg/L		----	----	----	----	<5
1.1.1-Trichloroethane	71-55-6	5	µg/L		----	----	----	----	<5
Carbon Tetrachloride	56-23-5	5	µg/L		----	----	----	----	<5
1.2-Dichloroethane	107-06-2	5	µg/L		----	----	----	----	<5
Trichloroethene	79-01-6	5	µg/L		----	----	----	----	<5
1.1.2-Trichloroethane	79-00-5	5	µg/L		----	----	----	----	<5
Tetrachloroethene	127-18-4	5	µg/L		----	----	----	----	<5
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L		----	----	----	----	<5
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L		----	----	----	----	<5
Hexachlorobutadiene	87-68-3	5	µg/L		----	----	----	----	<5
EP074F: Halogenated Aromatic Compounds									
Chlorobenzene	108-90-7	5	µg/L		----	----	----	----	<5
1.4-Dichlorobenzene	106-46-7	5	µg/L		----	----	----	----	<5
1.2-Dichlorobenzene	95-50-1	5	µg/L		----	----	----	----	<5
1.2.4-Trichlorobenzene	120-82-1	5	µg/L		----	----	----	----	<5
EP074G: Trihalomethanes									
Chloroform	67-66-3	5	µg/L		----	----	----	----	<5
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		----	----	----	----	<1.0
Acenaphthylene	208-96-8	1.0	µg/L		----	----	----	----	<1.0
Acenaphthene	83-32-9	1.0	µg/L		----	----	----	----	<1.0
Fluorene	86-73-7	1.0	µg/L		----	----	----	----	<1.0
Phenanthrene	85-01-8	1.0	µg/L		----	----	----	----	<1.0
Anthracene	120-12-7	1.0	µg/L		----	----	----	----	<1.0
Fluoranthene	206-44-0	1.0	µg/L		----	----	----	----	<1.0
Pyrene	129-00-0	1.0	µg/L		----	----	----	----	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L		----	----	----	----	<1.0
Chrysene	218-01-9	1.0	µg/L		----	----	----	----	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		----	----	----	----	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		----	----	----	----	<1.0

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WORMBH23a	WORMBH22	Deep Creek	Jacksons Ck	WORMBH15
				Client sampling date / time	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00
Compound	CAS Number	LOR	Unit		EM2019188-001	EM2019188-002	EM2019188-003	EM2019188-004	EM2019188-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(a)pyrene	50-32-8	0.5	µg/L		----	----	----	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		----	----	----	----	<1.0
Dibenz(a h)anthracene	53-70-3	1.0	µg/L						<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		----	----	----	----	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L						<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		----	----	----	----	<0.5
EP075A: Phenolic Compounds (Halogenated)									
2-Chlorophenol	95-57-8	2	µg/L		----	----	----	----	<2
2.4-Dichlorophenol	120-83-2	2	µg/L		----	----	----	----	<2
2.6-Dichlorophenol	87-65-0	2	µg/L		----	----	----	----	<2
4-Chloro-3-methylphenol	59-50-7	4	µg/L		----	----	----	----	<4
2.4.5-Trichlorophenol	95-95-4	2	µg/L		----	----	----	----	<2
2.4.6-Trichlorophenol	88-06-2	2	µg/L		----	----	----	----	<2
2.3.5.6-Tetrachlorophenol	935-95-5	2	µg/L		----	----	----	----	<2
2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/58-90-2	2	µg/L		----	----	----	----	<2
Pentachlorophenol	87-86-5	2	µg/L		----	----	----	----	<2
Sum of Phenols (halogenated)	----	2	µg/L		----	----	----	----	<2
EP075A: Phenolic Compounds (Non-halogenated)									
Phenol	108-95-2	4	µg/L		----	----	----	----	<4
2-Methylphenol	95-48-7	4	µg/L		----	----	----	----	<4
3- & 4-Methylphenol	1319-77-3	4	µg/L		----	----	----	----	<4
2-Nitrophenol	88-75-5	4	µg/L		----	----	----	----	<4
2.4-Dimethylphenol	105-67-9	4	µg/L		----	----	----	----	<4
2.4-Dinitrophenol	51-28-5	100	µg/L		----	----	----	----	<100
4-Nitrophenol	100-02-7	50	µg/L		----	----	----	----	<50
2-Methyl-4.6-dinitrophenol	8071-51-0	50	µg/L		----	----	----	----	<50
Dinoseb	88-85-7	50	µg/L		----	----	----	----	<50
2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	50	µg/L		----	----	----	----	<50
Sum of Phenols (non-halogenated)	----	4	µg/L		----	----	----	----	<4
EP075I: Organochlorine Pesticides									
alpha-BHC	319-84-6	0.5	µg/L		----	----	----	----	<0.5
Heptachlor	76-44-8	0.5	µg/L		----	----	----	----	<0.5
Aldrin	309-00-2	0.5	µg/L		----	----	----	----	<0.5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WORMBH23a	WORMBH22	Deep Creek	Jacksons Ck	WORMBH15
				Client sampling date / time	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00
Compound	CAS Number	LOR	Unit		EM2019188-001	EM2019188-002	EM2019188-003	EM2019188-004	EM2019188-005
					Result	Result	Result	Result	Result
EP075l: Organochlorine Pesticides - Continued									
cis-Chlordane	5103-71-9	0.5	µg/L		----	----	----	----	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		----	----	----	----	<0.5
4.4`-DDE	72-55-9	0.5	µg/L		----	----	----	----	<0.5
Dieldrin	60-57-1	0.5	µg/L		----	----	----	----	<0.5
4 4 DDD	72-54-8	0.5	µg/L						<0.5
4.4`-DDT	50-29-3	0.5	µg/L		----	----	----	----	<0.5
Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		----	----	----	----	<0.5
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		----	----	----	----	<20
C10 - C14 Fraction	----	50	µg/L		----	----	----	----	<50
C15 - C28 Fraction	----	100	µg/L		----	----	----	----	<100
C29 - C36 Fraction	----	50	µg/L		----	----	----	----	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		----	----	----	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		----	----	----	----	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		----	----	----	----	<20
>C10 - C16 Fraction	----	100	µg/L		----	----	----	----	<100
>C16 - C34 Fraction	----	100	µg/L		----	----	----	----	<100
>C34 - C40 Fraction	----	100	µg/L		----	----	----	----	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		----	----	----	----	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		----	----	----	----	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		----	----	----	----	<1
Toluene	108-88-3	2	µg/L		----	----	----	----	<2
Ethylbenzene	100-41-4	2	µg/L		----	----	----	----	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		----	----	----	----	<2
ortho-Xylene	95-47-6	2	µg/L		----	----	----	----	<2
^ Total Xylenes	----	2	µg/L		----	----	----	----	<2
^ Sum of BTEX	----	1	µg/L		----	----	----	----	<1
Naphthalene	91-20-3	5	µg/L		----	----	----	----	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L		<0.002	<0.002	<0.002	**0.006**	<0.002

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Client sample ID	WORMBH23a	WORMBH22	Deep Creek	Jacksons Ck	WORMBH15
				Client sampling date / time	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00
					EM2019188-001	EM2019188-002	EM2019188-003	EM2019188-004	EM2019188-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L		<0.002	<0.002	<0.003	**0.003**	<0.002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L		<0.002	<0.002	<0.002	**0.004**	<0.002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L		<0.002	<0.002	<0.002	**0.004**	<0.002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L		<0.002	<0.002	<0.002	**0.003**	<0.002
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WORMBH23a	WORMBH22	Deep Creek	Jacksons Ck	WORMBH15
				Client sampling date / time	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00
Compound	CAS Number	LOR	Unit		EM2019188-001	EM2019188-002	EM2019188-003	EM2019188-004	EM2019188-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L		<0.002	<0.002	<0.002	<0.002	<0.002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L		<0.005	<0.008	<0.005	<0.005	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L		<0.005	<0.005	<0.005	<0.005	<0.005
EP231P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L		<0.002	<0.002	<0.002	**0.020**	<0.002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L		<0.002	<0.002	<0.002	**0.007**	<0.002
Sum of PFAS (WA DER List)	----	0.002	µg/L		<0.002	<0.002	<0.002	**0.020**	<0.002
MM514: E.coli & Total Coliforms MPN by Colilert									
Escherichia coli (Colilert)	----	1	orgs/100mL		----	----	----	----	**3**
Subcontracted Analysis: MBAS									
Anionic Surfactants as MBAS	----	0.05	mg/L		----	----	----	----	<0.05
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		----	----	----	----	**66.7**
EP074S: VOC Surrogates									
1.2-Dichloroethane-D4	17060-07-0	5	%		----	----	----	----	**107**
Toluene-D8	2037-26-5	5	%		----	----	----	----	**98.8**
4-Bromofluorobenzene	460-00-4	5	%		----	----	----	----	**108**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		----	----	----	----	**30.6**
2-Chlorophenol-D4	93951-73-6	1.0	%		----	----	----	----	**84.2**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WORMBH23a	WORMBH22	Deep Creek	Jacksons Ck	WORMBH15
				Client sampling date / time	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00	29-Oct-2020 00:00
Compound	CAS Number	LOR	Unit		EM2019188-001	EM2019188-002	EM2019188-003	EM2019188-004	EM2019188-005
					Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued									
2.4.6-Tribromophenol	118-79-6	1.0	%		----	----	----	----	98.8
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		----	----	----	----	84.8
Anthracene-d10	1719-06-8	1.0	%		----	----	----	----	92.0
4-Terphenyl-d14	1718-51-0	1.0	%		----	----	----	----	96.3
EP075S: Acid Extractable Surrogates (Waste Classification)									
Phenol-d6	13127-88-3	0.25	%		----	----	----	----	36.8
2-Chlorophenol-D4	93951-73-6	0.25	%		----	----	----	----	86.7
2.4.6-Tribromophenol	118-79-6	0.25	%		----	----	----	----	93.3
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)									
Nitrobenzene-D5	4165-60-0	0.25	%		----	----	----	----	98.1
1.2-Dichlorobenzene-D4	2199-69-1	0.25	%		----	----	----	----	94.0
2-Fluorobiphenyl	321-60-8	0.25	%		----	----	----	----	103
Anthracene-d10	1719-06-8	0.25	%		----	----	----	----	102
4-Terphenyl-d14	1718-51-0	0.25	%		----	----	----	----	120
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		----	----	----	----	107
Toluene-D8	2037-26-5	2	%		----	----	----	----	95.4
4-Bromofluorobenzene	460-00-4	2	%		----	----	----	----	103
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.002	%		103	98.6	96.8	85.2	87.2
13C8-PFOA	----	0.002	%		101	95.2	102	96.6	102

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	RB01	----	----	----	----
			Client sampling date / time	30-Oct-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2019188-006	--------	--------	--------	--------
				Result	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	41	125
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72	132
Toluene-D8	2037-26-5	77	132
4-Bromofluorobenzene	460-00-4	67	131
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	46
2-Chlorophenol-D4	93951-73-6	23	104
2.4.6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127
EP075S: Acid Extractable Surrogates (Waste Classification)			
Phenol-d6	13127-88-3	13	90
2-Chlorophenol-D4	93951-73-6	42	117
2.4.6-Tribromophenol	118-79-6	52	140
EP075T: Base/Neutral Extractable Surrogates (Waste Classification)			
Nitrobenzene-D5	4165-60-0	49	136
1.2-Dichlorobenzene-D4	2199-69-1	49	128
2-Fluorobiphenyl	321-60-8	57	137
Anthracene-d10	1719-06-8	67	137
4-Terphenyl-d14	1718-51-0	66	136
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2019188**	Page	: 1 of 15
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 1252999708	Date Samples Received	: 30-Oct-2020
Order number	: 1252999708	Date Analysis Commenced	: 30-Oct-2020
C-O-C number	: ----	Issue Date	: 05-Nov-2020
Sampler	: ADW		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 6		
No. of samples analysed	: 6		

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. 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*
[redacted]	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
[redacted]	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	Laboratory Coordinator	WRG Subcontracting, Springvale, VIC
[redacted]	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

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

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	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3339866)									
EM2019114-004	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.44	7.46	0.282	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3339865)									
EM2019111-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1040	1070	3.04	0% - 20%
EM2019111-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2020	2030	0.346	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3339238)									
EM2019139-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	9	10	0.00	No Limit
EM2019183-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	30	28	7.86	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3339863)									
EM2019114-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	7	150	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	758	773	2.01	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	758	773	2.01	0% - 20%
EM2019114-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	660	659	0.216	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	660	659	0.216	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3339345)									
EM2019185-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	10	10	0.00	0% - 50%
EM2019213-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	116	118	1.81	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3339361)									
EM2019073-012	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	409	403	1.44	0% - 20%
EM2019234-022	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	24	26	4.90	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3339343)									
EM2019115-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3960	3980	0.332	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 3339343) - continued									
EM2019158-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	436	435	0.319	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3339362)									
EM2019073-012	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2060	2150	4.38	0% - 20%
EM2019234-022	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	45	44	3.31	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3339189)									
EM2019185-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	3	4	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	3	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	18	18	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EM2019188-001	WORMBH23a	ED093F: Calcium	7440-70-2	1	mg/L	105	110	5.17	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	225	241	6.89	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	935	1010	7.66	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	31	33	7.18	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3339872)									
EM2019115-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	26	26	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	48	47	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	994	994	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	17	17	0.00	0% - 50%
EM2019175-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	151	150	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	334	334	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1170	1180	0.255	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	23	23	0.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3339874)									
EM2019175-010	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0007	0.0007	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.024	0.024	0.00	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.132	0.133	0.918	0% - 20%
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.709	0.716	1.09	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EM2019234-025	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.013	0.013	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.081	0.080	0.00	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.101	0.103	1.63	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3339874) - continued									
EM2019234-025	Anonymous	EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.018	0.017	0.00	0% - 50%
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.114	0.110	3.22	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3339875)									
EM2019188-005	WORMBH15	EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 3339873)									
EM2019115-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2019175-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG050F: Dissolved Hexavalent Chromium (QC Lot: 3345157)									
EM2019188-005	WORMBH15	EG050G-F: Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3339862)									
EM2019109-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	4.5	4.4	2.30	0% - 20%
EM2019114-004	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.1	1.2	0.00	0% - 50%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3341585)									
EM2019122-024	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.14	0.14	0.00	0% - 50%
EM2019188-005	WORMBH15	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.87	1.88	0.00	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3339346)									
EM2019185-004	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EM2019200-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.40	0.40	0.00	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3341586)									
EM2019188-005	WORMBH15	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EM2019318-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3341430)									
EM2019112-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	636	617	2.97	0% - 20%
EM2019115-007	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3341432)									
EM2019188-005	WORMBH15	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.9	1.9	0.00	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3341431)									
EM2019115-007	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.05	0.06	0.00	No Limit
EM2019188-005	WORMBH15	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.09	0.09	0.00	No Limit
EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QC Lot: 3344952)									
EM2019188-005	WORMBH15	EP026SP: Chemical Oxygen Demand	----	10	mg/L	<20	<20	0.00	No Limit
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 3340872)									
EM2019203-001	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	50	53	5.45	0% - 20%
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 3339397)									
EM2019188-005	WORMBH15	EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074E: Halogenated Aliphatic Compounds (QC Lot: 3339397)									
EM2019188-005	WORMBH15	EP074: 1.1-Dichloroe hene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Methylene chloride	75-09-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroe hane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 3339397)									
EM2019188-005	WORMBH15	EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 3339397)									
EM2019188-005	WORMBH15	EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3339398)									
EM2019188-005	WORMBH15	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3339398)									
EM2019188-005	WORMBH15	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3339398)									
EM2019188-005	WORMBH15	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3340824)									
EM2019188-001	WORMBH23a	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3340824) - continued									
EM2019188-001	WORMBH23a	EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3340824)									
EM2019188-001	WORMBH23a	EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3340824)									
EM2019188-001	WORMBH23a	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3340824)									
EM2019188-001	WORMBH23a	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231P: PFAS Sums (QC Lot: 3340824)									
EM2019188-001	WORMBH23a	EP231X-LL: Sum of PFAS	----	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	<0.002	<0.002	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (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 Spike (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 Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 3339865)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.0	85.0	119
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3339238)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.7	90.3	109
				<5	1000 mg/L	98.8	90.3	109
ED037P: Alkalinity by PC Titrator (QCLot: 3339863)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	110	88.0	112
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3339345)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	92.6	85.8	117
				<1	500 mg/L	110	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3339361)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.3	85.8	117
				<1	500 mg/L	110	80.0	120
ED045G: Chloride by Discrete Analyser (QCLot: 3339343)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	104	85.0	122
				<1	1000 mg/L	96.3	85.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 3339362)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	85.0	122
				<1	1000 mg/L	97.7	85.0	122
ED093F: Dissolved Major Cations (QCLot: 3339189)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	107	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	104	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	101	86.7	111
ED093F: Dissolved Major Cations (QCLot: 3339872)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	107	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	104	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.8	86.7	111
EG020F: Dissolved Metals by ICP-MS (QCLot: 3339874)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	88.5	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	83.5	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.7	83.2	105
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.8	83.1	106

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3339874) - continued								
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	84.6	107
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	101	88.3	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.6	84.3	108
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	104	82.3	110
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	97.8	86.7	111
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	86.3	111
EG020F: Dissolved Metals by ICP-MS (QCLot: 3339875)								
EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	0.02 mg/L	101	83.2	113
EG035F: Dissolved Mercury by FIMS (QCLot: 3339873)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.3	71.1	112
EG050F: Dissolved Hexavalent Chromium (QCLot: 3345157)								
EG050G-F: Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	0.5 mg/L	92.2	80.0	120
EK040P: Fluoride by PC Titrator (QCLot: 3339862)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	104	84.3	122
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3341585)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	94.7	88.0	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3339346)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	90.9	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3341586)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	111	90.0	117
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3341430)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	104	70.0	117
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3341432)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	86.2	70.0	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3341431)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	105	71.9	114
EP020: Oil and Grease (O&G) (QCLot: 3343100)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	101	81.0	121
EP026SP: Chemical Oxygen Demand (Spectrophotometric) (QCLot: 3344952)								
EP026SP: Chemical Oxygen Demand	----	10	mg/L	<10	500 mg/L	102	89.7	111
EP030: Biochemical Oxygen Demand (BOD) (QCLot: 3340872)								
EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	198 mg/L	109	77.5	120
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3339231)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	92.9	47.7	124
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 3339397)								
EP074: Styrene	100-42-5	5	µg/L	<5	20 µg/L	103	80.4	117

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 3339397)								
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	200 µg/L	90.3	57.1	135
EP074: 1.1-Dichloroe hene	75-35-4	5	µg/L	<5	20 µg/L	89.2	67.4	123
EP074: Methylene chloride	75-09-2	5	µg/L	<5	20 µg/L	113	83.5	126
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	20 µg/L	93.4	69.2	119
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	20 µg/L	104	78.9	118
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	20 µg/L	91.7	69.2	120
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	20 µg/L	91.2	63.7	120
EP074: 1.2-Dichloroe hane	107-06-2	5	µg/L	<5	20 µg/L	107	82.0	116
EP074: Trichloroethene	79-01-6	5	µg/L	<5	20 µg/L	102	72.9	118
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	20 µg/L	105	84.9	118
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	20 µg/L	100	70.4	118
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	20 µg/L	92.5	77.9	113
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	20 µg/L	124	83.0	125
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	20 µg/L	82.3	62.6	128
EP074F: Halogenated Aromatic Compounds (QCLot: 3339397)								
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	20 µg/L	99.3	81.7	116
EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	20 µg/L	98.8	75.5	119
EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	20 µg/L	98.4	82.0	113
EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	20 µg/L	81.4	64.0	123
EP074G: Trihalomethanes (QCLot: 3339397)								
EP074: Chloroform	67-66-3	5	µg/L	<5	20 µg/L	104	80.4	118
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3339230)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	81.0	41.1	116
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	82.8	47.2	121
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	87.2	47.3	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	87.9	49.4	121
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	90.8	52.5	124
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	86.1	52.3	125
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	90.7	52.4	127
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	84.5	51.3	130
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	97.8	50.0	130
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	87.9	49.6	131
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	86.8	51.5	132
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	90.5	54.0	131
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	87.4	52.3	133
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	92.7	50.4	127
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	94.0	50.0	127

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3339230) - continued								
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	93.9	50.8	128
EP075A: Phenolic Compounds (Halogenated) (QCLot: 3339282)								
EP075-EM: 2-Chlorophenol	95-57-8	2	µg/L	<2	10 µg/L	86.0	47.6	117
EP075-EM: 2.4-Dichlorophenol	120-83-2	2	µg/L	<2	10 µg/L	96.3	46.8	137
EP075-EM: 2.6-Dichlorophenol	87-65-0	2	µg/L	<2	10 µg/L	96.9	45.8	138
EP075-EM: 4-Chloro-3-methylphenol	59-50-7	4	µg/L	<4	10 µg/L	92.3	45.0	116
EP075-EM: 2.4.5-Trichlorophenol	95-95-4	2	µg/L	<2	10 µg/L	94.2	46.0	131
EP075-EM: 2.4.6-Trichlorophenol	88-06-2	2	µg/L	<2	10 µg/L	95.7	44.0	150
EP075-EM: 2.3.5.6-Tetrachlorophenol	935-95-5	2	µg/L	<2	10 µg/L	104	43.5	136
EP075-EM: 2.3.4.5 & 2.3.4.6-Tetrachlorophenol	4901-51-3/5 8-90-2	2	µg/L	<2	20 µg/L	100	39.6	139
EP075-EM: Pentachlorophenol	87-86-5	2	µg/L	<2	20 µg/L	108	33.4	122
EP075A: Phenolic Compounds (Non-halogenated) (QCLot: 3339282)								
EP075-EM: Phenol	108-95-2	4	µg/L	<4	10 µg/L	35.4	18.8	59.6
EP075-EM: 2-Methylphenol	95-48-7	4	µg/L	<4	10 µg/L	81.5	41.3	111
EP075-EM: 3- & 4-Methylphenol	1319-77-3	4	µg/L	<4	20 µg/L	74.0	38.1	105
EP075-EM: 2-Nitrophenol	88-75-5	4	µg/L	<4	10 µg/L	99.6	44.9	120
EP075-EM: 2.4-Dimethylphenol	105-67-9	4	µg/L	<4	10 µg/L	94.6	44.6	129
EP075-EM: 2.4-Dinitrophenol	51-28-5	100	µg/L	<100	50 µg/L	112	24.0	130
EP075-EM: 4-Nitrophenol	100-02-7	50	µg/L	<50	50 µg/L	43.9	19.0	48.8
EP075-EM: 2-Methyl-4.6-dinitrophenol	8071-51-0	50	µg/L	<50	50 µg/L	108	37.0	131
EP075-EM: Dinoseb	88-85-7	50	µg/L	<50	50 µg/L	101	36.9	133
EP075-EM: 2-Cyclohexyl-4.6-Dinitrophenol	131-89-5	50	µg/L	<50	10 µg/L	89.0	44.9	135
EP075I: Organochlorine Pesticides (QCLot: 3339282)								
EP075-EM: alpha-BHC	319-84-6	0.5	µg/L	<0.5	10 µg/L	98.2	44.9	126
EP075-EM: Heptachlor	76-44-8	0.5	µg/L	<0.5	10 µg/L	95.3	46.1	134
EP075-EM: Aldrin	309-00-2	0.5	µg/L	<0.5	10 µg/L	97.4	46.2	133
EP075-EM: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	10 µg/L	98.7	46.1	133
EP075-EM: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	10 µg/L	98.3	45.8	132
EP075-EM: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	10 µg/L	89.8	48.8	137
EP075-EM: Dieldrin	60-57-1	0.5	µg/L	<0.5	10 µg/L	93.6	45.9	130
EP075-EM: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	10 µg/L	108	46.1	135
EP075-EM: 4.4`-DDT	50-29-3	0.5	µg/L	<0.5	10 µg/L	75.2	46.8	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3339229)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	4600 µg/L	93.0	44.8	125
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16100 µg/L	96.7	51.3	135
EP071: C29 - C36 Fraction	----	50	µg/L	<50	8130 µg/L	98.3	49.4	134
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3339398)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3339398) - continued								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	93.4	65.5	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3339229)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	6070 µg/L	93.4	47.3	129
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	21200 µg/L	101	50.4	133
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	97.5	45.2	136
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3339398)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	88.7	64.3	126
EP080: BTEXN (QCLot: 3339398)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	87.2	69.8	124
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	93.5	73.6	126
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	90.9	72.0	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	98.7	71.5	132
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	101	76.5	132
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	76.1	70.5	127
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3340824)								
EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.0222 µg/L	93.3	72.0	130
EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.0235 µg/L	118	71.0	127
EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.0228 µg/L	103	68.0	131
EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.0238 µg/L	116	69.0	134
EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.0232 µg/L	109	65.0	140
EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	0.0241 µg/L	119	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3340824)								
EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	0.125 µg/L	112	73.0	129
EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.025 µg/L	112	72.0	129
EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.025 µg/L	98.4	72.0	129
EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	0.025 µg/L	125	72.0	130
EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.025 µg/L	103	71.0	133
EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.025 µg/L	96.6	69.0	130
EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.025 µg/L	104	71.0	129
EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	0.025 µg/L	110	69.0	133
EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	0.025 µg/L	91.4	72.0	134
EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	0.025 µg/L	94.3	65.0	144
EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	0.0625 µg/L	77.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3340824)								
EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	0.025 µg/L	107	67.0	137
EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	0.0625 µg/L	124	68.0	141

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3340824) - continued								
EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	0.0625 µg/L	111	70.0	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	0.0625 µg/L	78.5	70.0	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	0.0625 µg/L	117	70.0	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	0.025 µg/L	117	65.0	136
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	0.025 µg/L	104	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3340824)								
EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	0.0234 µg/L	110	63.0	143
EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.0238 µg/L	103	64.0	140
EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	0.024 µg/L	111	67.0	138
EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	0.0242 µg/L	92.0	70.0	130
EP231P: PFAS Sums (QCLot: 3340824)								
EP231X-LL: Sum of PFAS	----	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	<0.002	----	----	----	----

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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3339345)							
EM2019185-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	85.6	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3339361)							
EM2019073-013	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3339343)							
EM2019115-002	Anonymous	ED045G: Chloride	16887-00-6	800 mg/L	86 3	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3339362)							
EM2019073-013	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3339874)							
EM2019175-010	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	106	85.0	131
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	102	81.0	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	93 3	71.0	135
		EG020A-F: Copper	7440-50-8	0.2 mg/L	98 9	76.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	101	75.0	133
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	97 8	73.0	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	90.6	75.0	131
EG035F: Dissolved Mercury by FIMS (QCLot: 3339873)							
EM2019115-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	71.6	70.0	120
EK040P: Fluoride by PC Titrator (QCLot: 3339862)							
EM2019101-030	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	104	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3341585)							
EM2019122-025	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	98.4	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3339346)							
EM2019185-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	99 2	80.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3341586)							
EM2019145-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	102	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3341430)							
EM2019112-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	# Not Determined	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3341432)							
EM2019188-006	RB01	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	84.4	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3341431)							
EM2019188-006	RB01	EK067G: Total Phosphorus as P	----	1 mg/L	81 3	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3340824)							
EM2019188-002	WORMBH22	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0222 µg/L	124	72.0	130
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0235 µg/L	98 2	71.0	127
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0228 µg/L	93 8	68.0	131
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0238 µg/L	91 0	69.0	134
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0232 µg/L	90.1	65.0	140
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0241 µg/L	98 2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3340824)							
EM2019188-002	WORMBH22	EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.125 µg/L	87.6	73.0	129
		EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.025 µg/L	82.6	72.0	129
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.025 µg/L	94 5	72.0	129
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.025 µg/L	112	72.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3340824) - continued							
EM2019188-002	WORMBH22	EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.025 µg/L	85 2	71.0	133
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.025 µg/L	91 0	69.0	130
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.025 µg/L	99.7	71.0	129
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.025 µg/L	96.4	69.0	133
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.025 µg/L	96.6	72.0	134
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.025 µg/L	86 2	65.0	144
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0625 µg/L	100	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3340824)							
EM2019188-002	WORMBH22	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.025 µg/L	100	67.0	137
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0625 µg/L	100	68.0	141
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0625 µg/L	99 2	70.0	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0625 µg/L	98.7	70.0	130
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0625 µg/L	95 9	70.0	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.025 µg/L	104	65.0	136
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.025 µg/L	95 5	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3340824)							
EM2019188-002	WORMBH22	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0234 µg/L	95.1	63.0	143
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0238 µg/L	120	64.0	140
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.024 µg/L	87 8	67.0	138
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0242 µg/L	# 65.3	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2019188**	Page	: 1 of 14
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 1252999708	Date Samples Received	: 30-Oct-2020
Site	: ----	Issue Date	: 05-Nov-2020
Sampler	: ADW	No. of samples received	: 6
Order number	: 1252999708	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.**
- **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 D	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EM2019073--013	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EM2019073--013	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	EM2019112--002	Anonymous	**Total Kjeldahl Nitrogen as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EM2019188--002	WORMBH22	**10:2 Fluorotelomer sulfonic acid (10:2 FTS)**	120226-60-0	65.3 %	70.0-130%	**Recovery less than lower data quality objective**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample D(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							
WORMBH23a, Deep Creek, WORMBH15	WORMBH22, Jacksons Ck,	----	----	----	04-Nov-2020	29-Oct-2020	**6**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Biochemical Oxygen Demand (BOD)	1	20	5.00	10.00	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	4	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Chemical Oxygen Demand (COD) (Spectrophotometric)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Discrete Analyser - Dissolved	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Matrix Spikes (MS) - Continued					
TRH - Semivolatile Fraction	0	4	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	0	1	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)							
WORMBH23a, Deep Creek, WORMBH15 / WORMBH22, Jacksons Ck,	**29-Oct-2020**	**----**	----	----	**04-Nov-2020**	29-Oct-2020	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
WORMBH23a, Deep Creek, WORMBH15 / WORMBH22, Jacksons Ck,	**29-Oct-2020**	**----**	----	----	**04-Nov-2020**	26-Nov-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
WORMBH15	**29-Oct-2020**	**----**	----	----	**02-Nov-2020**	05-Nov-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
WORMBH23a, Deep Creek, WORMBH15 / WORMBH22, Jacksons Ck,	**29-Oct-2020**	**----**	----	----	**04-Nov-2020**	12-Nov-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
WORMBH23a, Deep Creek, WORMBH15 / WORMBH22, Jacksons Ck,	**29-Oct-2020**	**----**	----	----	**04-Nov-2020**	26-Nov-2020	✓

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
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
WORMBH23a, WORMBH22, Deep Creek, Jacksons Ck, WORMBH15	**29-Oct-2020**	**----**	----	----	**04-Nov-2020**	26-Nov-2020	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
WORMBH23a, WORMBH22, Deep Creek, Jacksons Ck	**29-Oct-2020**	**----**	----	----	**02-Nov-2020**	05-Nov-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
WORMBH15	**29-Oct-2020**	**----**	----	----	**04-Nov-2020**	26-Nov-2020	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)							
WORMBH15	**29-Oct-2020**	**----**	----	----	**02-Nov-2020**	27-Apr-2021	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
WORMBH15	**29-Oct-2020**	**----**	----	----	**02-Nov-2020**	26-Nov-2020	✓
EG050F: Dissolved Hexavalent Chromium							
Clear Plastic Bottle - NaOH (EG050G-F)							
WORMBH15	**29-Oct-2020**	**----**	----	----	**04-Nov-2020**	26-Nov-2020	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
WORMBH15	**29-Oct-2020**	**----**	----	----	**04-Nov-2020**	26-Nov-2020	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
Deep Creek, Jacksons Ck, WORMBH15	**29-Oct-2020**	**----**	----	----	**05-Nov-2020**	26-Nov-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
RB01	**30-Oct-2020**	**----**	----	----	**05-Nov-2020**	27-Nov-2020	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
Deep Creek, Jacksons Ck, WORMBH15	**29-Oct-2020**	**----**	----	----	**31-Oct-2020**	31-Oct-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
Deep Creek, Jacksons Ck, WORMBH15	**29-Oct-2020**	**----**	----	----	**04-Nov-2020**	26-Nov-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
RB01	**30-Oct-2020**	**----**	----	----	**04-Nov-2020**	27-Nov-2020	✓

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
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
Deep Creek, Jacksons Ck, WORMBH15	**29-Oct-2020**	**02-Nov-2020**	26-Nov-2020	✓	**04-Nov-2020**	26-Nov-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
RB01	**30-Oct-2020**	**02-Nov-2020**	27-Nov-2020	✓	**04-Nov-2020**	27-Nov-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
Deep Creek, Jacksons Ck, WORMBH15	**29-Oct-2020**	**02-Nov-2020**	26-Nov-2020	✓	**04-Nov-2020**	26-Nov-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
RB01	**30-Oct-2020**	**02-Nov-2020**	27-Nov-2020	✓	**04-Nov-2020**	27-Nov-2020	✓
EP020: Oil and Grease (O&G)							
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)							
WORMBH15	**29-Oct-2020**	**----**	----	----	**03-Nov-2020**	26-Nov-2020	✓
EP026SP: Chemical Oxygen Demand (Spectrophotometric)							
Clear Plastic Bottle - Sulfuric Acid (EP026SP)							
WORMBH15	**29-Oct-2020**	**----**	----	----	**04-Nov-2020**	26-Nov-2020	✓
EP030: Biochemical Oxygen Demand (BOD)							
Clear Plastic Bottle - Natural (EP030)							
WORMBH15	**29-Oct-2020**	**----**	----	----	**30-Oct-2020**	31-Oct-2020	✓
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	05-Nov-2020	✓	**02-Nov-2020**	12-Dec-2020	✓
EP074A: Monocyclic Aromatic Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP074)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	12-Nov-2020	✓	**02-Nov-2020**	12-Nov-2020	✓
EP074E: Halogenated Aliphatic Compounds							
Amber VOC Vial - Sulfuric Acid (EP074)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	12-Nov-2020	✓	**02-Nov-2020**	12-Nov-2020	✓
EP074F: Halogenated Aromatic Compounds							
Amber VOC Vial - Sulfuric Acid (EP074)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	12-Nov-2020	✓	**02-Nov-2020**	12-Nov-2020	✓
EP074G: Trihalomethanes							
Amber VOC Vial - Sulfuric Acid (EP074)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	12-Nov-2020	✓	**02-Nov-2020**	12-Nov-2020	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	05-Nov-2020	✓	**02-Nov-2020**	12-Dec-2020	✓
EP075A: Phenolic Compounds (Halogenated)							
Amber Glass Bottle - Unpreserved (EP075-EM)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	05-Nov-2020	✓	**02-Nov-2020**	12-Dec-2020	✓

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
EP075A: Phenolic Compounds (Non-halogenated)							
Amber Glass Bottle - Unpreserved (EP075-EM)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	05-Nov-2020	✓	**02-Nov-2020**	12-Dec-2020	✓
EP075I: Organochlorine Pesticides							
Amber Glass Bottle - Unpreserved (EP075-EM)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	05-Nov-2020	✓	**02-Nov-2020**	12-Dec-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	05-Nov-2020	✓	**02-Nov-2020**	12-Dec-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	12-Nov-2020	✓	**02-Nov-2020**	12-Nov-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	05-Nov-2020	✓	**02-Nov-2020**	12-Dec-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	12-Nov-2020	✓	**02-Nov-2020**	12-Nov-2020	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
WORMBH15	**29-Oct-2020**	**02-Nov-2020**	12-Nov-2020	✓	**02-Nov-2020**	12-Nov-2020	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-LL)							
WORMBH23a, Deep Creek, WORMBH15 / WORMBH22, Jacksons Ck,	**29-Oct-2020**	**02-Nov-2020**	27-Apr-2021	✓	**02-Nov-2020**	27-Apr-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-LL)							
WORMBH23a, Deep Creek, WORMBH15 / WORMBH22, Jacksons Ck,	**29-Oct-2020**	**02-Nov-2020**	27-Apr-2021	✓	**02-Nov-2020**	27-Apr-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-LL)							
WORMBH23a, Deep Creek, WORMBH15 / WORMBH22, Jacksons Ck,	**29-Oct-2020**	**02-Nov-2020**	27-Apr-2021	✓	**02-Nov-2020**	27-Apr-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-LL)							
WORMBH23a, Deep Creek, WORMBH15 / WORMBH22, Jacksons Ck,	**29-Oct-2020**	**02-Nov-2020**	27-Apr-2021	✓	**02-Nov-2020**	27-Apr-2021	✓

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
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-LL)							
WORMBH23a, WORMBH22, Deep Creek, Jacksons Ck, WORMBH15	**29-Oct-2020**	**02-Nov-2020**	27-Apr-2021	✓	**02-Nov-2020**	27-Apr-2021	✓
MM514: E.coli & Total Coliforms MPN by Colilert							
Sterile Plastic Bottle - Sodium Thiosulfate (MM514)							
WORMBH15	**29-Oct-2020**	**----**	----	----	**30-Oct-2020**	30-Oct-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within he 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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	**5.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Discrete Analyser - Dissolved	EG050G-F	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	29	**10.34**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	4	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.00**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Fluoride by PC Titrator	EK040P	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Discrete Analyser - Dissolved	EG050G-F	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**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	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Discrete Analyser - Dissolved	EG050G-F	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Ca ions - Dissolved	ED093F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction	EP071	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Discrete Analyser - Dissolved	EG050G-F	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds - Waste Classification	EP075-EM	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	4	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	0	1	**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.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC 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 PC 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)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescr bed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC 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)
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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
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 Metals by ICP-MS - Suite B	EG020B-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.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, 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).
Hexavalent Chromium by Discrete Analyser - Dissolved	EG050G-F	WATER	In house: Referenced to APHA 3500 Cr-A & B. Samples are 0.45µm filtered prior to analysis. Hexavalent chromium is determined directly on water sample by Descrete Analyser as received by pH adjustment and colour development using dephenylcarbazide. Each run of samples is measured against a five-point cal bration curve. This method is compliant with NEPM Schedule B(3).
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. 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)
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 seperately 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)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	WATER	In house: Referenced to APHA 5220 D. Samples are digested with a known excess of an acidic potassium dichromate solution using silver sulfate as a catalyst. The chromium is reduced from the Cr (VI) oxidation state to the Cr (III) state by the oxygen present in the organic material. Both of these chromium species are coloued and absorb in the visible region of (400nm & 600nm) the spectrum. The oxidisable organic matter can be calculated in terms of oxygen equivalents.
Biochemical Oxygen Demand (BOD)	EP030	WATER	In house: Referenced to APHA 5210 B. The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM Schedule B(3).
Polychlorinated Biphenyls (PCB)	EP066	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 - Semivolatile 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-A kane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
Volatile Organic Compounds	EP074	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. This method is compliant with 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)
Semivolatile Organic Compounds - Waste Classification	EP075-EM	WATER	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 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)
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
E.coli & Total Coliforms by MPN Colilert	MM514	WATER	Microbiological analysis subcontracted to ALS Scoresby (NATA Accredited Laboratory No. 992).
Anionic Surfactants as MBAS	W-MBAS	WATER	APHA 5540 C. Analysis subcontracted to ALS Scoresby (NATA Accredited Laboratory No. 992).

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)

Preparation Methods	Method	Matrix	Method Descriptions
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.
Separatory Funnel Extraction of Liquids	ORG14-EM	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 dichloromethane. The resultant extracts are combined, dehydrated, concentrated and exchanged into toluene 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 sparging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

URGENT

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 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 Callemondah 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 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee mail@alsglobal.com
NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 [illegible] E: samples.newcastle@alsglobal.com
NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville [illegible]
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: APA	TURNAROUND REQUIREMENTS: ☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE:	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☑ Non Standard or urgent TAT (List due date): Two days	Custody Seal Intact?	Yes / No / N/A
PROJECT: WORM pipeline	ALS QUOTE NO.:	Free ice / frozen ice bricks present upon receipt?	Yes / No / N/A
ORDER NUMBER: 12529997/08	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt:	°C
PROJECT MANAGER: [redacted] CONTACT PH: [redacted]	OF: 1 2 3 4 5 6 7	Other comment:	
SAMPLER: MOW SAMPLER MOBILE:	RELINQUISHED BY: MOW	RECEIVED BY: Ruth	RELINQUISHED BY:
COC emailed to ALS? (YES / NO) EDD FORMAT (or default): Esdat	DATE/TIME: 30/10/2020	DATE/TIME: 30/10/20 15:40	DATE/TIME:
Email Reports to (will default to PM if no other addresses are listed): [redacted]			RECEIVED BY:
Email Invoice to (will default to PM if no other addresses are listed):			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 (refer to codes below)	TOTAL CONTAINERS	Salinity (TDS) pH, EC	Major Ions	PFAS - long (3 times)	Ammonia(N) Nitrate(N) Nitrite(N)	Total Flour	Sulfate(SO4) Metals	E. coli TSS, BOD, COD	Oil&grease surfactants MBAS	UV EPA cover	
1	WORMBH23a	29/10/2020 (Am)				✓	✓								
2	WORMBH22	—"—				✓	✓								
3	Deep Creek	—"— (Pm)				✓	✓	✓	✓						
4	Jacksons Ck	—"—				✓	✓	✓	✓						
5	WORMBH15	—"—				✓	✓	✓	✓	✓	✓	✓	✓	✓	
6	RB01	30/10/2020 (Am)						✓	✓						
						Analysis as per email request.									
					TOTAL										

Environmental Division Melbourne
Work Order Reference
EM2019188

Telephone : + 61-3-8549 9600

Received: Ruth 30/10/20 15:40 Carrier:
C/note:
Temp: 5.5 °C Seal Y / N
Ice / Icebricks

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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2101615**	Page	: 1 of 6
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 04-Feb-2021 13:20
Order number	: ----	Date Analysis Commenced	: 05-Feb-2021
C-O-C number	: ----	Issue Date	: 10-Feb-2021 17:42
Sampler	: ADW		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
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.

Signatories	*Position*	*Accreditation Category*
[redacted]	Senior Inorganic Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	Senior Inorganic Instrument Chemist	Me bourne Inorganics, Springvale, VIC
[redacted]	Senior Organic Chemist	Me bourne Organics, Springvale, VIC

General Comments

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

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

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

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

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

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

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

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EK061G: EM2101640 #4 Poor duplicate precision for TKN due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- EK067G: EM2101604 #4 Poor duplicate precision for TKN. Confirmed by re-extraction and re-analysis.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at ini ial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	JC_C	JC_DS	JC_US	----	----
			Sampling date / time	03-Feb-2021 00:00	03-Feb-2021 00:00	03-Feb-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	EM2101615-001	EM2101615-002	EM2101615-003	--------	--------
				Result	Result	Result	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**596**	**550**	**578**	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**387**	**358**	**376**	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.11**	**0.12**	**0.20**	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.39**	**0.43**	**0.40**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.39**	**0.43**	**0.40**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.7**	**0.4**	**0.4**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**1.1**	**0.8**	**0.8**	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	**0.005**	<0.002	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	<0.002	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	**0.005**	**0.004**	**0.005**	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	**0.006**	**0.005**	**0.006**	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	**0.006**	**0.004**	**0.008**	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	**0.005**	**0.006**	**0.005**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	**0.002**	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	**0.005**	**0.006**	**0.005**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	JC_C	JC_DS	JC_US	----	----
				Sampling date / time	03-Feb-2021 00:00	03-Feb-2021 00:00	03-Feb-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2101615-001	EM2101615-002	EM2101615-003	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L		<0.002	<0.002	<0.002	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L		<0.002	<0.002	<0.002	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L		<0.002	<0.002	<0.002	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L		<0.002	<0.002	<0.002	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L		<0.002	<0.002	<0.002	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L		<0.005	<0.005	<0.005	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L		<0.002	<0.002	<0.002	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L		<0.005	<0.005	<0.005	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L		<0.005	<0.005	<0.005	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L		<0.005	<0.005	<0.005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L		<0.005	<0.005	<0.005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L		<0.002	<0.002	<0.002	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L		<0.002	<0.002	<0.002	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L		<0.005	<0.005	<0.005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L		<0.005	<0.005	<0.005	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L		<0.005	<0.005	<0.005	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L		<0.005	<0.005	<0.005	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	JC_C	JC_DS	JC_US	----	----
				Sampling date / time	03-Feb-2021 00:00	03-Feb-2021 00:00	03-Feb-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2101615-001	EM2101615-002	EM2101615-003	--------	--------
					Result	Result	Result	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L		**0.027**	**0.030**	**0.031**	**----**	**----**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L		**0.011**	**0.009**	**0.011**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.002	µg/L		**0.027**	**0.030**	**0.031**	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.002	%		**102**	**98.5**	**91.4**	**----**	**----**
13C8-PFOA	----	0.002	%		**102**	**99.8**	**91.7**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM2101615**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 04-Feb-2021
Order number	: ----	Date Analysis Commenced	: 05-Feb-2021
C-O-C number	: ----	Issue Date	: 10-Feb-2021
Sampler	: ADW		
Site	: ----		
Quote number	: EN/005/17 (Victoria Primary Quote)		
No. of samples received	: 3		
No. of samples analysed	: 3		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
[redacted]	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

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

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 (%)*	*Recovery Limits (%)*
EA010P: Conductivity by PC Titrator (QC Lot: 3496384)									
EM2101583-005	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	22300	22400	0.403	0% - 20%
EM2101596-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	9460	9470	0.106	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3496756)									
EM2101553-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.32	0.32	0.00	0% - 20%
EM2101615-001	JC_C	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.11	0.15	28.8	0% - 50%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3496424)									
EM2101615-003	JC_US	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EM2101244-004	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	10.2	10.2	0.00	0% - 50%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3496757)									
EM2101596-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.91	1.91	0.00	0% - 20%
EM2101619-005	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3497436)									
EM2101604-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EM2101640-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.6	# 1.9	29.2	0% - 20%

Method Blank (MB) and Laboratory Control Spike (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 Spike (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 Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 3496384)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	98.4	85.0	119
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3496756)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	114	84.1	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3496424)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	106	90.9	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3496757)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	103	90.0	117
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3497436)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	111	70.0	117
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3498096)								
EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.0222 µg/L	104	72.0	130
EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.0235 µg/L	101	71.0	127
EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.0228 µg/L	104	68.0	131
EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.0238 µg/L	89.7	69.0	134
EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.0232 µg/L	88.2	65.0	140
EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	0.0241 µg/L	81.5	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3498096)								
EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	0.125 µg/L	97.5	73.0	129
EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.025 µg/L	90.6	72.0	129
EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.025 µg/L	97.7	72.0	129
EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	0.025 µg/L	100	72.0	130
EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.025 µg/L	93.8	71.0	133
EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.025 µg/L	109	69.0	130
EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.025 µg/L	103	71.0	129
EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	0.025 µg/L	83.0	69.0	133
EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	0.025 µg/L	126	72.0	134
EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	0.025 µg/L	105	65.0	144
EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	0.0625 µg/L	96.8	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3498096)								
EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	0.025 µg/L	90.8	67.0	137
EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	0.0625 µg/L	106	68.0	141
EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	0.0625 µg/L	96.8	70.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3498096) - continued								
EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	0.0625 µg/L	121	70.0	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	0.0625 µg/L	98.8	70.0	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	0.025 µg/L	106	65.0	136
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	0.025 µg/L	99.5	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3498096)								
EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	0.0234 µg/L	98.4	63.0	143
EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.0238 µg/L	99.3	64.0	140
EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	0.024 µg/L	103	67.0	138
EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	0.0242 µg/L	91.7	70.0	130
EP231P: PFAS Sums (QCLot: 3498096)								
EP231X-LL: Sum of PFAS	----	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	<0.002	----	----	----	----

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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3496756)							
EM2101553-002	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	104	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3496424)							
EM2101251-004	Anonymous	EK057G: Nitrite as N	14797-65-0	100 mg/L	95 8	80.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3496757)							
EM2101604-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	99.7	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3497436)							
EM2101619-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	122	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2101615**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 12529997	Date Samples Received	: 04-Feb-2021
Site	: ----	Issue Date	: 10-Feb-2021
Sampler	: ADW	No. of samples received	: 3
Order number	: ----	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 Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **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							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	EM2101640--004	Anonymous	**Total Kjeldahl Nitrogen as N**	----	29.2 %	0% - 20%	**RPD exceeds LOR based limits**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	0	9	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	0	9	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; o hers 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*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
JC_C, JC_DS, JC_US	**03-Feb-2021**	**----**	----	----	**05-Feb-2021**	03-Mar-2021	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
JC_C, JC_DS, JC_US	**03-Feb-2021**	**----**	----	----	**08-Feb-2021**	03-Mar-2021	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
JC_C, JC_DS, JC_US	**03-Feb-2021**	**----**	----	----	**05-Feb-2021**	05-Feb-2021	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
JC_C, JC_DS, JC_US	**03-Feb-2021**	**----**	----	----	**05-Feb-2021**	03-Mar-2021	✓

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
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
JC_C, JC_DS, JC_US	**03-Feb-2021**	**05-Feb-2021**	03-Mar-2021	✓	**08-Feb-2021**	03-Mar-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-LL)							
JC_C, JC_DS, JC_US	**03-Feb-2021**	**06-Feb-2021**	02-Aug-2021	✓	**06-Feb-2021**	02-Aug-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-LL)							
JC_C, JC_DS, JC_US	**03-Feb-2021**	**06-Feb-2021**	02-Aug-2021	✓	**06-Feb-2021**	02-Aug-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-LL)							
JC_C, JC_DS, JC_US	**03-Feb-2021**	**06-Feb-2021**	02-Aug-2021	✓	**06-Feb-2021**	02-Aug-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-LL)							
JC_C, JC_DS, JC_US	**03-Feb-2021**	**06-Feb-2021**	02-Aug-2021	✓	**06-Feb-2021**	02-Aug-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-LL)							
JC_C, JC_DS, JC_US	**03-Feb-2021**	**06-Feb-2021**	02-Aug-2021	✓	**06-Feb-2021**	02-Aug-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within he 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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	0	9	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	0	9	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	15	**6.67**	**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
Conductivity by PC 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)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. 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)
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 seperately 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)
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

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)
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 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 Callemondah 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 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 034423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: [illegible]
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☑ Standard TAT (List due date):
OFFICE:		☐ Non Standard or urgent TAT (List due date):
PROJECT: APA WORM EES	ALS QUOTE NO.:	
ORDER NUMBER: 12529997		
PROJECT MANAGER: [redacted]	CONTACT PH: [redacted]	
SAMPLER: ADW	SAMPLER MOBILE: [redacted]	
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	
Email Reports to (will default to PM if no other addresses are listed):	[redacted]	
Email Invoice to (will default to PM if no other addresses are listed): GHD accounts		

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free Ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comment:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
ADW			[signature]
DATE/TIME: 04 Feb 2021	DATE/TIME:	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 (refer to codes below)	TOTAL CONTAINERS	Salinity (TDS)	PFAS trace (long suite)	Ammonia (as N)	Nitrate (as N)	Nitrite (as N)	Total nitrogen	TKN	
1	JC_C	3-Feb-21	W			✓	✓	✓	✓	✓	✓	✓	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
2	JC_DS	3-Feb-21	W			✓	✓	✓	✓	✓	✓	✓	
3	JC_US	3-Feb-21	W			✓	✓	✓	✓	✓	✓	✓	
				TOTAL									

Environmental Division
Melbourne
Work Order Reference
EM2101615

Telephone : +61-3-8549 9600

Received: 4/2 03:20
Carrier:
C/note:
Temp: 12 °C Sea (Y) N
Ice / Icebricks (NA)

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.

Appendix F – Tabulated analytical results

Table F1 – Soil Analytical Results

Table F2 – Acid Sulfate Soil Analytical Results

Table F3 – Groundwater Analytical Results

			Inorganics			Major Ions	Metals												BTEXN				
			Moisture (%)	pH (CaCl2)	Cyanide (Total)	Fluoride	Arsenic	Cadmium	Chromium (hexavalent)	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Tin	Zinc	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)
			%	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			1	0.1	1	40	5	1	0.5	5	5	0.1	2	2	5	2	5	5	0.2	0.5	0.5	0.5	0.5
EPA Victoria IWRG 621 Category B Upper Limit					10,000	40,000	2,000	400	2,000	20,000	6,000	300	4,000	12,000	200	720		140,000	16				
EPA Victoria IWRG 621 Category C Upper Limit					2,500	10,000	500	100	500	5,000	1,500	75	1,000	3,000	50	180	500	35,000	4				
EPA Victoria IWRG 621 Clean Fill Upper Limit					50	450	20	3	1	100	300	1	40	60	10	10	50	200	1				
Location Code	**Date**	**Field ID**																					
BH01	10/08/2020	BH01_0.1	32.4	5.2	<1	180	6	<1	<0.5	14	19	<0.1	<2	24	<5	<2	<5	21	<0.2	<0.5	<0.5	<0.5	<0.5
		BH01_0.5	31.7	7.7	<1	210	<5	<1	<0.5	10	11	<0.1	<2	45	<5	<2	<5	17	<0.2	<0.5	<0.5	<0.5	<0.5
BH03	7/08/2020	BH03_0.1	21.2	5.0	<1	170	<5	<1	<0.5	10	10	<0.1	<2	25	<5	<2	<5	10	<0.2	<0.5	<0.5	<0.5	<0.5
		BH03_0.5	17.4	6.9	<1	190	<5	<1	<0.5	8	8	<0.1	<2	18	<5	<2	<5	10	<0.2	<0.5	<0.5	<0.5	<0.5
BH05	4/08/2020	BH05_0.1	19.1	4.4	<1	150	<5	<1	<0.5	5	13	<0.1	<2	10	<5	<2	<5	8	<0.2	<0.5	<0.5	<0.5	<0.5
		BH05_0.5	21.0	6.1	<1	170	<5	<1	<0.5	<5	12	<0.1	<2	16	<5	<2	<5	<5	<0.2	<0.5	<0.5	<0.5	<0.5
BH06	5/08/2020	BH06_0.1	16.0	5.2	<1	90	<5	<1	<0.5	<5	9	<0.1	<2	5	<5	<2	<5	<5	<0.2	<0.5	<0.5	<0.5	<0.5
		BH06_0.5	17.9	4.9	<1	180	<5	<1	<0.5	<5	9	<0.1	<2	8	<5	<2	<5	6	<0.2	<0.5	<0.5	<0.5	<0.5
BH07	3/09/2020	BH07_0.1	15.1	4.4	<1	100	<5	<1	<0.5	<5	10	<0.1	<2	3	<5	<2	<5	<5	<0.2	<0.5	<0.5	<0.5	<0.5
		BH07_0.5	21.1	4.5	<1	220	<5	<1	<0.5	6	14	<0.1	<2	6	<5	<2	<5	6	<0.2	<0.5	<0.5	<0.5	<0.5
BH09	14/08/2020	BH9_0.1	33.2	6.5	<1	120	6	<1	<0.5	12	10	<0.1	<2	27	<5	<2	<5	20	<0.2	<0.5	<0.5	<0.5	<0.5
		BH9_0.5	28.8	7.4	<1	140	<5	<1	<0.5	13	10	<0.1	<2	33	<5	<2	<5	20	<0.2	<0.5	<0.5	<0.5	<0.5
BH10	14/08/2020	BH10_0.1	21.2	6.6	<1	300	11	<1	<0.5	17	6	<0.1	<2	43	<5	<2	<5	42	<0.2	<0.5	<0.5	<0.5	<0.5
		BH10_1	25.4	7.1	<1	240	<5	<1	<0.5	27	10	<0.1	<2	41	<5	<2	<5	14	<0.2	<0.5	<0.5	<0.5	<0.5
		DUP01	26.8	7.2	<1	200	<5	<1	<0.5	27	11	<0.1	<2	46	<5	<2	<5	16	<0.2	<0.5	<0.5	<0.5	<0.5
BH11	13/08/2020	BH11_0.1	23.5	4.6	<1	140	<5	<1	<0.5	15	12	<0.1	<2	30	<5	<2	<5	13	<0.2	<0.5	<0.5	<0.5	<0.5
		BH11_0.5	25.6	5.6	<1	190	<5	<1	<0.5	23	10	<0.1	<2	40	<5	<2	<5	19	<0.2	<0.5	<0.5	<0.5	<0.5
BH12	3/08/2020	BH12_0.1	25.5	7.5	<1	130	<5	<1	<0.5	11	9	<0.1	<2	34	<5	<2	<5	18	<0.2	<0.5	<0.5	<0.5	<0.5
		BH12_0.5	25.2	7.7	<1	160	<5	<1	<0.5	10	7	<0.1	<2	16	<5	<2	<5	16	<0.2	<0.5	<0.5	<0.5	<0.5
BH14	6/08/2020	BH14_0.1	34.8	5.2	1	100	<5	<1	<0.5	9	15	<0.1	<2	19	<5	<2	<5	16	<0.2	<0.5	<0.5	<0.5	<0.5
		BH14_0.5	24.1	6.6	<1	120	<5	<1	<0.5	8	8	<0.1	<2	26	<5	<2	<5	10	<0.2	<0.5	<0.5	<0.5	<0.5
BH16	5/08/2020	BH16_0.1	21.4	7.4	<1	120	<5	<1	<0.5	12	9	<0.1	<2	30	<5	<2	<5	30	<0.2	<0.5	<0.5	<0.5	<0.5
		BH16_0.5	25.2	6.9	<1	100	<5	<1	<0.5	12	14	<0.1	<2	20	<5	<2	<5	16	<0.2	<0.5	<0.5	<0.5	<0.5

				TRH - NEPM 2013							TRH - NEPM 1999													
			Xylene Total	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.5	10	10	50	50	100	100	50	10	50	100	100	50	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
EPA Victoria IWRG 621 Category B Upper Limit											2,600				40,000					20			
EPA Victoria IWRG 621 Category C Upper Limit											650				10,000					5			
EPA Victoria IWRG 621 Clean Fill Upper Limit											100				1,000					1			
Location Code	**Date**	**Field ID**																					
BH01	10/08/2020	BH01_0.1	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
		BH01_0.5	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH03	7/08/2020	BH03_0.1	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
		BH03_0.5	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH05	4/08/2020	BH05_0.1	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
		BH05_0.5	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH06	5/08/2020	BH06_0.1	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
		BH06_0.5	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH07	3/09/2020	BH07_0.1	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
		BH07_0.5	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH09	14/08/2020	BH9_0.1	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
		BH9_0.5	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH10	14/08/2020	BH10_0.1	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
		BH10_1	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
		DUP01	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH11	13/08/2020	BH11_0.1	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
		BH11_0.5	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH12	3/08/2020	BH12_0.1	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
		BH12_0.5	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH14	6/08/2020	BH14_0.1	<0.5	<10	<10	<50	<50	140	<100	140	<10	<50	<100	120	120	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
		BH14_0.5	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH16	5/08/2020	BH16_0.1	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
		BH16_0.5	<0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

			PAHs - standard 16										PAHs - extended	Phenols		Phenols - Halogenated							
			Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Sum of standard 16 PAHs	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ) (half LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(full LOR) - Lab Calc	Benzo(b+j+k)fluoranthene	2,3,5,6-Tetrachlorophenol	2,3,4,5 & 2,3,4,6-Tetrachlorophenol	2-Chlorophenol	2,4-Dichlorophenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,6-Dichlorophenol	4-Chloro-3-methylphenol	Pentachlorophenol	Phenols(halogenated) - Lab Calc
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.03	0.05	0.03	0.03	0.05	0.05	0.03	0.03	0.2	0.03
EPA Victoria IWRG 621 Category B Upper Limit									400														
EPA Victoria IWRG 621 Category C Upper Limit									100														
EPA Victoria IWRG 621 Clean Fill Upper Limit									20														
Location Code	**Date**	**Field ID**																					
BH01	10/08/2020	BH01_0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
		BH01_0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
BH03	7/08/2020	BH03_0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
		BH03_0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
BH05	4/08/2020	BH05_0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
		BH05_0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
BH06	5/08/2020	BH06_0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
		BH06_0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
BH07	3/09/2020	BH07_0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
		BH07_0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
BH09	14/08/2020	BH9_0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
		BH9_0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
BH10	14/08/2020	BH10_0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
		BH10_1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
		DUP01	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
BH11	13/08/2020	BH11_0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
		BH11_0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
BH12	3/08/2020	BH12_0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
		BH12_0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
BH14	6/08/2020	BH14_0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
		BH14_0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
BH16	5/08/2020	BH16_0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03
		BH16_0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<0.03	<0.05	<0.03	<0.03	<0.05	<0.05	<0.03	<0.03	<0.2	<0.03

			Phenols - Non-Halogenated										VOCs										
			Phenol	2-Nitrophenol	2-Methylphenol (o-Cresol)	3,4-Methylphenol (m,p-cresol)	2,4-Dimethylphenol	2,4-Dinitrophenol	4,6-Dinitro-2-methylphenol	4,6-Dinitro-o-cyclohexyl phenol	4-Nitrophenol	Phenols (non-halogenated) EPAVic	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	4,4'-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			1	1	1	1	1	5	5	5	5	1	0.02	0.02	0.02	0.03	0.03	0.05	0.03	0.03	0.03	0.03	0.03
EPA Victoria IWRG 621 Category B Upper Limit												2,200					50				4.8		16
EPA Victoria IWRG 621 Category C Upper Limit												560					10				1.2		4
EPA Victoria IWRG 621 Clean Fill Upper Limit												60				1							
Location Code	**Date**	**Field ID**																					
BH01	10/08/2020	BH01_0.1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
		BH01_0.5	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
BH03	7/08/2020	BH03_0.1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
		BH03_0.5	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
BH05	4/08/2020	BH05_0.1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
		BH05_0.5	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
BH06	5/08/2020	BH06_0.1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
		BH06_0.5	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
BH07	3/09/2020	BH07_0.1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
		BH07_0.5	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
BH09	14/08/2020	BH9_0.1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
		BH9_0.5	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
BH10	14/08/2020	BH10_0.1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
		BH10_1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
		DUP01	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
BH11	13/08/2020	BH11_0.1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
		BH11_0.5	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
BH12	3/08/2020	BH12_0.1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
		BH12_0.5	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
BH14	6/08/2020	BH14_0.1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
		BH14_0.5	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
BH16	5/08/2020	BH16_0.1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
		BH16_0.5	<1	<1	<1	<1	<1	<5	<5	<5	<5	<1	<0.02	<0.02	<0.02	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03

			OC Pesticides																	MAH		PCBs	Herbicides
			Chlordane (cis)	Chlordane (trans)	d-BHC	4,4 DDD	4,4 DDT	DDT+DDE+DDD - Lab Calc	Dieldrin	Endosulfan I (alpha)	Endosulfan II (beta)	Endosulfan Sulfate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	Styrene	Total MAH	PCBs (Total)	Dinoseb
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	mg/kg
EQL			0.03	0.03	0.03	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.5	0.2	100	5
EPA Victoria IWRG 621 Category B Upper Limit								50								4.8					240	0	
EPA Victoria IWRG 621 Category C Upper Limit								50								1.2					70	0	
EPA Victoria IWRG 621 Clean Fill Upper Limit																					7	2,000	
Location Code	**Date**	**Field ID**																					
BH01	10/08/2020	BH01_0.1	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
		BH01_0.5	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
BH03	7/08/2020	BH03_0.1	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
		BH03_0.5	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
BH05	4/08/2020	BH05_0.1	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
		BH05_0.5	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
BH06	5/08/2020	BH06_0.1	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
		BH06_0.5	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
BH07	3/09/2020	BH07_0.1	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
		BH07_0.5	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
BH09	14/08/2020	BH9_0.1	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
		BH9_0.5	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
BH10	14/08/2020	BH10_0.1	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
		BH10_1	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
		DUP01	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
BH11	13/08/2020	BH11_0.1	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
		BH11_0.5	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
BH12	3/08/2020	BH12_0.1	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
		BH12_0.5	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
BH14	6/08/2020	BH14_0.1	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
		BH14_0.5	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
BH16	5/08/2020	BH16_0.1	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5
		BH16_0.5	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.2	<100	<5

			Chlorinated Hydrocarbons																	
			Chlorinated hydrocarbons EPAVic	Other chlorinated hydrocarbons (Total)	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,2-dichloroethane	1,4-dichlorobenzene	Carbon tetrachloride	Chlorobenzene	Chloroform	cis-1,2-dichloroethene	Methylene chloride	Hexachlorobutadiene	Vinyl chloride
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.01	0.01	0.01	0.01	0.02	0.04	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.4	0.02	0.02
EPA Victoria IWRG 621 Category B Upper Limit				50															11	4.8
EPA Victoria IWRG 621 Category C Upper Limit				10															2.8	1.2
EPA Victoria IWRG 621 Clean Fill Upper Limit			1																	
Location Code	**Date**	**Field ID**																		
BH01	10/08/2020	BH01_0.1	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
		BH01_0.5	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
BH03	7/08/2020	BH03_0.1	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
		BH03_0.5	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
BH05	4/08/2020	BH05_0.1	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
		BH05_0.5	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
BH06	5/08/2020	BH06_0.1	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
		BH06_0.5	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
BH07	3/09/2020	BH07_0.1	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
		BH07_0.5	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
BH09	14/08/2020	BH9_0.1	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
		BH9_0.5	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
BH10	14/08/2020	BH10_0.1	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
		BH10_1	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
		DUP01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
BH11	13/08/2020	BH11_0.1	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
		BH11_0.5	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
BH12	3/08/2020	BH12_0.1	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
		BH12_0.5	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
BH14	6/08/2020	BH14_0.1	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
		BH14_0.5	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
BH16	5/08/2020	BH16_0.1	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02
		BH16_0.5	<0.01	<0.01	<0.01	<0.01	<0.02	<0.04	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.4	<0.02	<0.02

			ASS - Field			ASS - pH	ASS - Acidity Trail		ASS - Potential Acidity		ASS - ANC			ASS - Acid Base Accounting					ASS - Liming Rate	
			pHF	pHFox	Reaction Ratings*	pHKCl	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Chromium Reducible Sulphur (acidity units)	Chromium Reducible Sulfur	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity (sulfur units)	Acid Neutralising Capacity	Net Acidity (acidity units)	Net Acidity (Acidity Units) Minus ANC	Net Acidity (sulfur units)	Net Acidity (Sulfur Units) Minus ANC	ANC Fineness Factor	Liming Rate	Liming Rate excluding ANC
			pH Units	pH Units	COMMENT	pH Units	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	% CaCO3	mole H+/t	mole H+/t	%S	% S	-	kg CaCO3/t	kg CaCO3/t
EQL			0.1	0.1	1	0.1	2	0.02	10	0.005	10	0.01	0.01	10	10	0.02	0.02	0.5	1	1
EPA Vic 655.1				<5											18	0.03				
Location Code	**Date**	**Field ID**																		
BH09	14/08/2020	BH9 0.1	7.7	5.2	3	6.0	6	<0.02	11	0.018	-	-	-	17	17	0.03	0.03	1.5	1	1
		BH9 0.5	8.0	6.9	4	6.3	<2	<0.02	<10	0.014	-	-	-	<10	<10	<0.02	<0.02	1.5	<1	<1
		BH9 1	8.2	8.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		BH9 2	8.3	6.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		BH9 4	7.9	8.4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	3/08/2020	BH12 0.1	7.8	7.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		BH12 0.5	8.3	6.8	4	7.8	<2	<0.02	<10	0.010	267	0.43	1.34	<10	<10	<0.02	<0.02	1.5	<1	<1
		BH12 1.0	7.8	7.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix F
Table F3
Groundwater and surface water analytical results

									Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM
									Bore ID	BH04	BH09	BH11	BH12	BH14	BH15	BH15	BH16	BH22
									GW / SW	GW	GW	GW	GW	GW	GW	GW	GW	GW
									Sampled Date	13/08/2020	9/09/2020	26/08/2020	18/08/2020	18/08/2020	3/03/2020	29/10/2020	26/08/2020	2/03/2020
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)									
Chemical Group	**Chemical Name**	**output unit**	**EQL**															
Inorganics	pH (Lab)	pH units	0.01	6.5-8.5		6-9			6.7-7.7	7.86	7.12	7.54	7.64	7.76	6.85	6.83	7.05	7.73
	Electrical conductivity (lab)	µS/cm	1			2900			250	4840	10,300	3830	3900	2410	7420	8560	2000	5710
	Total Dissolved Solids	mg/L	10	600	5000					-	5300	1920	3790	1300	-	-	1180	-
	Total Dissolved Solids (est.)	mg/L	1		5000					3150	-	-	-	-	4820	5560	-	3710
	Total Suspended Solids	mg/L	5							-	-	-	15	25	-	5	-	-
	COD	mg/L	10							-	-	-	16	14	-	<20	-	-
Biological	Escherichia coli (Colilert)	orgs/100mL	1							-	-	-	0	0	-	3	-	-
Cyanide	Cyanide (Total)	mg/L	0.004					0.007		-	-	-	-	-	-	-	-	-
Acidity & Alkalinity	Alkalinity (Carbonate as CaCO3)	mg/L	1							<1	<1	<1	<1	<1	<1	<1	<1	<1
	Alkalinity (Bicarbonate as CaCO3)	mg/L	1							916	478	314	357	489	1360	1660	384	322
	Alkalinity (Hydroxide as CaCO3)	mg/L	1							<1	<1	<1	<1	<1	<1	<1	<1	<1
	Alkalinity (total as CaCO3)	mg/L	1							916	478	314	357	489	1360	1660	384	322
Major Ions	Calcium (Filtered)	mg/L	1		1000					88	87	63	71	32	187	185	92	106
	Magnesium (Filtered)	mg/L	1							178	413	99	195	66	290	316	77	205
	Potassium (Filtered)	mg/L	1							32	11	8	13	9	60	49	4	22
	Sodium (Filtered)	mg/L	1	180						587	1340	521	333	315	990	1100	195	804
	Chloride	mg/L	1	250		350				1190	3440	974	1090	457	1820	1900	354	1460
	Sulfate (Filtered)	mg/L	1	250	1000					7	312	232	123	88	41	11	193	446
	Fluoride	mg/L	0.1		2	1	2			-	-	-	-	-	-	0.4	-	-
	Cations Total	meq/L	0.01							45.4	96.9	34.2	34.4	21	77.8	84.3	19.5	57.7
	Anions Total	meq/L	0.01							52	113	38.6	40.4	24.5	79.4	87	21.7	56.9
	Ionic Balance	%	0.01							6.8	7.71	6.08	8.06	7.77	1	1.55	5.25	0.69
Nutrients	Ammonia as N	mg/L	0.01					0.9		1.4	0.02	0.08	0.02	0.03	1.6	1.87	<0.01	0.16
	Nitrate (as N)	mg/L	0.01		90					0.19	0.92	1.44	0.72	1.04	<0.01	<0.01	0.01	<0.01
	Nitrite (as N)	mg/L	0.01		9.1					<0.01	<0.01	0.02	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
	Nitrogen (Total Oxidised) (as N)	mg/L	0.01							0.19	0.92	1.46	0.72	1.05	<0.01	<0.01	0.01	<0.01
	Nitrogen (Total)	mg/L	0.1			5	25		1.1	1.6	1.1	1.8	0.9	1.2	2.2	1.9	0.2	0.3
	Kjeldahl Nitrogen Total	mg/L	0.1							1.4	0.2	0.3	0.2	0.2	2.2	1.9	0.2	0.3
	Phosphorus (Total)	mg/L	0.01			0.05	0.8		0.055	0.04	0.39	<0.01	0.14	0.23	0.12	0.09	1.13	0.03
Organic Indicators	BOD	mg/L	2							-	-	-	<2	<2	-	<8	-	-
Metals	Arsenic (Filtered)	mg/L	0.001		0.5	0.1	2	0.013	0.013	0.004	<0.001	<0.001	<0.001	<0.001	0.018	0.001	<0.001	0.001
	Cadmium (Filtered)	mg/L	0.0001		0.01	0.01	0.05	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001
	Chromium (III+VI) (Filtered)	mg/L	0.001		1	0.1	1	0.001	0.001	0.001	0.003	0.008	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
	Chromium (hexavalent) (Filtered)	mg/L	0.01					0.001	0.001	-	-	-	-	-	-	<0.01	-	-
	Copper (Filtered)	mg/L	0.001	1	1	0.2	5	0.0014	0.0014	0.001	0.014	<0.001	0.012	0.016	0.019	0.018	0.015	0.011
	Lead (Filtered)	mg/L	0.001		0.1	2	5	0.0034	0.0034	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
	Mercury (Filtered)	mg/L	0.0001		0.002	0.002	0.002	0.0006	0.0006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Molybdenum (Filtered)	mg/L	0.001		0.15	0.01	0.05			-	-	-	-	-	-	0.002	-	-
	Nickel (Filtered)	mg/L	0.001		1	0.2	2	0.011	0.011	0.009	0.011	<0.001	0.008	0.012	0.068	0.083	0.024	0.019
	Selenium (Filtered)	mg/L	0.01		0.02	0.02	0.05	0.011	0.011	-	-	-	-	-	-	<0.01	-	-
	Silver (Filtered)	mg/L	0.001					0.00005	0.00005	-	-	-	-	-	-	<0.001	-	-
	Tin (Filtered)	mg/L	0.001							-	-	-	-	-	-	0.001	-	-
	Zinc (Filtered)	mg/L	0.005	3	20	2	5	0.008	0.008	0.01	0.042	<0.005	0.041	0.078	0.074	0.118	0.053	0.105
BTEXN	Benzene	µg/L	1					950		-	-	-	<1	<1	-	<1	-	-
	Toluene	µg/L	2	25				180		-	-	-	<2	<2	-	<2	-	-
	Ethylbenzene	µg/L	2	3				80		-	-	-	<2	<2	-	<2	-	-
	Xylene (o)	µg/L	2					350		-	-	-	<2	<2	-	<2	-	-
	Xylene (m & p)	µg/L	2							-	-	-	<2	<2	-	<2	-	-
	Xylene Total	µg/L	2	20						-	-	-	<2	<2	-	<2	-	-
	BTEX (Sum of Total) - Lab Calc	µg/L	1							-	-	-	<1	<1	-	<1	-	-
TRH - NEPM 2013	F1 (C6-C10 minus BTEX)	µg/L	20							-	-	-	<20	<20	-	<20	-	-
	C6-C10 Fraction	µg/L	20							-	-	-	<20	<20	-	<20	-	-
	F2 (>C10-C16 minus Naphthalene)	µg/L	100							-	-	-	<100	<100	-	<100	-	-
	>C10-C16 Fraction	µg/L	100							-	-	-	<100	<100	-	<100	-	-
	F3 (>C16-C34 Fraction)	µg/L	100							-	-	-	<100	<100	-	<100	-	-
	F4 (>C34-C40 Fraction)	µg/L	100							-	-	-	<100	<100	-	<100	-	-
	>C10-C40 (Sum of Total)	µg/L	100							-	-	-	<100	<100	-	<100	-	-
TPH	Oil & Grease	µg/L	5000							-	-	-	<5000	<5000	-	<5000	-	-

										Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM
										Bore ID	BH04	BH09	BH11	BH12	BH14	BH15	BH15	BH16	BH22
										GW / SW	GW	GW	GW	GW	GW	GW	GW	GW	GW
										Sampled Date	13/08/2020	9/09/2020	26/08/2020	18/08/2020	18/08/2020	3/03/2020	29/10/2020	26/08/2020	2/03/2020
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)										
Chemical Group	**Chemical Name**	**output unit**	**EQL**																
PAHs	Acenaphthene	µg/L	1							-	-	-	<2	<2	-	<1	-	-
	Acenaphthylene	µg/L	1							-	-	-	<2	<2	-	<1	-	-
	Anthracene	µg/L	1					0.4		-	-	-	<2	<2	-	<1	-	-
	Benz(a)anthracene	µg/L	1							-	-	-	<2	<2	-	<1	-	-
	Benzo(a)pyrene	µg/L	0.5					0.2		-	-	-	<2	<2	-	<0.5	-	-
	Benzo[b+j]fluoranthene	µg/L	1							-	-	-	-	-	-	<1	-	-
	Benzo(k)fluoranthene	µg/L	1							-	-	-	-	-	-	<1	-	-
	Benzo(g,h,i)perylene	µg/L	1							-	-	-	<2	<2	-	<1	-	-
	Chrysene	µg/L	1							-	-	-	<2	<2	-	<1	-	-
	Dibenz(a,h)anthracene	µg/L	1							-	-	-	<2	<2	-	<1	-	-
	Fluoranthene	µg/L	1					1.4		-	-	-	<2	<2	-	<1	-	-
	Fluorene	µg/L	1							-	-	-	<2	<2	-	<1	-	-
	Indeno(1,2,3-c,d)pyrene	µg/L	1							-	-	-	<2	<2	-	<1	-	-
	Naphthalene	µg/L	1					16		-	-	-	<2	<2	-	<1	-	-
	Phenanthrene	µg/L	1					2		-	-	-	<2	<2	-	<1	-	-
	Pyrene	µg/L	1							-	-	-	<2	<2	-	<1	-	-
	PAHs (Sum of total) - Lab calc	µg/L	0.5							-	-	-	<2	<2	-	<0.5	-	-
	2-methylnaphthalene	µg/L	2							-	-	-	<2	<2	-	-	-	-
	3-methylcholanthrene	µg/L	2							-	-	-	<2	<2	-	-	-	-
	7,12-dimethylbenz(a)anthracene	µg/L	2							-	-	-	<2	<2	-	-	-	-
	Benzo(b+j+k)fluoranthene	µg/L	4							-	-	-	<4	<4	-	-	-	-
Phenols - Halogenated	2-Chlorophenol	µg/L	2	0.1				490		-	-	-	<2	<2	-	<2	-	-
	2,4-Dichlorophenol	µg/L	2	0.3				160		-	-	-	<2	<2	-	<2	-	-
	2,4,5-Trichlorophenol	µg/L	2							-	-	-	<2	<2	-	<2	-	-
	2,4,6-Trichlorophenol	µg/L	2	2				20		-	-	-	<2	<2	-	<2	-	-
	2,6-Dichlorophenol	µg/L	2							-	-	-	<2	<2	-	<2	-	-
	4-Chloro-3-methylphenol	µg/L	2							-	-	-	<2	<2	-	<4	-	-
	Pentachlorophenol	µg/L	2					10		-	-	-	<4	<4	-	<2	-	-
	Phenols(halogenated) - Lab Calc	µg/L	2							-	-	-	-	-	-	<2	-	-
Phenols - Non-Halogenated	Phenol	µg/L	2					320		-	-	-	<2	<2	-	<4	-	-
	2-Nitrophenol	µg/L	2							-	-	-	<2	<2	-	<4	-	-
	2-Methylphenol (o-Cresol)	µg/L	2							-	-	-	<2	<2	-	<4	-	-
	3,4-Methylphenol (m,p-cresol)	µg/L	4							-	-	-	<4	<4	-	<4	-	-
	2,4-Dimethylphenol	µg/L	2							-	-	-	<2	<2	-	<4	-	-
	2,4-Dinitrophenol	µg/L	100					45		-	-	-	-	-	-	<100	-	-
	4,6-Dinitro-2-methylphenol	µg/L	50							-	-	-	-	-	-	<50	-	-
	4,6-Dinitro-o-cyclohexyl phenol	µg/L	50							-	-	-	-	-	-	<50	-	-
	4-Nitrophenol	µg/L	50							-	-	-	-	-	-	<50	-	-
	Phenols (non-halogenated) EPAVic	µg/L	4							-	-	-	-	-	-	<4	-	-
Phenols	2,3,5,6-Tetrachlorophenol	µg/L	2							-	-	-	-	-	-	<2	-	-
	2,3,4,5 & 2,3,4,6-Tetrachlorophenol	µg/L	2							-	-	-	-	-	-	<2	-	-
OC Pesticides	4,4'-DDE	µg/L	0.5							-	-	-	<0.5	<0.5	-	<0.5	-	-
	a-BHC	µg/L	0.5							-	-	-	<0.5	<0.5	-	<0.5	-	-
	Aldrin	µg/L	0.5							-	-	-	<0.5	<0.5	-	<0.5	-	-
	Aldrin + Dieldrin	µg/L	0.5							-	-	-	<0.5	<0.5	-	<0.5	-	-
	b-BHC	µg/L	0.5							-	-	-	<0.5	<0.5	-	-	-	-
	Chlordane	µg/L	0.5					0.08		-	-	-	<0.5	<0.5	-	-	-	-
	Chlordane (cis)	µg/L	0.5							-	-	-	<0.5	<0.5	-	<0.5	-	-
	Chlordane (trans)	µg/L	0.5							-	-	-	<0.5	<0.5	-	<0.5	-	-
	d-BHC	µg/L	0.5							-	-	-	<0.5	<0.5	-	-	-	-
	4,4 DDD	µg/L	0.5							-	-	-	<0.5	<0.5	-	<0.5	-	-
	4,4 DDT	µg/L	0.5					0.01		-	-	-	<2	<2	-	<0.5	-	-
	DDT+DDE+DDD - Lab Calc	µg/L	0.5							-	-	-	<0.5	<0.5	-	-	-	-
	Dieldrin	µg/L	0.5							-	-	-	<0.5	<0.5	-	<0.5	-	-
	Endosulfan I (alpha)	µg/L	0.5							-	-	-	<0.5	<0.5	-	-	-	-
	Endosulfan II (beta)	µg/L	0.5							-	-	-	<0.5	<0.5	-	-	-	-
	Endosulfan Sulfate	µg/L	0.5							-	-	-	<0.5	<0.5	-	-	-	-
	Endrin	µg/L	0.5					0.02		-	-	-	<0.5	<0.5	-	-	-	-
	Endrin aldehyde	µg/L	0.5							-	-	-	<0.5	<0.5	-	-	-	-
	Endrin ketone	µg/L	0.5							-	-	-	<0.5	<0.5	-	-	-	-
	g-BHC (Lindane)	µg/L	0.5					0.2		-	-	-	<0.5	<0.5	-	-	-	-
	Heptachlor	µg/L	0.5					0.09		-	-	-	<0.5	<0.5	-	<0.5	-	-
	Heptachlor epoxide	µg/L	0.5							-	-	-	<0.5	<0.5	-	-	-	-
	Hexachlorobenzene	µg/L	0.5					0.1		-	-	-	<0.5	<0.5	-	-	-	-
	Methoxychlor	µg/L	2							-	-	-	<2	<2	-	-	-	-

Appendix F
Table F3
Groundwater and surface water analytical results

Chemical Group	Chemical Name	output unit	EQL	ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)	Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM
										Bore ID	BH04	BH09	BH11	BH12	BH14	BH15	BH15	BH16	BH22
										GW / SW	GW	GW	GW	GW	GW	GW	GW	GW	GW
										Sampled Date	13/08/2020	9/09/2020	26/08/2020	18/08/2020	18/08/2020	3/03/2020	29/10/2020	26/08/2020	2/03/2020
OP Pesticides	Chlorfenvinphos	µg/L	2								-	-	-	<2	<2	-	-	-	-
	Chlorpyrifos	µg/L	2					0.01			-	-	-	<2	<2	-	-	-	-
	Chlorpyrifos-methyl	µg/L	2								-	-	-	<2	<2	-	-	-	-
	Diazinon	µg/L	2					0.01			-	-	-	<2	<2	-	-	-	-
	Dichlorvos	µg/L	2								-	-	-	<2	<2	-	-	-	-
	Dimethoate	µg/L	2					0.15			-	-	-	<2	<2	-	-	-	-
	Ethion	µg/L	2								-	-	-	<2	<2	-	-	-	-
	Fenthion	µg/L	2								-	-	-	<2	<2	-	-	-	-
	Malathion	µg/L	2					0.05			-	-	-	<2	<2	-	-	-	-
	Pirimphos-ethyl	µg/L	2								-	-	-	<2	<2	-	-	-	-
	Prothiofos	µg/L	2								-	-	-	<2	<2	-	-	-	-
Chlorinated Hydrocarbons	1,1,1,2-tetrachloroethane	µg/L	5								-	-	-	<5	<5	-	<5	-	-
	1,1,1-trichloroethane	µg/L	5					270			-	-	-	<5	<5	-	<5	-	-
	1,1,2,2-tetrachloroethane	µg/L	5					400			-	-	-	<5	<5	-	<5	-	-
	1,1,2-trichloroethane	µg/L	5					6500			-	-	-	<5	<5	-	<5	-	-
	1,1-dichloroethene	µg/L	5					700			-	-	-	<5	<5	-	<5	-	-
	1,1-dichloropropene	µg/L	5								-	-	-	<5	<5	-	-	-	-
	1,2,4-trichlorobenzene	µg/L	2					170			-	-	-	<2	<2	-	<5	-	-
	1,2-dibromo-3-chloropropane	µg/L	5								-	-	-	<5	<5	-	-	-	-
	1,2-dichlorobenzene	µg/L	2	1				160			-	-	-	<2	<2	-	<5	-	-
	1,2-dichloroethane	µg/L	5					1900			-	-	-	<5	<5	-	<5	-	-
	1,2-dichloropropane	µg/L	5					900			-	-	-	<5	<5	-	-	-	-
	1,3-dichloropropane	µg/L	5								-	-	-	<5	<5	-	-	-	-
	1,4-dichlorobenzene	µg/L	2	0.3				60			-	-	-	<2	<2	-	<5	-	-
	2,2-dichloropropane	µg/L	5								-	-	-	<5	<5	-	-	-	-
	2-chloronaphthalene	µg/L	2								-	-	-	<2	<2	-	-	-	-
	2-chlorotoluene	µg/L	5								-	-	-	<5	<5	-	-	-	-
	4-chlorotoluene	µg/L	5								-	-	-	<5	<5	-	-	-	-
	Bromobenzene	µg/L	5								-	-	-	<5	<5	-	-	-	-
	Carbon tetrachloride	µg/L	5					240			-	-	-	<5	<5	-	<5	-	-
	Chlorobenzene	µg/L	5	10				55			-	-	-	<5	<5	-	<5	-	-
	Chloroform	µg/L	5					770			-	-	-	<5	<5	-	<5	-	-
	Chloromethane	µg/L	50								-	-	-	<50	<50	-	-	-	-
	cis-1,2-dichloroethene	µg/L	5								-	-	-	<5	<5	-	<5	-	-
	Methylene chloride	µg/L	5					4000			-	-	-	-	-	-	<5	-	-
	Hexachlorobutadiene	µg/L	2								-	-	-	<2	<2	-	<5	-	-
	Vinyl chloride	µg/L	50					100			-	-	-	<50	<50	-	<50	-	-
Explosives	1,3,5-Trinitrobenzene	µg/L	2								-	-	-	<2	<2	-	-	-	-
	2,4-Dinitrotoluene	µg/L	4					65			-	-	-	<4	<4	-	-	-	-
	2,6-dinitrotoluene	µg/L	4								-	-	-	<4	<4	-	-	-	-
	Nitrobenzene	µg/L	2					550			-	-	-	<2	<2	-	-	-	-
Halogenated Hydrocarbons	Bromomethane	µg/L	50								-	-	-	<50	<50	-	-	-	-
	Dichlorodifluoromethane	µg/L	50								-	-	-	<50	<50	-	-	-	-
Herbicides	Dinoseb	µg/L	50								-	-	-	-	-	-	<50	-	-
	Pronamide	µg/L	2								-	-	-	<2	<2	-	-	-	-
Nitroaromatics and Keytones	2-Picoline	µg/L	2								-	-	-	<2	<2	-	-	-	-
	4-aminobiphenyl	µg/L	2								-	-	-	<2	<2	-	-	-	-
	Acetophenone	µg/L	2								-	-	-	<2	<2	-	-	-	-
	N-Nitrosodiphenyl & Diphenylamine	µg/L	4								-	-	-	<4	<4	-	-	-	-
	Pentachloronitrobenzene	µg/L	2								-	-	-	<2	<2	-	-	-	-
PCBs	PCBs (Total)	µg/L	1								-	-	-	<1	<1	-	<1	-	-
Phthalates	Bis(2-ethylhexyl) phthalate	µg/L	10								-	-	-	<10	<10	-	-	-	-
	Butyl benzyl phthalate	µg/L	2								-	-	-	<2	<2	-	-	-	-
	Diethylphthalate	µg/L	2					1000			-	-	-	<2	<2	-	-	-	-
	Dimethyl phthalate	µg/L	2					3700			-	-	-	<2	<2	-	-	-	-
	Di-n-butyl phthalate	µg/L	2					26			-	-	-	<2	<2	-	-	-	-
	Di-n-octyl phthalate	µg/L	2								-	-	-	<2	<2	-	-	-	-
Surfactants	Anionic Surfactants as MBAS	µg/L	50								-	-	-	<100	<100	-	<50	-	-

											Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM
											Bore ID	BH04	BH09	BH11	BH12	BH14	BH15	BH15	BH16	BH22
											GW / SW	GW	GW	GW	GW	GW	GW	GW	GW	GW
											Sampled Date	13/08/2020	9/09/2020	26/08/2020	18/08/2020	18/08/2020	3/03/2020	29/10/2020	26/08/2020	2/03/2020
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)											
Chemical Group	**Chemical Name**	**output unit**	**EQL**																	
MAH	1,2,4-trimethylbenzene	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	1,3,5-trimethylbenzene	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	Isopropylbenzene	µg/L	5					30			-	-	-	<5	<5	-	-	-	-	
	Styrene	µg/L	5	4							-	-	-	<5	<5	-	<5	-	-	
	n-butylbenzene	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	n-propylbenzene	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	sec-butylbenzene	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	tert-butylbenzene	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	p-isopropyltoluene	µg/L	5								-	-	-	<5	<5	-	-	-	-	
SVOCs	1-naphthylamine	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	2-(acetylamino) fluorene	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	2-nitroaniline	µg/L	4								-	-	-	<4	<4	-	-	-	-	
	3,3-Dichlorobenzidine	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	3-nitroaniline	µg/L	4								-	-	-	<4	<4	-	-	-	-	
	4-(dimethylamino) azobenzene	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	4-bromophenyl phenyl ether	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	4-chloroaniline	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	4-chlorophenyl phenyl ether	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	4-nitroaniline	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	4-Nitroquinoline-N-oxide	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	5-nitro-o-toluidine	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	Aniline	µg/L	2					250			-	-	-	<2	<2	-	-	-	-	
	Azobenzene	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	Bis(2-chloroethoxy) methane	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	Bis(2-chloroethyl)ether	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	Carbazole	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	Chlorobenzilate	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	Hexachlorocyclopentadiene	µg/L	10								-	-	-	<10	<10	-	-	-	-	
	Hexachloroethane	µg/L	2					360			-	-	-	<2	<2	-	-	-	-	
	Hexachloropropene	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	Isophorone	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	Methapyrilene	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	N-nitrosodiethylamine	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	N-nitrosodi-n-butylamine	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	N-nitrosodi-n-propylamine	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	N-Nitrosomethylethylamine	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	N-nitrosomorpholine	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	N-nitrosopiperidine	µg/L	2								-	-	-	<2	<2	-	-	-	-	
	N-nitrosopyrrolidine	µg/L	4								-	-	-	<4	<4	-	-	-	-	
	Pentachlorobenzene	µg/L	2					2			-	-	-	<2	<2	-	-	-	-	
	Phenacetin	µg/L	2								-	-	-	<2	<2	-	-	-	-	
VOCs	1,1-dichloroethane	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	1,2,3-trichlorobenzene	µg/L	5					10			-	-	-	<5	<5	-	-	-	-	
	1,2,3-trichloropropane	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	1,2-dibromoethane	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	1,3-dichlorobenzene	µg/L	2	20				260			-	-	-	<2	<2	-	-	-	-	
	2-butanone (MEK)	µg/L	50								-	-	-	<50	<50	-	-	-	-	
	2-hexanone (MBK)	µg/L	50								-	-	-	<50	<50	-	-	-	-	
	4-methyl-2-pentanone (MIBK)	µg/L	50								-	-	-	<50	<50	-	-	-	-	
	Bromodichloromethane	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	Bromoform	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	Carbon disulfide	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	Chlorodibromomethane	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	Chloroethane	µg/L	50								-	-	-	<50	<50	-	-	-	-	
	cis-1,3-dichloropropene	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	cis-1,4-Dichloro-2-butene	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	Dibromomethane	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	Iodomethane	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	Pentachloroethane	µg/L	5					80			-	-	-	<5	<5	-	-	-	-	
	Trichloroethene	µg/L	5					330			-	-	-	<5	<5	-	<5	-	-	
	Tetrachloroethene	µg/L	5					70			-	-	-	<5	<5	-	<5	-	-	
	trans-1,3-dichloropropene	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	trans-1,2-dichloroethene	µg/L	5								-	-	-	<5	<5	-	<5	-	-	
	trans-1,4-Dichloro-2-butene	µg/L	5								-	-	-	<5	<5	-	-	-	-	
	Trichlorofluoromethane	µg/L	50								-	-	-	<50	<50	-	-	-	-	
	Vinyl acetate	µg/L	50								-	-	-	<50	<50	-	-	-	-	

Appendix F
Table F3
Groundwater and surface water analytical results

										Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM
										Bore ID	BH04	BH09	BH11	BH12	BH14	BH15	BH15	BH16	BH22
										GW / SW	GW	GW	GW	GW	GW	GW	GW	GW	GW
										Sampled Date	13/08/2020	9/09/2020	26/08/2020	18/08/2020	18/08/2020	3/03/2020	29/10/2020	26/08/2020	2/03/2020
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)											
Chemical Group	**Chemical Name**	**output unit**	**EQL**																	
Dioxins & Furans	Dibenzofuran	pg/L	2000000							-	-	-	<2,000,000	<2,000,000	-	-	-	-
PFAS - Perfluoroalkyl Carboxylic Acids	Perfluorobutanoic acid (PFBA)	µg/L	0.01							-	-	-	-	-	-	<0.01	-	-
	Perfluoropentanoic acid (PFPeA)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	Perfluorohexanoic acid (PFHxA)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	Perfluoroheptanoic acid (PFHpA)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	Perfluorooctanoic acid (PFOA)	µg/L	0.002					19 [1]		-	-	-	-	-	-	<0.002	-	-
	Perfluorononanoic acid (PFNA)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	Perfluorodecanoic acid (PFDA)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	Perfluoroundecanoic acid (PFUnDA)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	Perfluorododecanoic acid (PFDoDA)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	Perfluorotridecanoic acid (PFTrDA)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.005							-	-	-	-	-	-	<0.005	-	-
PFAS - Perfluoroalkyl Sulfonic Acids	Perfluorobutane sulfonic acid (PFBS)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	Perfluorooctane sulfonic acid (PFOS)	µg/L	0.002					0.00023 [1]		-	-	-	-	-	-	<0.002	-	-
	Perfluorodecanesulfonic acid (PFDS)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
PFAS - Perfluoroalkyl Sulfonamide	Perfluorooctane sulfonamide (FOSA)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.005							-	-	-	-	-	-	<0.005	-	-
	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.005							-	-	-	-	-	-	<0.005	-	-
	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	µg/L	0.005							-	-	-	-	-	-	<0.005	-	-
	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.005							-	-	-	-	-	-	<0.005	-	-
	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
PFAS - Fluorotelomer Sulfonic Acids	4 2 Fluorotelomer sulfonic acid (4 2 FTS)	µg/L	0.005							-	-	-	-	-	-	<0.005	-	-
	6 2 Fluorotelomer Sulfonate (6 2 FTS)	µg/L	0.005							-	-	-	-	-	-	<0.005	-	-
	8 2 Fluorotelomer sulfonic acid (8 2 FTS)	µg/L	0.005							-	-	-	-	-	-	<0.005	-	-
	10 2 Fluorotelomer sulfonic acid (10 2 FTS)	µg/L	0.005							-	-	-	-	-	-	<0.005	-	-
PFAS - Sums	Sum of PFHxS and PFOS	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-
	PFAS (Sum of Total)	µg/L	0.002							-	-	-	-	-	-	<0.002	-	-

Note:
1 99% species
GW Groundwater
SW Surface water

Appendix F
Table F3
Groundwater and surface water analytical results

									Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM
									Bore ID	BH22	BH22	BH23	BH23A	BH23A	BH27C	BH27C	BH32	BH32
									GW / SW	GW	GW	GW	GW	GW	GW	GW	GW	GW
									Sampled Date	10/09/2020	29/10/2020	2/03/2020	4/04/2020	29/10/2020	3/03/2020	28/10/2020	2/03/2020	20/08/2020
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)									
Chemical Group	**Chemical Name**	**output unit**	**EQL**															
Inorganics	pH (Lab)	pH units	0.01	6.5-8.5		6-9			6.7-7.7	6.93	7.26	8.06	7.41	7.22	8.36	8.54	8.09	7.73
	Electrical conductivity (lab)	µS/cm	1			2900			250	7040	7350	6460	7190	7030	1400	2410	7780	12,500
	Total Dissolved Solids	mg/L	10	600	5000					3960	-	-	3560	-	-	-	-	7340
	Total Dissolved Solids (est.)	mg/L	1		5000					-	4780	4200	-	4570	910	1570	5060	-
	Total Suspended Solids	mg/L	5							30	-	-	12	-	-	66	-	21
	COD	mg/L	10							<50	-	-	24	-	-	<10	-	41
Biological	Escherichia coli (Colilert)	orgs/100mL	1							0	-	-	0	-	-	0	-	0
Cyanide	Cyanide (Total)	mg/L	0.004					0.007		-	-	-	-	-	-	<0.004	-	-
Acidity & Alkalinity	Alkalinity (Carbonate as CaCO3)	mg/L	1							<1	<1	<1	<1	<1	3	17	<1	<1
	Alkalinity (Bicarbonate as CaCO3)	mg/L	1							348	414	542	469	578	159	265	106	388
	Alkalinity (Hydroxide as CaCO3)	mg/L	1							<1	<1	<1	<1	<1	<1	<1	<1	<1
	Alkalinity (total as CaCO3)	mg/L	1							348	414	542	469	578	162	282	106	388
Major Ions	Calcium (Filtered)	mg/L	1		1000					124	114	136	137	105	7	12	135	135
	Magnesium (Filtered)	mg/L	1							253	268	236	238	225	21	40	95	321
	Potassium (Filtered)	mg/L	1							24	25	37	32	31	17	28	10	15
	Sodium (Filtered)	mg/L	1	180						930	1040	895	926	935	217	371	1200	1980
	Chloride	mg/L	1	250		350				1950	1780	1730	1920	1660	385	601	2500	4090
	Sulfate (Filtered)	mg/L	1	250	1000					508	563	286	386	403	41	64	453	641
	Fluoride	mg/L	0.1		2	1	2			-	-	-	-	-	-	0.2	-	-
	Cations Total	meq/L	0.01							68.1	73.6	66.1	67.5	65.2	12	20.7	67	120
	Anions Total	meq/L	0.01							72.5	70.2	65.6	71.6	66.8	15	23.9	82.1	136
	Ionic Balance	%	0.01							3.17	2.38	0.38	2.91	1.17	11.1	7.11	10.1	6.56
Nutrients	Ammonia as N	mg/L	0.01					0.9		0.42	-	0.41	0.9	-	0.05	0.08	0.33	0.03
	Nitrate (as N)	mg/L	0.01		90					<0.01	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	0.08
	Nitrite (as N)	mg/L	0.01		9.1					<0.01	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01
	Nitrogen (Total Oxidised) (as N)	mg/L	0.01							<0.01	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	0.08
	Nitrogen (Total)	mg/L	0.1			5	25		1.1	0.4	-	14.1	0.9	-	0.3	<0.1	15.1	<0.1
	Kjeldahl Nitrogen Total	mg/L	0.1							0.4	-	14.1	0.9	-	0.3	<0.1	15.1	<0.1
	Phosphorus (Total)	mg/L	0.01			0.05	0.8		0.055	0.01	-	20.6	0.02	-	0.29	0.31	6.07	0.03
Organic Indicators	BOD	mg/L	2							<8	-	-	<2	-	-	<2	-	<2
Metals	Arsenic (Filtered)	mg/L	0.001		0.5	0.1	2	0.013	0.013	<0.001	-	0.003	<0.001	-	0.003	0.002	0.002	<0.001
	Cadmium (Filtered)	mg/L	0.0001		0.01	0.01	0.05	0.0002	0.0002	<0.0001	-	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	0.0002
	Chromium (III+VI) (Filtered)	mg/L	0.001		1	0.1	1	0.001	0.001	<0.001	-	<0.001	<0.001	-	0.002	-	0.06	<0.001
	Chromium (hexavalent) (Filtered)	mg/L	0.01					0.001	0.001	-	-	-	-	-	-	<0.01	-	-
	Copper (Filtered)	mg/L	0.001	1	1	0.2	5	0.0014	0.0014	0.02	-	0.012	0.022	-	0.022	0.01	0.012	0.102
	Lead (Filtered)	mg/L	0.001		0.1	2	5	0.0034	0.0034	<0.001	-	<0.001	<0.001	-	0.001	<0.001	<0.001	0.002
	Mercury (Filtered)	mg/L	0.0001		0.002	0.002	0.002	0.0006	0.0006	<0.0001	-	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001
	Molybdenum (Filtered)	mg/L	0.001		0.15	0.01	0.05			-	-	-	-	-	-	0.023	-	-
	Nickel (Filtered)	mg/L	0.001		1	0.2	2	0.011	0.011	0.031	-	0.014	0.023	-	0.006	0.006	0.007	0.015
	Selenium (Filtered)	mg/L	0.01		0.02	0.02	0.05	0.011	0.011	-	-	-	-	-	-	<0.01	-	-
	Silver (Filtered)	mg/L	0.001					0.00005	0.00005	-	-	-	-	-	-	<0.001	-	-
	Tin (Filtered)	mg/L	0.001							-	-	-	-	-	-	<0.001	-	-
	Zinc (Filtered)	mg/L	0.005	3	20	2	5	0.008	0.008	0.086	-	0.032	0.087	-	0.048	0.012	0.036	0.129
BTEXN	Benzene	µg/L	1					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 (o)	µg/L	2					350		<2	-	-	<2	-	-	<2	-	<2
	Xylene (m & p)	µg/L	2							<2	-	-	<2	-	-	<2	-	<2
	Xylene Total	µg/L	2	20						<2	-	-	<2	-	-	<2	-	<2
	BTEX (Sum of Total) - Lab Calc	µg/L	1							<1	-	-	<1	-	-	<1	-	<1
TRH - NEPM 2013	F1 (C6-C10 minus BTEX)	µg/L	20							<20	-	-	<20	-	-	<20	-	<20
	C6-C10 Fraction	µg/L	20							<20	-	-	<20	-	-	<20	-	<20
	F2 (>C10-C16 minus Naphthalene)	µg/L	100							<100	-	-	<100	-	-	<100	-	<100
	>C10-C16 Fraction	µg/L	100							<100	-	-	<100	-	-	<100	-	<100
	F3 (>C16-C34 Fraction)	µg/L	100							<100	-	-	<100	-	-	<100	-	<100
	F4 (>C34-C40 Fraction)	µg/L	100							<100	-	-	<100	-	-	<100	-	<100
	>C10-C40 (Sum of Total)	µg/L	100							<100	-	-	<100	-	-	<100	-	<100
TPH	Oil & Grease	µg/L	5000							<5000	-	-	<5000	-	-	<5000	-	<5000

										Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM
										Bore ID	BH22	BH22	BH23	BH23A	BH23A	BH27C	BH27C	BH32	BH32
										GW / SW	GW	GW	GW	GW	GW	GW	GW	GW	GW
										Sampled Date	10/09/2020	29/10/2020	2/03/2020	4/04/2020	29/10/2020	3/03/2020	28/10/2020	2/03/2020	20/08/2020
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)										
Chemical Group	**Chemical Name**	**output unit**	**EQL**																
PAHs	Acenaphthene	µg/L	1							<2	-	-	<2	-	-	<1	-	<2
	Acenaphthylene	µg/L	1							<2	-	-	<2	-	-	<1	-	<2
	Anthracene	µg/L	1					0.4		<2	-	-	<2	-	-	<1	-	<2
	Benz(a)anthracene	µg/L	1							<2	-	-	<2	-	-	<1	-	<2
	Benzo(a)pyrene	µg/L	0.5					0.2		<2	-	-	<2	-	-	<0.5	-	<2
	Benzo[b+j]fluoranthene	µg/L	1							-	-	-	-	-	-	<1	-	-
	Benzo(k)fluoranthene	µg/L	1							-	-	-	-	-	-	<1	-	-
	Benzo(g,h,i)perylene	µg/L	1							<2	-	-	<2	-	-	<1	-	<2
	Chrysene	µg/L	1							<2	-	-	<2	-	-	<1	-	<2
	Dibenz(a,h)anthracene	µg/L	1							<2	-	-	<2	-	-	<1	-	<2
	Fluoranthene	µg/L	1					1.4		<2	-	-	<2	-	-	<1	-	<2
	Fluorene	µg/L	1							<2	-	-	<2	-	-	<1	-	<2
	Indeno(1,2,3-c,d)pyrene	µg/L	1							<2	-	-	<2	-	-	<1	-	<2
	Naphthalene	µg/L	1					16		<2	-	-	<2	-	-	<1	-	<2
	Phenanthrene	µg/L	1					2		<2	-	-	<2	-	-	<1	-	<2
	Pyrene	µg/L	1							<2	-	-	<2	-	-	<1	-	<2
	PAHs (Sum of total) - Lab calc	µg/L	0.5							<2	-	-	<2	-	-	<0.5	-	<2
	2-methylnaphthalene	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	3-methylcholanthrene	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	7,12-dimethylbenz(a)anthracene	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Benzo(b+j+k)fluoranthene	µg/L	4							<4	-	-	<4	-	-	-	-	<4
Phenols - Halogenated	2-Chlorophenol	µg/L	2	0.1				490		<2	-	-	<2	-	-	<2	-	<2
	2,4-Dichlorophenol	µg/L	2	0.3				160		<2	-	-	<2	-	-	<2	-	<2
	2,4,5-Trichlorophenol	µg/L	2							<2	-	-	<2	-	-	<2	-	<2
	2,4,6-Trichlorophenol	µg/L	2	2				20		<2	-	-	<2	-	-	<2	-	<2
	2,6-Dichlorophenol	µg/L	2							<2	-	-	<2	-	-	<2	-	<2
	4-Chloro-3-methylphenol	µg/L	2							<2	-	-	<2	-	-	<4	-	<2
	Pentachlorophenol	µg/L	2					10		<4	-	-	<4	-	-	<2	-	<4
	Phenols(halogenated) - Lab Calc	µg/L	2							-	-	-	-	-	-	-	-	-
Phenols - Non-Halogenated	Phenol	µg/L	2					320		<2	-	-	<2	-	-	<4	-	<2
	2-Nitrophenol	µg/L	2							<2	-	-	<2	-	-	<4	-	<2
	2-Methylphenol (o-Cresol)	µg/L	2							<2	-	-	<2	-	-	<4	-	<2
	3,4-Methylphenol (m,p-cresol)	µg/L	4							<4	-	-	<4	-	-	<4	-	<4
	2,4-Dimethylphenol	µg/L	2							<2	-	-	<2	-	-	<4	-	<2
	2,4-Dinitrophenol	µg/L	100					45		-	-	-	-	-	-	<100	-	-
	4,6-Dinitro-2-methylphenol	µg/L	50							-	-	-	-	-	-	<50	-	-
	4,6-Dinitro-o-cyclohexyl phenol	µg/L	50							-	-	-	-	-	-	<50	-	-
	4-Nitrophenol	µg/L	50							-	-	-	-	-	-	<50	-	-
	Phenols (non-halogenated) EPAVic	µg/L	4							-	-	-	-	-	-	-	-	-
Phenols	2,3,5,6-Tetrachlorophenol	µg/L	2							-	-	-	-	-	-	<2	-	-
	2,3,4,5 & 2,3,4,6-Tetrachlorophenol	µg/L	2							-	-	-	-	-	-	<2	-	-
OC Pesticides	4,4'-DDE	µg/L	0.5							<2	-	-	<0.5	-	-	<0.5	-	<0.5
	a-BHC	µg/L	0.5							<2	-	-	<0.5	-	-	<0.5	-	<0.5
	Aldrin	µg/L	0.5							<2	-	-	<0.5	-	-	<0.5	-	<0.5
	Aldrin + Dieldrin	µg/L	0.5							<4	-	-	<0.5	-	-	-	-	<0.5
	b-BHC	µg/L	0.5							<2	-	-	<0.5	-	-	-	-	<0.5
	Chlordane	µg/L	0.5					0.08		-	-	-	<0.5	-	-	-	-	<0.5
	Chlordane (cis)	µg/L	0.5							-	-	-	<0.5	-	-	<0.5	-	<0.5
	Chlordane (trans)	µg/L	0.5							-	-	-	<0.5	-	-	<0.5	-	<0.5
	d-BHC	µg/L	0.5							<2	-	-	<0.5	-	-	-	-	<0.5
	4,4 DDD	µg/L	0.5							<2	-	-	<0.5	-	-	<0.5	-	<0.5
	4,4 DDT	µg/L	0.5					0.01		<4	-	-	<2	-	-	<0.5	-	<2
	DDT+DDE+DDD - Lab Calc	µg/L	0.5							<4	-	-	<0.5	-	-	-	-	<0.5
	Dieldrin	µg/L	0.5							<2	-	-	<0.5	-	-	<0.5	-	<0.5
	Endosulfan I (alpha)	µg/L	0.5							<2	-	-	<0.5	-	-	-	-	<0.5
	Endosulfan II (beta)	µg/L	0.5							<2	-	-	<0.5	-	-	-	-	<0.5
	Endosulfan Sulfate	µg/L	0.5							<2	-	-	<0.5	-	-	-	-	<0.5
	Endrin	µg/L	0.5					0.02		<2	-	-	<0.5	-	-	-	-	<0.5
	Endrin aldehyde	µg/L	0.5							-	-	-	<0.5	-	-	-	-	<0.5
	Endrin ketone	µg/L	0.5							-	-	-	<0.5	-	-	-	-	<0.5
	g-BHC (Lindane)	µg/L	0.5					0.2		<2	-	-	<0.5	-	-	-	-	<0.5
	Heptachlor	µg/L	0.5					0.09		<2	-	-	<0.5	-	-	<0.5	-	<0.5
	Heptachlor epoxide	µg/L	0.5							<2	-	-	<0.5	-	-	-	-	<0.5
	Hexachlorobenzene	µg/L	0.5					0.1		<4	-	-	<0.5	-	-	-	-	<0.5
	Methoxychlor	µg/L	2							-	-	-	<2	-	-	-	-	<2

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										Bore ID	BH22	BH22	BH23	BH23A	BH23A	BH27C	BH27C	BH32	BH32
										GW / SW	GW	GW	GW	GW	GW	GW	GW	GW	GW
										Sampled Date	10/09/2020	29/10/2020	2/03/2020	4/04/2020	29/10/2020	3/03/2020	28/10/2020	2/03/2020	20/08/2020
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)										
Chemical Group	**Chemical Name**	**output unit**	**EQL**																
OP Pesticides	Chlorfenvinphos	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Chlorpyrifos	µg/L	2					0.01		<2	-	-	<2	-	-	-	-	<2
	Chlorpyrifos-methyl	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Diazinon	µg/L	2					0.01		<2	-	-	<2	-	-	-	-	<2
	Dichlorvos	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Dimethoate	µg/L	2					0.15		<2	-	-	<2	-	-	-	-	<2
	Ethion	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Fenthion	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Malathion	µg/L	2					0.05		<2	-	-	<2	-	-	-	-	<2
	Pirimphos-ethyl	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Prothiofos	µg/L	2							<2	-	-	<2	-	-	-	-	<2
Chlorinated Hydrocarbons	1,1,1,2-tetrachloroethane	µg/L	5							<5	-	-	<5	-	-	<5	-	<5
	1,1,1-trichloroethane	µg/L	5					270		<5	-	-	<5	-	-	<5	-	<5
	1,1,2,2-tetrachloroethane	µg/L	5					400		<5	-	-	<5	-	-	<5	-	<5
	1,1,2-trichloroethane	µg/L	5					6500		<5	-	-	<5	-	-	<5	-	<5
	1,1-dichloroethene	µg/L	5					700		<5	-	-	<5	-	-	<5	-	<5
	1,1-dichloropropene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	1,2,4-trichlorobenzene	µg/L	2					170		<2	-	-	<2	-	-	<5	-	<2
	1,2-dibromo-3-chloropropane	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	1,2-dichlorobenzene	µg/L	2	1				160		<2	-	-	<2	-	-	<5	-	<2
	1,2-dichloroethane	µg/L	5					1900		<5	-	-	<5	-	-	<5	-	<5
	1,2-dichloropropane	µg/L	5					900		<5	-	-	<5	-	-	-	-	<5
	1,3-dichloropropane	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	1,4-dichlorobenzene	µg/L	2	0.3				60		<2	-	-	<2	-	-	<5	-	<2
	2,2-dichloropropane	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	2-chloronaphthalene	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	2-chlorotoluene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	4-chlorotoluene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	Bromobenzene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	Carbon tetrachloride	µg/L	5					240		<5	-	-	<5	-	-	<5	-	<5
	Chlorobenzene	µg/L	5	10				55		<5	-	-	<5	-	-	<5	-	<5
	Chloroform	µg/L	5					770		<5	-	-	<5	-	-	<5	-	<5
	Chloromethane	µg/L	50							<50	-	-	<50	-	-	-	-	<50
	cis-1,2-dichloroethene	µg/L	5							<5	-	-	<5	-	-	<5	-	<5
	Methylene chloride	µg/L	5					4000		-	-	-	-	-	-	<5	-	<5
	Hexachlorobutadiene	µg/L	2							<2	-	-	<2	-	-	<5	-	<2
	Vinyl chloride	µg/L	50					100		<50	-	-	<50	-	-	<50	-	<50
Explosives	1,3,5-Trinitrobenzene	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	2,4-Dinitrotoluene	µg/L	4					65		<4	-	-	<4	-	-	-	-	<4
	2,6-dinitrotoluene	µg/L	4							<4	-	-	<4	-	-	-	-	<4
	Nitrobenzene	µg/L	2					550		<2	-	-	<2	-	-	-	-	<2
Halogenated Hydrocarbons	Bromomethane	µg/L	50							<50	-	-	<50	-	-	-	-	<50
	Dichlorodifluoromethane	µg/L	50							<50	-	-	<50	-	-	-	-	<50
Herbicides	Dinoseb	µg/L	50							-	-	-	-	-	-	<50	-	-
	Pronamide	µg/L	2							<2	-	-	<2	-	-	-	-	<2
Nitroaromatics and Keytones	2-Picoline	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	4-aminobiphenyl	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Acetophenone	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	N-Nitrosodiphenyl & Diphenylamine	µg/L	4							<4	-	-	<4	-	-	-	-	<4
	Pentachloronitrobenzene	µg/L	2							<2	-	-	<2	-	-	-	-	<2
PCBs	PCBs (Total)	µg/L	1							<1	-	-	<1	-	-	<1	-	<1
Phthalates	Bis(2-ethylhexyl) phthalate	µg/L	10							<10	-	-	<10	-	-	-	-	<10
	Butyl benzyl phthalate	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Diethylphthalate	µg/L	2					1000		<2	-	-	<2	-	-	-	-	<2
	Dimethyl phthalate	µg/L	2					3700		<2	-	-	<2	-	-	-	-	<2
	Di-n-butyl phthalate	µg/L	2					26		<2	-	-	<2	-	-	-	-	<2
	Di-n-octyl phthalate	µg/L	2							<2	-	-	<2	-	-	-	-	<2
Surfactants	Anionic Surfactants as MBAS	µg/L	50							<50	-	-	<100	-	-	<100	-	<50

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										Bore ID	BH22	BH22	BH23	BH23A	BH23A	BH27C	BH27C	BH32	BH32
										GW / SW	GW	GW	GW	GW	GW	GW	GW	GW	GW
										Sampled Date	10/09/2020	29/10/2020	2/03/2020	4/04/2020	29/10/2020	3/03/2020	28/10/2020	2/03/2020	20/08/2020
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)										
Chemical Group	**Chemical Name**	**output unit**	**EQL**																
MAH	1,2,4-trimethylbenzene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	1,3,5-trimethylbenzene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	Isopropylbenzene	µg/L	5					30		<5	-	-	<5	-	-	-	-	<5
	Styrene	µg/L	5	4						<5	-	-	<5	-	-	<5	-	<5
	n-butylbenzene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	n-propylbenzene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	sec-butylbenzene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	tert-butylbenzene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	p-isopropyltoluene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
SVOCs	1-naphthylamine	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	2-(acetylamino) fluorene	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	2-nitroaniline	µg/L	4							<4	-	-	<4	-	-	-	-	<4
	3,3-Dichlorobenzidine	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	3-nitroaniline	µg/L	4							<4	-	-	<4	-	-	-	-	<4
	4-(dimethylamino) azobenzene	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	4-bromophenyl phenyl ether	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	4-chloroaniline	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	4-chlorophenyl phenyl ether	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	4-nitroaniline	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	4-Nitroquinoline-N-oxide	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	5-nitro-o-toluidine	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Aniline	µg/L	2					250		<2	-	-	<2	-	-	-	-	<2
	Azobenzene	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Bis(2-chloroethoxy) methane	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Bis(2-chloroethyl)ether	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Carbazole	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Chlorobenzilate	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Hexachlorocyclopentadiene	µg/L	10							<10	-	-	<10	-	-	-	-	<10
	Hexachloroethane	µg/L	2					360		<2	-	-	<2	-	-	-	-	<2
	Hexachloropropene	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Isophorone	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	Methapyrilene	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	N-nitrosodiethylamine	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	N-nitrosodi-n-butylamine	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	N-nitrosodi-n-propylamine	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	N-Nitrosomethylethylamine	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	N-nitrosomorpholine	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	N-nitrosopiperidine	µg/L	2							<2	-	-	<2	-	-	-	-	<2
	N-nitrosopyrrolidine	µg/L	4							<4	-	-	<4	-	-	-	-	<4
	Pentachlorobenzene	µg/L	2					2		<2	-	-	<2	-	-	-	-	<2
	Phenacetin	µg/L	2							<2	-	-	<2	-	-	-	-	<2
VOCs	1,1-dichloroethane	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	1,2,3-trichlorobenzene	µg/L	5					10		<5	-	-	<5	-	-	-	-	<5
	1,2,3-trichloropropane	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	1,2-dibromoethane	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	1,3-dichlorobenzene	µg/L	2	20				260		<2	-	-	<2	-	-	-	-	<2
	2-butanone (MEK)	µg/L	50							<50	-	-	<50	-	-	-	-	<50
	2-hexanone (MBK)	µg/L	50							<50	-	-	<50	-	-	-	-	<50
	4-methyl-2-pentanone (MIBK)	µg/L	50							<50	-	-	<50	-	-	-	-	<50
	Bromodichloromethane	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	Bromoform	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	Carbon disulfide	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	Chlorodibromomethane	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	Chloroethane	µg/L	50							<50	-	-	<50	-	-	-	-	<50
	cis-1,3-dichloropropene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	cis-1,4-Dichloro-2-butene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	Dibromomethane	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	Iodomethane	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	Pentachloroethane	µg/L	5					80		<5	-	-	<5	-	-	-	-	<5
	Trichloroethene	µg/L	5					330		<5	-	-	<5	-	-	<5	-	<5
	Tetrachloroethene	µg/L	5					70		<5	-	-	<5	-	-	<5	-	<5
	trans-1,3-dichloropropene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	trans-1,2-dichloroethene	µg/L	5							<5	-	-	<5	-	-	<5	-	<5
	trans-1,4-Dichloro-2-butene	µg/L	5							<5	-	-	<5	-	-	-	-	<5
	Trichlorofluoromethane	µg/L	50							<50	-	-	<50	-	-	-	-	<50
	Vinyl acetate	µg/L	50							<50	-	-	<50	-	-	-	-	<50

Appendix F
Table F3
Groundwater and surface water analytical results

										Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM	WORM
										Bore ID	BH22	BH22	BH23	BH23A	BH23A	BH27C	BH27C	BH32	BH32
										GW / SW	GW	GW	GW	GW	GW	GW	GW	GW	GW
										Sampled Date	10/09/2020	29/10/2020	2/03/2020	4/04/2020	29/10/2020	3/03/2020	28/10/2020	2/03/2020	20/08/2020
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)											
Chemical Group	**Chemical Name**	**output unit**	**EQL**																	
Dioxins & Furans	Dibenzofuran	pg/L	2000000								<2,000,000	-	-	<2,000,000	-	-	-	-	<2,000,000
PFAS - Perfluoroalkyl Carboxylic Acids	Perfluorobutanoic acid (PFBA)	µg/L	0.01								-	<0.01	-	-	<0.01	-	-	-	-
	Perfluoropentanoic acid (PFPeA)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	Perfluorohexanoic acid (PFHxA)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	Perfluoroheptanoic acid (PFHpA)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	Perfluorooctanoic acid (PFOA)	µg/L	0.002					19 [1]			-	<0.002	-	-	<0.002	-	-	-	-
	Perfluorononanoic acid (PFNA)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	Perfluorodecanoic acid (PFDA)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	Perfluoroundecanoic acid (PFUnDA)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	Perfluorododecanoic acid (PFDoDA)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	Perfluorotridecanoic acid (PFTrDA)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.005								-	<0.005	-	-	<0.005	-	-	-	-
PFAS - Perfluoroalkyl Sulfonic Acids	Perfluorobutane sulfonic acid (PFBS)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	Perfluorooctane sulfonic acid (PFOS)	µg/L	0.002					0.00023 [1]			-	<0.002	-	-	<0.002	-	-	-	-
	Perfluorodecanesulfonic acid (PFDS)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
PFAS - Perfluoroalkyl Sulfonamide	Perfluorooctane sulfonamide (FOSA)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.005								-	<0.005	-	-	<0.005	-	-	-	-
	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.005								-	<0.005	-	-	<0.005	-	-	-	-
	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	µg/L	0.005								-	<0.005	-	-	<0.005	-	-	-	-
	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.005								-	<0.005	-	-	<0.005	-	-	-	-
	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
PFAS - Fluorotelomer Sulfonic Acids	4 2 Fluorotelomer sulfonic acid (4 2 FTS)	µg/L	0.005								-	<0.005	-	-	<0.005	-	-	-	-
	6 2 Fluorotelomer Sulfonate (6 2 FTS)	µg/L	0.005								-	<0.008	-	-	<0.005	-	-	-	-
	8 2 Fluorotelomer sulfonic acid (8 2 FTS)	µg/L	0.005								-	<0.005	-	-	<0.005	-	-	-	-
	10 2 Fluorotelomer sulfonic acid (10 2 FTS)	µg/L	0.005								-	<0.005	-	-	<0.005	-	-	-	-
PFAS - Sums	Sum of PFHxS and PFOS	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-
	PFAS (Sum of Total)	µg/L	0.002								-	<0.002	-	-	<0.002	-	-	-	-

Note:
1 99% species
GW Groundwater
SW Surface water

Appendix F
Table F3
Groundwater and surface water analytical results

										Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM
										Bore ID	BH49	BH49	Deep Ck	Jacksons Ck	Jacksons Ck	acksons Ck Downstream	Jacksons Ck Upstream
										GW / SW	GW	GW	SW	SW	SW	SW	SW
										Sampled Date	3/03/2020	27/10/2020	29/10/2020	29/10/2020	3/02/2021	3/02/2021	3/02/2021
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)							
Chemical Group	**Chemical Name**	**output unit**	**EQL**													
Inorganics	pH (Lab)	pH units	0.01	6.5-8.5		6-9			6.7-7.7	8.3	7.97	7.75	7.54	-	-	-
	Electrical conductivity (lab)	µS/cm	1			2900			250	2460	2380	731	540	596	550	578
	Total Dissolved Solids	mg/L	10	600	5000					-	-	-	-	-	-	-
	Total Dissolved Solids (est.)	mg/L	1		5000					1600	1550	475	351	387	358	376
	Total Suspended Solids	mg/L	5							-	<5	-	-	-	-	-
	COD	mg/L	10							-	<10	-	-	-	-	-
Biological	Escherichia coli (Colilert)	orgs/100mL	1							-	0	-	-	-	-	-
Cyanide	Cyanide (Total)	mg/L	0.004					0.007		-	<0.004	-	-	-	-	-
Acidity & Alkalinity	Alkalinity (Carbonate as CaCO3)	mg/L	1							<1	<1	<1	<1	-	-	-
	Alkalinity (Bicarbonate as CaCO3)	mg/L	1							232	247	107	86	-	-	-
	Alkalinity (Hydroxide as CaCO3)	mg/L	1							<1	<1	<1	<1	-	-	-
	Alkalinity (total as CaCO3)	mg/L	1							232	247	107	86	-	-	-
Major Ions	Calcium (Filtered)	mg/L	1		1000					18	15	13	9	-	-	-
	Magnesium (Filtered)	mg/L	1							64	66	25	14	-	-	-
	Potassium (Filtered)	mg/L	1							23	22	3	6	-	-	-
	Sodium (Filtered)	mg/L	1	180						345	346	76	66	-	-	-
	Chloride	mg/L	1	250		350				675	620	165	103	-	-	-
	Sulfate (Filtered)	mg/L	1	250	1000					114	78	8	22	-	-	-
	Fluoride	mg/L	0.1		2	1	2			-	0.1	-	-	-	-	-
	Cations Total	meq/L	0.01							21.8	21.8	6.09	4.62	-	-	-
	Anions Total	meq/L	0.01							26	24	6.96	5.08	-	-	-
	Ionic Balance	%	0.01							8.97	4.92	6.67	4.7	-	-	-
Nutrients	Ammonia as N	mg/L	0.01					0.9		0.09	0.04	0.01	0.03	0.11	0.12	0.2
	Nitrate (as N)	mg/L	0.01		90					<0.01	<0.01	0.05	0.51	0.39	0.43	0.4
	Nitrite (as N)	mg/L	0.01		9.1					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Nitrogen (Total Oxidised) (as N)	mg/L	0.01							<0.01	<0.01	0.05	0.51	0.39	0.43	0.4
	Nitrogen (Total)	mg/L	0.1			5	25		1.1	<0.1	<0.1	0.8	1.2	1.1	0.8	0.8
	Kjeldahl Nitrogen Total	mg/L	0.1							<0.1	<0.1	0.7	0.7	0.7	0.4	0.4
	Phosphorus (Total)	mg/L	0.01			0.05	0.8		0.055	0.25	0.22	0.07	0.11	-	-	-
Organic Indicators	BOD	mg/L	2							-	<2	-	-	-	-	-
Metals	Arsenic (Filtered)	mg/L	0.001		0.5	0.1	2	0.013	0.013	0.001	0.002	-	-	-	-	-
	Cadmium (Filtered)	mg/L	0.0001		0.01	0.01	0.05	0.0002	0.0002	<0.0001	<0.0001	-	-	-	-	-
	Chromium (III+VI) (Filtered)	mg/L	0.001		1	0.1	1	0.001	0.001	<0.001	-	-	-	-	-	-
	Chromium (hexavalent) (Filtered)	mg/L	0.01					0.001	0.001	-	<0.01	-	-	-	-	-
	Copper (Filtered)	mg/L	0.001	1	1	0.2	5	0.0014	0.0014	0.028	<0.001	-	-	-	-	-
	Lead (Filtered)	mg/L	0.001		0.1	2	5	0.0034	0.0034	<0.001	<0.001	-	-	-	-	-
	Mercury (Filtered)	mg/L	0.0001		0.002	0.002	0.002	0.0006	0.0006	<0.0001	<0.0001	-	-	-	-	-
	Molybdenum (Filtered)	mg/L	0.001		0.15	0.01	0.05			-	0.032	-	-	-	-	-
	Nickel (Filtered)	mg/L	0.001		1	0.2	2	0.011	0.011	0.008	0.009	-	-	-	-	-
	Selenium (Filtered)	mg/L	0.01		0.02	0.02	0.05	0.011	0.011	-	<0.01	-	-	-	-	-
	Silver (Filtered)	mg/L	0.001					0.00005	0.00005	-	<0.001	-	-	-	-	-
	Tin (Filtered)	mg/L	0.001							-	0.001	-	-	-	-	-
	Zinc (Filtered)	mg/L	0.005	3	20	2	5	0.008	0.008	0.053	0.025	-	-	-	-	-
BTEXN	Benzene	µg/L	1					950		-	<1	-	-	-	-	-
	Toluene	µg/L	2	25				180		-	<2	-	-	-	-	-
	Ethylbenzene	µg/L	2	3				80		-	<2	-	-	-	-	-
	Xylene (o)	µg/L	2					350		-	<2	-	-	-	-	-
	Xylene (m & p)	µg/L	2							-	<2	-	-	-	-	-
	Xylene Total	µg/L	2	20						-	<2	-	-	-	-	-
	BTEX (Sum of Total) - Lab Calc	µg/L	1							-	<1	-	-	-	-	-
TRH - NEPM 2013	F1 (C6-C10 minus BTEX)	µg/L	20							-	<20	-	-	-	-	-
	C6-C10 Fraction	µg/L	20							-	<20	-	-	-	-	-
	F2 (>C10-C16 minus Naphthalene)	µg/L	100							-	<100	-	-	-	-	-
	>C10-C16 Fraction	µg/L	100							-	<100	-	-	-	-	-
	F3 (>C16-C34 Fraction)	µg/L	100							-	<100	-	-	-	-	-
	F4 (>C34-C40 Fraction)	µg/L	100							-	<100	-	-	-	-	-
	>C10-C40 (Sum of Total)	µg/L	100							-	<100	-	-	-	-	-
TPH	Oil & Grease	µg/L	5000							-	<5000	-	-	-	-	-

Appendix F
Table F3
Groundwater and surface water analytical results

									Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM
									Bore ID	BH49	BH49	Deep Ck	Jacksons Ck	Jacksons Ck	acksons Ck Downstream	Jacksons Ck Upstream
									GW / SW	GW	GW	SW	SW	SW	SW	SW
									Sampled Date	3/03/2020	27/10/2020	29/10/2020	29/10/2020	3/02/2021	3/02/2021	3/02/2021
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)							
Chemical Group	**Chemical Name**	**output unit**	**EQL**													
PAHs	Acenaphthene	µg/L	1							-	<1	-	-	-	-	-
	Acenaphthylene	µg/L	1							-	<1	-	-	-	-	-
	Anthracene	µg/L	1					0.4		-	<1	-	-	-	-	-
	Benz(a)anthracene	µg/L	1							-	<1	-	-	-	-	-
	Benzo(a)pyrene	µg/L	0.5					0.2		-	<0.5	-	-	-	-	-
	Benzo[b+j]fluoranthene	µg/L	1							-	<1	-	-	-	-	-
	Benzo(k)fluoranthene	µg/L	1							-	<1	-	-	-	-	-
	Benzo(g,h,i)perylene	µg/L	1							-	<1	-	-	-	-	-
	Chrysene	µg/L	1							-	<1	-	-	-	-	-
	Dibenz(a,h)anthracene	µg/L	1							-	<1	-	-	-	-	-
	Fluoranthene	µg/L	1					1.4		-	<1	-	-	-	-	-
	Fluorene	µg/L	1							-	<1	-	-	-	-	-
	Indeno(1,2,3-c,d)pyrene	µg/L	1							-	<1	-	-	-	-	-
	Naphthalene	µg/L	1					16		-	<1	-	-	-	-	-
	Phenanthrene	µg/L	1					2		-	<1	-	-	-	-	-
	Pyrene	µg/L	1							-	<1	-	-	-	-	-
	PAHs (Sum of total) - Lab calc	µg/L	0.5							-	<0.5	-	-	-	-	-
	2-methylnaphthalene	µg/L	2							-	-	-	-	-	-	-
	3-methylcholanthrene	µg/L	2							-	-	-	-	-	-	-
	7,12-dimethylbenz(a)anthracene	µg/L	2							-	-	-	-	-	-	-
	Benzo(b+j+k)fluoranthene	µg/L	4							-	-	-	-	-	-	-
Phenols - Halogenated	2-Chlorophenol	µg/L	2	0.1				490		-	<2	-	-	-	-	-
	2,4-Dichlorophenol	µg/L	2	0.3				160		-	<2	-	-	-	-	-
	2,4,5-Trichlorophenol	µg/L	2							-	<2	-	-	-	-	-
	2,4,6-Trichlorophenol	µg/L	2	2				20		-	<2	-	-	-	-	-
	2,6-Dichlorophenol	µg/L	2							-	<2	-	-	-	-	-
	4-Chloro-3-methylphenol	µg/L	2							-	<4	-	-	-	-	-
	Pentachlorophenol	µg/L	2					10		-	<2	-	-	-	-	-
	Phenols(halogenated) - Lab Calc	µg/L	2							-	-	-	-	-	-	-
Phenols - Non-Halogenated	Phenol	µg/L	2					320		-	<4	-	-	-	-	-
	2-Nitrophenol	µg/L	2							-	<4	-	-	-	-	-
	2-Methylphenol (o-Cresol)	µg/L	2							-	<4	-	-	-	-	-
	3,4-Methylphenol (m,p-cresol)	µg/L	4							-	<4	-	-	-	-	-
	2,4-Dimethylphenol	µg/L	2							-	<4	-	-	-	-	-
	2,4-Dinitrophenol	µg/L	100					45		-	<100	-	-	-	-	-
	4,6-Dinitro-2-methylphenol	µg/L	50							-	<50	-	-	-	-	-
	4,6-Dinitro-o-cyclohexyl phenol	µg/L	50							-	<50	-	-	-	-	-
	4-Nitrophenol	µg/L	50							-	<50	-	-	-	-	-
	Phenols (non-halogenated) EPAVic	µg/L	4							-	-	-	-	-	-	-
Phenols	2,3,5,6-Tetrachlorophenol	µg/L	2							-	<2	-	-	-	-	-
	2,3,4,5 & 2,3,4,6-Tetrachlorophenol	µg/L	2							-	<2	-	-	-	-	-
OC Pesticides	4,4'-DDE	µg/L	0.5							-	<0.5	-	-	-	-	-
	a-BHC	µg/L	0.5							-	<0.5	-	-	-	-	-
	Aldrin	µg/L	0.5							-	<0.5	-	-	-	-	-
	Aldrin + Dieldrin	µg/L	0.5							-	-	-	-	-	-	-
	b-BHC	µg/L	0.5							-	-	-	-	-	-	-
	Chlordane	µg/L	0.5					0.08		-	-	-	-	-	-	-
	Chlordane (cis)	µg/L	0.5							-	<0.5	-	-	-	-	-
	Chlordane (trans)	µg/L	0.5							-	<0.5	-	-	-	-	-
	d-BHC	µg/L	0.5							-	-	-	-	-	-	-
	4,4 DDD	µg/L	0.5							-	<0.5	-	-	-	-	-
	4,4 DDT	µg/L	0.5					0.01		-	<0.5	-	-	-	-	-
	DDT+DDE+DDD - Lab Calc	µg/L	0.5							-	-	-	-	-	-	-
	Dieldrin	µg/L	0.5							-	<0.5	-	-	-	-	-
	Endosulfan I (alpha)	µg/L	0.5							-	-	-	-	-	-	-
	Endosulfan II (beta)	µg/L	0.5							-	-	-	-	-	-	-
	Endosulfan Sulfate	µg/L	0.5							-	-	-	-	-	-	-
	Endrin	µg/L	0.5					0.02		-	-	-	-	-	-	-
	Endrin aldehyde	µg/L	0.5							-	-	-	-	-	-	-
	Endrin ketone	µg/L	0.5							-	-	-	-	-	-	-
	g-BHC (Lindane)	µg/L	0.5					0.2		-	-	-	-	-	-	-
	Heptachlor	µg/L	0.5					0.09		-	<0.5	-	-	-	-	-
	Heptachlor epoxide	µg/L	0.5							-	-	-	-	-	-	-
	Hexachlorobenzene	µg/L	0.5					0.1		-	-	-	-	-	-	-
	Methoxychlor	µg/L	2							-	-	-	-	-	-	-

Appendix F
Table F3
Groundwater and surface water analytical results

										Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM
										Bore ID	BH49	BH49	Deep Ck	Jacksons Ck	Jacksons Ck	acksons Ck Downstream	Jacksons Ck Upstream
										GW / SW	GW	GW	SW	SW	SW	SW	SW
										Sampled Date	3/03/2020	27/10/2020	29/10/2020	29/10/2020	3/02/2021	3/02/2021	3/02/2021
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)							
Chemical Group	**Chemical Name**	**output unit**	**EQL**													
OP Pesticides	Chlorfenvinphos	µg/L	2							-	-	-	-	-	-	-
	Chlorpyrifos	µg/L	2					0.01		-	-	-	-	-	-	-
	Chlorpyrifos-methyl	µg/L	2							-	-	-	-	-	-	-
	Diazinon	µg/L	2					0.01		-	-	-	-	-	-	-
	Dichlorvos	µg/L	2							-	-	-	-	-	-	-
	Dimethoate	µg/L	2					0.15		-	-	-	-	-	-	-
	Ethion	µg/L	2							-	-	-	-	-	-	-
	Fenthion	µg/L	2							-	-	-	-	-	-	-
	Malathion	µg/L	2					0.05		-	-	-	-	-	-	-
	Pirimphos-ethyl	µg/L	2							-	-	-	-	-	-	-
	Prothiofos	µg/L	2							-	-	-	-	-	-	-
Chlorinated Hydrocarbons	1,1,1,2-tetrachloroethane	µg/L	5							-	<5	-	-	-	-	-
	1,1,1-trichloroethane	µg/L	5					270		-	<5	-	-	-	-	-
	1,1,2,2-tetrachloroethane	µg/L	5					400		-	<5	-	-	-	-	-
	1,1,2-trichloroethane	µg/L	5					6500		-	<5	-	-	-	-	-
	1,1-dichloroethene	µg/L	5					700		-	<5	-	-	-	-	-
	1,1-dichloropropene	µg/L	5							-	-	-	-	-	-	-
	1,2,4-trichlorobenzene	µg/L	2					170		-	<5	-	-	-	-	-
	1,2-dibromo-3-chloropropane	µg/L	5							-	-	-	-	-	-	-
	1,2-dichlorobenzene	µg/L	2	1				160		-	<5	-	-	-	-	-
	1,2-dichloroethane	µg/L	5					1900		-	<5	-	-	-	-	-
	1,2-dichloropropane	µg/L	5					900		-	-	-	-	-	-	-
	1,3-dichloropropane	µg/L	5							-	-	-	-	-	-	-
	1,4-dichlorobenzene	µg/L	2	0.3				60		-	<5	-	-	-	-	-
	2,2-dichloropropane	µg/L	5							-	-	-	-	-	-	-
	2-chloronaphthalene	µg/L	2							-	-	-	-	-	-	-
	2-chlorotoluene	µg/L	5							-	-	-	-	-	-	-
	4-chlorotoluene	µg/L	5							-	-	-	-	-	-	-
	Bromobenzene	µg/L	5							-	-	-	-	-	-	-
	Carbon tetrachloride	µg/L	5					240		-	<5	-	-	-	-	-
	Chlorobenzene	µg/L	5	10				55		-	<5	-	-	-	-	-
	Chloroform	µg/L	5					770		-	<5	-	-	-	-	-
	Chloromethane	µg/L	50							-	-	-	-	-	-	-
	cis-1,2-dichloroethene	µg/L	5							-	<5	-	-	-	-	-
	Methylene chloride	µg/L	5					4000		-	<5	-	-	-	-	-
	Hexachlorobutadiene	µg/L	2							-	<5	-	-	-	-	-
	Vinyl chloride	µg/L	50					100		-	<50	-	-	-	-	-
Explosives	1,3,5-Trinitrobenzene	µg/L	2							-	-	-	-	-	-	-
	2,4-Dinitrotoluene	µg/L	4					65		-	-	-	-	-	-	-
	2,6-dinitrotoluene	µg/L	4							-	-	-	-	-	-	-
	Nitrobenzene	µg/L	2					550		-	-	-	-	-	-	-
Halogenated Hydrocarbons	Bromomethane	µg/L	50							-	-	-	-	-	-	-
	Dichlorodifluoromethane	µg/L	50							-	-	-	-	-	-	-
Herbicides	Dinoseb	µg/L	50							-	<50	-	-	-	-	-
	Pronamide	µg/L	2							-	-	-	-	-	-	-
Nitroaromatics and Keytones	2-Picoline	µg/L	2							-	-	-	-	-	-	-
	4-aminobiphenyl	µg/L	2							-	-	-	-	-	-	-
	Acetophenone	µg/L	2							-	-	-	-	-	-	-
	N-Nitrosodiphenyl & Diphenylamine	µg/L	4							-	-	-	-	-	-	-
	Pentachloronitrobenzene	µg/L	2							-	-	-	-	-	-	-
PCBs	PCBs (Total)	µg/L	1							-	<1	-	-	-	-	-
Phthalates	Bis(2-ethylhexyl) phthalate	µg/L	10							-	-	-	-	-	-	-
	Butyl benzyl phthalate	µg/L	2							-	-	-	-	-	-	-
	Diethylphthalate	µg/L	2					1000		-	-	-	-	-	-	-
	Dimethyl phthalate	µg/L	2					3700		-	-	-	-	-	-	-
	Di-n-butyl phthalate	µg/L	2					26		-	-	-	-	-	-	-
	Di-n-octyl phthalate	µg/L	2							-	-	-	-	-	-	-
Surfactants	Anionic Surfactants as MBAS	µg/L	50							-	<100	-	-	-	-	-

Appendix F
Table F3
Groundwater and surface water analytical results

									Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM
									Bore ID	BH49	BH49	Deep Ck	Jacksons Ck	Jacksons Ck	acksons Ck Downstream	Jacksons Ck Upstream
									GW / SW	GW	GW	SW	SW	SW	SW	SW
									Sampled Date	3/03/2020	27/10/2020	29/10/2020	29/10/2020	3/02/2021	3/02/2021	3/02/2021
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)							
Chemical Group	**Chemical Name**	**output unit**	**EQL**													
MAH	1,2,4-trimethylbenzene	µg/L	5							-	-	-	-	-	-	-
	1,3,5-trimethylbenzene	µg/L	5							-	-	-	-	-	-	-
	Isopropylbenzene	µg/L	5					30		-	-	-	-	-	-	-
	Styrene	µg/L	5	4						-	<5	-	-	-	-	-
	n-butylbenzene	µg/L	5							-	-	-	-	-	-	-
	n-propylbenzene	µg/L	5							-	-	-	-	-	-	-
	sec-butylbenzene	µg/L	5							-	-	-	-	-	-	-
	tert-butylbenzene	µg/L	5							-	-	-	-	-	-	-
	p-isopropyltoluene	µg/L	5							-	-	-	-	-	-	-
SVOCs	1-naphthylamine	µg/L	2							-	-	-	-	-	-	-
	2-(acetylamino) fluorene	µg/L	2							-	-	-	-	-	-	-
	2-nitroaniline	µg/L	4							-	-	-	-	-	-	-
	3,3-Dichlorobenzidine	µg/L	2							-	-	-	-	-	-	-
	3-nitroaniline	µg/L	4							-	-	-	-	-	-	-
	4-(dimethylamino) azobenzene	µg/L	2							-	-	-	-	-	-	-
	4-bromophenyl phenyl ether	µg/L	2							-	-	-	-	-	-	-
	4-chloroaniline	µg/L	2							-	-	-	-	-	-	-
	4-chlorophenyl phenyl ether	µg/L	2							-	-	-	-	-	-	-
	4-nitroaniline	µg/L	2							-	-	-	-	-	-	-
	4-Nitroquinoline-N-oxide	µg/L	2							-	-	-	-	-	-	-
	5-nitro-o-toluidine	µg/L	2							-	-	-	-	-	-	-
	Aniline	µg/L	2					250		-	-	-	-	-	-	-
	Azobenzene	µg/L	2							-	-	-	-	-	-	-
	Bis(2-chloroethoxy) methane	µg/L	2							-	-	-	-	-	-	-
	Bis(2-chloroethyl)ether	µg/L	2							-	-	-	-	-	-	-
	Carbazole	µg/L	2							-	-	-	-	-	-	-
	Chlorobenzilate	µg/L	2							-	-	-	-	-	-	-
	Hexachlorocyclopentadiene	µg/L	10							-	-	-	-	-	-	-
	Hexachloroethane	µg/L	2					360		-	-	-	-	-	-	-
	Hexachloropropene	µg/L	2							-	-	-	-	-	-	-
	Isophorone	µg/L	2							-	-	-	-	-	-	-
	Methapyrilene	µg/L	2							-	-	-	-	-	-	-
	N-nitrosodiethylamine	µg/L	2							-	-	-	-	-	-	-
	N-nitrosodi-n-butylamine	µg/L	2							-	-	-	-	-	-	-
	N-nitrosodi-n-propylamine	µg/L	2							-	-	-	-	-	-	-
	N-Nitrosomethylethylamine	µg/L	2							-	-	-	-	-	-	-
	N-nitrosomorpholine	µg/L	2							-	-	-	-	-	-	-
	N-nitrosopiperidine	µg/L	2							-	-	-	-	-	-	-
	N-nitrosopyrrolidine	µg/L	4							-	-	-	-	-	-	-
	Pentachlorobenzene	µg/L	2					2		-	-	-	-	-	-	-
	Phenacetin	µg/L	2							-	-	-	-	-	-	-
VOCs	1,1-dichloroethane	µg/L	5							-	-	-	-	-	-	-
	1,2,3-trichlorobenzene	µg/L	5					10		-	-	-	-	-	-	-
	1,2,3-trichloropropane	µg/L	5							-	-	-	-	-	-	-
	1,2-dibromoethane	µg/L	5							-	-	-	-	-	-	-
	1,3-dichlorobenzene	µg/L	2	20				260		-	-	-	-	-	-	-
	2-butanone (MEK)	µg/L	50							-	-	-	-	-	-	-
	2-hexanone (MBK)	µg/L	50							-	-	-	-	-	-	-
	4-methyl-2-pentanone (MIBK)	µg/L	50							-	-	-	-	-	-	-
	Bromodichloromethane	µg/L	5							-	-	-	-	-	-	-
	Bromoform	µg/L	5							-	-	-	-	-	-	-
	Carbon disulfide	µg/L	5							-	-	-	-	-	-	-
	Chlorodibromomethane	µg/L	5							-	-	-	-	-	-	-
	Chloroethane	µg/L	50							-	-	-	-	-	-	-
	cis-1,3-dichloropropene	µg/L	5							-	-	-	-	-	-	-
	cis-1,4-Dichloro-2-butene	µg/L	5							-	-	-	-	-	-	-
	Dibromomethane	µg/L	5							-	-	-	-	-	-	-
	Iodomethane	µg/L	5							-	-	-	-	-	-	-
	Pentachloroethane	µg/L	5					80		-	-	-	-	-	-	-
	Trichloroethene	µg/L	5					330		-	<5	-	-	-	-	-
	Tetrachloroethene	µg/L	5					70		-	<5	-	-	-	-	-
	trans-1,3-dichloropropene	µg/L	5							-	-	-	-	-	-	-
	trans-1,2-dichloroethene	µg/L	5							-	<5	-	-	-	-	-
	trans-1,4-Dichloro-2-butene	µg/L	5							-	-	-	-	-	-	-
	Trichlorofluoromethane	µg/L	50							-	-	-	-	-	-	-
	Vinyl acetate	µg/L	50							-	-	-	-	-	-	-

Appendix F
Table F3
Groundwater and surface water analytical results

										Site_ID	WORM	WORM	WORM	WORM	WORM	WORM	WORM
										Bore ID	BH49	BH49	Deep Ck	Jacksons Ck	Jacksons Ck	acksons Ck Downstream	Jacksons Ck Upstream
										GW / SW	GW	GW	SW	SW	SW	SW	SW
										Sampled Date	3/03/2020	27/10/2020	29/10/2020	29/10/2020	3/02/2021	3/02/2021	3/02/2021
				ADWG 2011 Aesthetic (v3.5 updated 2018)	ANZECC 2000 - Stock Watering	ANZECC 2000 Irrigation - Long-term Trigger Values	ANZECC 2000 Irrigation - Short-term Trigger Values	ANZG (2018) - FW - 95% species protection	SEPP Waters (2018)							
Chemical Group	**Chemical Name**	**output unit**	**EQL**													
Dioxins & Furans	Dibenzofuran	pg/L	2000000							-	-	-	-	-	-	-
PFAS - Perfluoroalkyl Carboxylic Acids	Perfluorobutanoic acid (PFBA)	µg/L	0.01							-	-	<0.01	<0.01	<0.01	<0.01	<0.01
	Perfluoropentanoic acid (PFPeA)	µg/L	0.002							-	-	<0.002	<0.002	0.006	0.004	0.008
	Perfluorohexanoic acid (PFHxA)	µg/L	0.002							-	-	<0.002	0.004	0.005	0.006	0.005
	Perfluoroheptanoic acid (PFHpA)	µg/L	0.002							-	-	<0.002	<0.002	<0.002	<0.002	0.002
	Perfluorooctanoic acid (PFOA)	µg/L	0.002					19 [1]		-	-	<0.002	0.003	0.005	0.006	0.005
	Perfluorononanoic acid (PFNA)	µg/L	0.002							-	-	<0.002	<0.002	<0.002	<0.002	<0.002
	Perfluorodecanoic acid (PFDA)	µg/L	0.002							-	-	<0.002	<0.002	<0.002	<0.002	<0.002
	Perfluoroundecanoic acid (PFUnDA)	µg/L	0.002							-	-	<0.002	<0.002	<0.002	<0.002	<0.002
	Perfluorododecanoic acid (PFDoDA)	µg/L	0.002							-	-	<0.002	<0.002	<0.002	<0.002	<0.002
	Perfluorotridecanoic acid (PFTrDA)	µg/L	0.002							-	-	<0.002	<0.002	<0.002	<0.002	<0.002
	Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.005							-	-	<0.005	<0.005	<0.005	<0.005	<0.005
PFAS - Perfluoroalkyl Sulfonic Acids	Perfluorobutane sulfonic acid (PFBS)	µg/L	0.002							-	-	<0.002	0.006	<0.002	0.005	<0.002
	Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.002							-	-	<0.002	<0.002	<0.002	<0.002	<0.002
	Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.002							-	-	<0.003	0.003	0.005	0.004	0.005
	Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.002							-	-	<0.002	<0.002	<0.002	<0.002	<0.002
	Perfluorooctane sulfonic acid (PFOS)	µg/L	0.002					0.00023 [1]		-	-	<0.002	0.004	0.006	0.005	0.006
	Perfluorodecanesulfonic acid (PFDS)	µg/L	0.002							-	-	<0.002	<0.002	<0.002	<0.002	<0.002
PFAS - Perfluoroalkyl Sulfonamide	Perfluorooctane sulfonamide (FOSA)	µg/L	0.002							-	-	<0.002	<0.002	<0.002	<0.002	<0.002
	N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.005							-	-	<0.005	<0.005	<0.005	<0.005	<0.005
	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.005							-	-	<0.005	<0.005	<0.005	<0.005	<0.005
	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.002							-	-	<0.002	<0.002	<0.002	<0.002	<0.002
	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	µg/L	0.005							-	-	<0.005	<0.005	<0.005	<0.005	<0.005
	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.005							-	-	<0.005	<0.005	<0.005	<0.005	<0.005
	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.002							-	-	<0.002	<0.002	<0.002	<0.002	<0.002
PFAS - Fluorotelomer Sulfonic Acids	4 2 Fluorotelomer sulfonic acid (4 2 FTS)	µg/L	0.005							-	-	<0.005	<0.005	<0.005	<0.005	<0.005
	6 2 Fluorotelomer Sulfonate (6 2 FTS)	µg/L	0.005							-	-	<0.005	<0.005	<0.005	<0.005	<0.005
	8 2 Fluorotelomer sulfonic acid (8 2 FTS)	µg/L	0.005							-	-	<0.005	<0.005	<0.005	<0.005	<0.005
	10 2 Fluorotelomer sulfonic acid (10 2 FTS)	µg/L	0.005							-	-	<0.005	<0.005	<0.005	<0.005	<0.005
PFAS - Sums	Sum of PFHxS and PFOS	µg/L	0.002							-	-	<0.002	0.007	0.011	0.009	0.011
	PFAS (Sum of Total)	µg/L	0.002							-	-	<0.002	0.02	0.027	0.03	0.031

Note:
1 99% species
GW Groundwater
SW Surface water

GHD

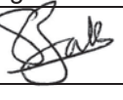
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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	S Campbell	M Clough		S Brattle		03/05/2021

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