

Geelong Saleyards

Further Environmental Site Assessment and Remediation Estimates

City of Greater Geelong



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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AHD	Australian Height Datum
B(a)P	Benzo(a)pyrene
Bgs	Below ground surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
CEC	Cation exchange capacity
COC	Chain of custody
COPC	Chemicals of potential concern
EIL	Ecological investigation level
ESA	Environmental site assessment
ESL	Ecological screening level
HA	Hand auger
HIL	Health investigation level
HSL	Health screening level
LOR	Limit of reporting
Mbgs	Metres below ground surface
MW	Monitoring well
NATA	National association of testing authorities
NEPM	National environmental protection measure
OCP	Organochlorine pesticide
OPP	Organophosphorous pesticide
PAH	Polycyclic aromatic hydrocarbon
PID	Photoionisation detector
ppm	Parts per million
ppmv	Parts per million by volume
PT	Push tube
QA	Quality assurance
QC	Quality control
RPD	Relative percent difference
SB	Soil bore
SWL	Static water level
TDS	Total dissolved solids
TEQ	Toxicity equivalence
TOC	Top of casing
TRH	Total recoverable hydrocarbon
VOC	Volatile organic compound

1. INTRODUCTION

In 2018 the City of Greater Geelong (COGG) engaged Coffey Services Australia Pty Ltd (now Tetra Tech Coffey) to complete a Phase 1 and Phase 2 Environmental Site Assessment (ESA) for the Geelong Saleyards, located at 125 – 135 Weddell Road, North Geelong, Victoria (the 'Site').

The ESA (Coffey, 2018) was undertaken to investigate and document the contamination status of the Site, to inform the development of a Precinct Plan for the Site. The ESA identified contaminants in soil above adopted human health and/or ecological investigation at four main areas of the site. Contaminants potentially associated with use of the Site as a saleyard were also identified in groundwater beneath the Site.

The ESA considered potential risks to human health and the environmental associated with the contamination, as well as likely remediation / environmental management requirements associated with the contaminants identified under various future land use scenarios (i.e. residential, commercial / industrial or recreation public open space land-uses). This included a preliminary remediation / management options assessment under different future land use / development scenarios.

COGG has now progressed the Precinct Plan for the area, which includes the saleyards site, as detailed in 'The City of Greater Geelong Saleyards Precinct Plan June 2021'. The Precinct Plan sets out the background, design principles, land use and layout for the saleyards precinct as it transitions to a proposed mixed-use high density residential precinct. COGG now requires refinement of the preliminary remediation / environmental management requirements, and associated indicative costs, under the specific proposed residential land use and layout scenario. This is required to inform COGG's land disposal options and the next steps in the planning scheme amendment process for the site.

Accordingly, COGG engaged Tetra Tech Coffey to undertake a further soil contamination assessment and evaluation to refine the previous contamination remediation / environmental management and cost estimates under the currently proposed Precinct Plan. This report presents the results for this further work.

1.1 OBJECTIVES

The overall objective of this further environmental site assessment is to refine the previous contamination remediation / environmental management and cost estimates to inform land development and disposal options.

The specific objectives of the assessment are to:

- Further characterise the lateral and/or vertical extents of previously identified areas of soil contamination on the Site; and
- Provide further advice on the nature and extent of remediation / environmental management works likely to be required for the Site, under the proposed Precinct Plan, including provision of refined cost estimates for remediation / environmental management works.

It is noted that the focus of the further environmental site assessment and remediation options assessment presented in this report is on chemical contamination. Based on information provided by COGG it is understood that Q fever (*Coxiella burnetii*) is suspected to be present on the site, in former manure stockpiling areas. It was beyond the scope of this report to address remediation requirements related to Q fever. However, in the previous ESA report (Coffey, 2018) there was considered to be a low potential for Q fever contamination of soil on the Site, based on a qualitative appraisal. EPA Victoria provide guidance to landholders and planning authorities in relation to Q-Fever in EPA Publication 1907 'Q-Fever: guidance for preparing planning approvals' (December 2020).

1.2 SCOPE OF WORKS

The scope of works for this assessment included:

- Review of current Precinct Plan documents
- Targeted soil contamination assessment
- Refinement of remediation / environmental management options and cost estimates
- Preparation of this report

1.3 STRUCTURE OF REPORT

This report is structure in the following key sections:

- Summary of site setting
- Overview of Precinct Plan and existing site contamination status
- Targeted soil contamination assessment
- Summary of soil contamination status of site (current and historical)
- Remediation options assessment
- Conclusions

2. SITE SETTING

2.1 SITE IDENTIFICATION

Site identification details are summarised in Table 2-1.

The boundaries of the saleyards Site are shown on **Figure 1** (attached).

Table 2-1: Site identification details

Site Address	125 – 135 Weddell Road, North Geelong
Total Site Area	6.1 hectares
Title Identification Details	Volume 11758 Folio 476, Crown Allotment 73K Parish of Moorpanyal, Lot 2 LP206464
Current Zoning	Industrial 1 Zone (IN1Z) and Public Park and Recreation (PPRZ) under the City of Greater Geelong Planning Scheme
Planning Overlays	Design and Development Overlay (DDO) Design and Development Overlay – Schedule 20 (DDO20) Heritage Overlay (HO) Heritage Overlay Schedule (HO1915) Special Building Overlay (SBO)
Current / Ongoing Site Use	Saleyards
Future Site Use	Various sensitive and non-sensitive land uses being considered
Surrounding Land Use	North: Rippleside Stormwater Harvesting, Storage, Treatment and Re-Use System and commercial/industrial businesses including a motor mechanic, recycling facility and cosmetics business. East: Multicultural Aged Care Services facility (former Geelong Abattoirs, residential properties and commercial/industrial businesses including a food and beverage supplier and bearing supplier. South: Geelong Golf Club and residential properties. West: Gateway Support Services site (former Target Business Office), The Sphinx Hotel and commercial/industrial businesses including medical supplies and a hydraulics business.

2.2 SITE HISTORY

The ESA completed by Coffey (2018) included a detailed review of the Site history. A summary of the historical activities at the site is provided below and key historical features shown on Figure 1 (attached).

- The Geelong Saleyards were constructed using timber at the site in 1869, and operation commenced on 6 September of that year.
- A sheep dip is believed to have been an original feature of the Saleyards according a site layout plan from circa 1914. The sheep dip is shown to be to the east of the sheep yards and ramps' and to the north east of the current effluent pit. It is believed that dieldrin and arsenic were historically used in the sheep dip.
- The original Market Office building was constructed on site to the west of the saleyards in 1869, before being demolished and replaced by a timber building in 1913. The former Latrine Shed is also believed to have also been built at this time.
- The replacement Market Office building, which featured stock and station agent's offices, a bar area, refreshment room, kitchen, store, small office, staff lunch room and bathroom, was destroyed by fire in May 2013.
- Construction of open bluestone spoon drains (drained towards Fishermans Gully at the southern end of site) is thought to have occurred before 1900.
- The former Geelong Abattoirs were constructed opposite the site on Weddell Road in the 1890s (Dame & Moore, 1994). The former Geelong Abattoirs ceased operation in 1987 with most of the associated infrastructure consequently demolished (Dame & Moore, 1994)
- Due to the increasing use of motor vehicles, races were erected in 1929 for the purpose of loading and unloading livestock.
- After the closure of the Geelong tram network in 1956, the redundant steel tram tracks that had been removed were used to replace or support existing timber posts.
- Bye-washes and barrel drains in the vicinity of Fishermans Gully (near the southern boundary of the site). Brick-lined dams may also have been in this area.
- By 1965 a truck wash had been installed near Weddell Road. In the years following 1976 the truck wash was located to the east of the sheep yards. (CMP, 2007).
- Effluent treatment plant commissioned at the site in 1984.
- In the late 20th century, runoff from the sale yards was blamed for unacceptably high pollution levels at Rippleside beach.
- On 22 August 2016 the Geelong Saleyards were temporarily closed for sheep and cattle sales due to the unsafe condition of the facility.
- The Geelong Saleyards were permanently closed for sheep and cattle sales on 31 August 2017. Poultry sales ceased on 30 July 2018.

2.3 ENVIRONMENTAL SETTING

The environmental setting of the site has previously been described in detail in Coffey (2018). A summary of the key environmental setting features is provided in Table 2-2.

Table 2-2: Summary of environmental setting

Topography	The site slopes steadily from the western boundary close to the cattle yards which has an elevation of approximately 18.5 mAHD down to the south-eastern boundary of the site which has an elevation of approximately 12.5 mAHD
Regional geology	The geological survey of Victoria, Geelong map sheet (scale 1:63 360) shows the site to be underlain by the Tertiary aged (underlain by Miocene to Pliocene) deposits of calcareous sand, clayey sand/sandy clay, quartzite and ferruginous sand & gravel, known as the Moorabool Viaduct Sands
Site-specific geology	- The generalised subsurface lithology observed at the site is: - FILL: Sand, light brown, fine grained, dry loose (~0 – 0.2 metres below ground surface (mbgs)) - CLAY: Orange-brown, medium to high plasticity, moist, firm (~0.2 – 10 mbgs) - Extraneous material has been identified in the upper 0.2 m of fill at some locations, including glass fragments, nails, timber, metal, ash and/or charcoal
Regional hydrogeology	- Groundwater beneath the site is expected to be encountered between 5 m and 10 m below the surface - Groundwater is expected within the unconfined upper mid-tertiary aquitard consisting of clay, silt and minor sand
Site-specific hydrogeology	- Groundwater underlying the site has been identified at a depth of 4 to 8 m below the surface - The salinity of groundwater underlying the site has been identified to range from 6,325 mg/L to 10,368 mg/L total dissolved solids (TDS) and classified as Segment D in accordance with SEPP Waters (2018) - Groundwater water flow direction is anticipated to be east towards Corio Bay
Sensitive receptors – surface waters	- Fisherman's Gully is located immediately to the south of the Site - this is not a permanent body of surface water. - Surface water drains from the gully into Corio Bay approximately 1km to the east of the site.
Sensitive receptors – extractive users of groundwater	- One registered domestic use bore is located ~975m south-east of the Site - Two registered bores with unknown use are located ~200 to 285m north-east of the Site

3. OVERVIEW OF PRECINCT PLAN AND EXISTING SITE CONTAMINATION STATUS

3.1 PRECINCT PLAN

The COGG has developed a Precinct Plan for the Geelong saleyards site as documented in '*The City of Greater Geelong Saleyards Precinct Plan June 2021*'. A summary of the key aspects for the Precinct Plan is presented below.

The Precinct Plan study areas is defined as the Geelong Saleyards (125 & 135 Weddell Road) and Gateways Support Services site (8-14 & 6A Thompson Road). Consideration has been given to the adjoining uses in the development of the plan. The Precinct area is depicted on Figure 3-1.

A mixed housing development has been identified as the preferred land use. The purpose of the Precinct Plan is to:

- develop a vision for the future use of the precinct;
- prepare a concept layout plan that addresses land-use, built form, access and movement, drainage and preferred public open space network; and
- develop a suite of planning controls to implement the vision of the precinct.

A Concept Plan was developed in order to show how the design principles could be applied to deliver the objectives of the Precinct Plan. The Conceptual Plan for the Precinct is provided on Figure 3-2.

Key aspects of the Precinct Plan are as follows:

- Where development is to occur, these will be either mixed use or high-density residential developments, which may be as follows:
 - Two and Three storey row housing and maisonettes
 - Apartments, 4-6 storeys with basement or semi-basement carparking
 - Mixed use buildings with active frontages.
- Key heritage items are to remain onsite, namely:
 - Two rows of cattle yards
 - One timber cattle ramp
 - Central thoroughfare
 - Bluestone paved drain in the sheep yards
 - The Latrines shed.
- A portion of the site will be retained as open space (i.e. the central park and green-links), to include picnic and play areas and a community garden area
- Portions of the site will be redeveloped for roadways (and contain utility services)
- A drainage reserve in the northern end of the Precinct that could be reshaped with landscape enhancements and possible wetlands development with walking loops
- A parcel of crown land in the southern end of the Precinct that could be developed to add to the public open space of the Precinct



Figure 3-1: Geelong saleyards precinct context plan (from: COGG (2021) Saleyards Precinct Plan)



Figure 3-2: Geelong saleyards precinct - indicative concept plan (from: COGG (2021) Saleyards Precinct Plan)

In the Precinct Plan it is identified that suitable planning tools will be identified to deliver the vision for the site. This will require a planning scheme amendment to re-zone the land. This will consider several zone options including:

- Mixed use zone;
- Residential growth zone; and/or
- Comprehensive development zone.

As part of the planning scheme provisions overlays that will be considered include:

- Design and development overlay – to achieve specific built form outcomes
- Special building overlay – if the future development will need to have regard to overland flow issues
- Environmental audit overlay – to manage potentially contaminated land issues

The Precinct Plan document (COGG, 2021) states that once the final suite of planning controls is developed a planning scheme amendment will be required in accordance with the Planning and Environment Act, 1987.

3.2 EXISTING SITE CONTAMINATION STATUS

The ESA completed by Coffey in 2018 included a broad grid-based soil investigation and limited groundwater investigation. It is noted that this broad grid-based investigation was not intended to be undertaken in strict accordance with the required sampling density for detecting a 'hot spot' (i.e. per AS4482.1). Rather, it was undertaken to provide an initial characterisation of the contamination status of the site. The key findings in relation to soil and groundwater contamination identified are summarised below.

The ESA identified soil contamination in four main areas of the site, which will likely require remediation and/or environmental management under a future residential land use scenario. The key contaminants of concern identified in soil were:

- Polycyclic aromatic hydrocarbons (PAHs), including:
 - Benzo(a)pyrene
 - Carcinogenic PAH compounds as benzo(a)pyrene toxic equivalence (TEQ)
 - Naphthalene
- Total recoverable hydrocarbon fractions (TRH), specifically TRH C₁₆ – C₃₄
- Metals including arsenic, copper and zinc

A summary of the four soil contamination areas of concern is provided in Table 3-1 and identified on Figure 3-3, which are included below in the text of this report.

Isolated areas of more marginal soil contamination, predominantly metals marginally exceeding ecological assessment criteria, were also identified in other areas of the Site. However, significant remediation / management is less likely to be required for these marginal isolated areas.

The soil impacts were mainly present in shallow soil (< 0.5 mbgs). Elevated arsenic concentrations were identified in deeper soils (> 2 mbgs) within the south-eastern portion of the site, considered likely to be associated with a former sheep dip area.

Table 3-1: Summary of soil contamination areas of concern (Coffey, 2018)

Area of concern	Contaminants of Potential Concern – Residential and/or Public Open Space Land Use (assessment criteria exceeded) ¹		Estimated impacted area
	Human Health	Ecological	
Cattle yards area (Area A)	Benzo(a)pyrene (TEQ) (3 mg/kg) Total PAHs (300 mg/kg) ¹	TRH C ₁₆ -C ₃₄ (1,700 mg/kg) Benzo(a)pyrene (33 mg/kg)	1,500 m ²
Sheep yards area (Area B)	Benzo(a)pyrene (TEQ) (3 mg/kg)	TRH C ₁₆ -C ₃₄ (1,700 mg/kg)	1,200 m ²
Western boundary of Site (southern extent) (Area C)	Benzo(a)pyrene (TEQ) (3 mg/kg) Lead (300 mg/kg)	Copper (80 mg/kg) Zinc (280 mg/kg)	200 m ²
Former sheep dip area in south-eastern corner of Site (Area D)	Arsenic (100 mg/kg)	Arsenic (100 mg/kg)	700 m ²

1. Based on exceedance of adopted soil assessment criteria as provided in Coffey (2018)



Figure 3-3: Soil contamination areas of concern identified in 2018 ESA (Source: Coffey (2018))

The ESA (Coffey, 2018) included sampling and analysis of groundwater at three monitoring well locations on the site (MW01 – MW03), as shown on Figure 1 and Figure 10 (attached). The results from this limited groundwater investigation were compared to assessment criteria for the relevant protected beneficial uses of groundwater.

The groundwater investigation identified the following analytes above the adopted groundwater assessment criteria:

- Nutrients, including total nitrogen, nitrate, ammonia and phosphorous
- Metals, including boron, chromium, copper, nickel and zinc.

A summary of the contaminants of potential concern identified in groundwater is provided in Table 3-2.

Table 3-2: Summary of contaminants of potential concern in groundwater (Coffey, 2018)

Beneficial use	Contaminants of Potential Concern ¹
Water-dependent ecosystems	Total nitrogen Nitrate Phosphorous Boron Chromium Copper Nickel Zinc
Water-based recreation	Ammonia
Agriculture and irrigation – irrigation	Phosphorous Boron
Agriculture and irrigation – stock watering	None

1. Based on exceedance of adopted groundwater assessment criteria as provided in Coffey (2018)

Based on the results from the initial groundwater investigation Coffey (2018) considered that there are indications that the groundwater beneath the site has been impacted by nutrients (nitrogen species and phosphorous) derived from activities on the Site. However, there is uncertainty as to whether the metals reported to exceed adopted groundwater assessment criteria are Site derived or associated with up-gradient background and/or regional sources. Further, it is noted that the groundwater results have been compared to the assessment criteria at the point of measurement, it was beyond the scope of the ESA (Coffey, 2018) to evaluate the groundwater concentrations at the point of discharge (to a receiving water body) and/or point of groundwater extraction. As such, there is uncertainty as to whether impacts on the protected beneficial uses of groundwater are being realised, although it is noted exceedance of extractive use criteria must be considered where the extractive use is possible based on salinity.

The ESA report (Coffey, 2018) identified that further environmental site assessment, risk evaluation and/or remediation / risk management measures are likely to be required under future development of the site, in particular for a residential development. As such Coffey (2018) conducted a preliminary review of potential remediation / options considered likely to be required under various development scenarios (residential, commercial / industrial, public open space).

Under the main potential future land uses considered, further environmental assessment works were considered likely to be required, and remediation / management measures required to mitigate potential risks associated with shallow impacted soil. The further environmental assessment and remediation required are considered likely to be greatest for re-development for residential (and other sensitive land use), and public open space. Re-development for these land uses was also identified as requiring completion of a Section 53X Environmental Audit.

The main potential soil remediation / risk mitigation measures considered to be most viable for the future development of the precinct are: designing the precinct to avoiding development over impacted soils, excavating and re-using impacted soils in parts of the precinct to be zoned for a less sensitive land use, excavation and on-site retention in landscaped areas and excavation and off-site treatment / disposal at a licenced facility.

4. TARGETED SOIL CONTAMINATION ASSESSMENT

4.1 SOIL SAMPLING APPROACH AND METHODOLOGY

A further targeted soil contamination assessment was undertaken in general accordance with guidance in:

- *National Environmental Protection (Assessment of Site Contamination) Measure* (NEPM, 2013); and
- *Standards Australia 2005, AS4482.1 – 2005 Guide to the investigation and sampling of sites with potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds* (Standards Australia AS4482.1-2005)

The further targeted soil assessment was not intended to meet the required density to detect a 'hot spot' according to the systematic grid-based requirements of AS4482.1.

The purpose of the targeted soil assessment was to further characterise the lateral and vertical extents of the previous identified soil contamination in the following four areas of concern on the site:

- Cattle yards area (Area A)
- Sheep yards area (Area B)
- Western boundary of Site (southern extent) (Area C)
- Former sheep dip area in south-eastern corner of Site (Area D)

Sixteen targeted soil sampling locations were investigated. These targeted locations were selected based on the results from the previous ESA (Coffey, 2018) and using our expert judgement. The previous ESA (Coffey, 2018) identified that the soil contamination was predominantly in the shallow soil (< 0.5 mbgs) in the areas of concern. As such the main focus of the targeted soil assessment was on lateral delineation of the identified contamination, as opposed to vertical delineation.

The number of targeted sampling locations and depth of investigation in each area is summarised in Table 4-1.

Table 4-1: Summary of targeted soil sampling locations

Area of concern	No. targeted sampling locations	Sample location IDs	Maximum depth of investigation (mbgs)
Cattle yards area	4	BH61 – BH64	1.0
Sheep yards area	5	BH67 – BH68, BH73 – BH75	1.0
Western boundary of Site (southern extent)	3	BH65 - BH66, BH76	1.0
Former sheep dip area in south-eastern corner of Site	4	BH69 – BH72	1.8

The targeted soil sampling locations are identified on **Figure 2** (Attached). The locations were surveyed in the field by CTS Environmental Pty Ltd to an accuracy of approximately +/- 1 m. The survey data is provided in Appendix A.

The soil sampling methodology adopted for the targeted soil assessment is provided in Table 4-2.

Table 4-2: Summary of soil sampling methodology

Activity	Details / Comments
Date of field activities	Soil sampling works were conducted on 10 to 11 May 2021
Service location	Investigation locations were screened for the presence of underground services by an independent contractor (Underground Services Detection) using electronic detection equipment prior to any sub-surface works being undertaken. The Dial Before You Dig (DBYD) plans were also reviewed prior to the works commencing.
Soil sample collection	Soil bore samples were collected from hand auger at a range of depths from 0.0 m to 1.8 m.
Decontamination of equipment	Decontamination was undertaken on sampling equipment between bores using Decon 90 and de-ionised water. Disposable nitrile gloves were used between each sample collection.
Soil screening	Soil samples were screened using a Photoionisation Detector (PID) calibrated daily to 100 ppm_v iso-butylene calibration gas. The PID readings, together with other field observations, were used to assess which samples should be analysed for volatiles. PID readings are included on the bore logs (Appendix B). Calibration records for the PID are provided in Appendix C
Soil sampling	Sample collection was conducted according to Coffey sampling guidelines. Samples were obtained using a hand auger and push tube sampling. Dedicated disposable gloves and laboratory supplied containers were used.
Soil logging	The sub-surface conditions were logged by an experienced Environmental Consultant. Bore logs are included in Appendix B.
Sample handling and transportation	Sample collection storage and transport was conducted according to Coffey Environments Standard Operating Procedures (SOPs). Samples were immediately placed into laboratory supplied glass jars with Teflon lined seals to avoid volatile loss and placed into an esky with ice. The samples were dispatched to NATA accredited laboratories under chain of custody documentation. All laboratory reports are provided in Appendix D.
Disposal of waste	All excavated soil was reinstated within the boreholes from which it was excavated.
Sample preservation	Samples were stored at <4 °C (on ice), in an esky while on site and in transit to the laboratory.
Field QC	Collection of field duplicate and triplicate samples was undertaken at a rate of one per twenty samples. Field rinsate blanks were also collected daily.

Samples were sent to NATA accredited Eurofins-MGT (Eurofins) (Primary) and ALS Environmental Laboratories Pty Ltd (ALS) (Secondary) for laboratory analysis. The samples were submitted for a suite of analytes as summarised in Table 4-3. The analytical program was focused on the primary contaminants of concern identified from the previous ESA (Coffey, 2018) and specifically those contaminants that are likely to be driving the need for soil remediation / risk management in the areas of concern.

Table 4-3: Summary of analytical laboratory suites

Analyte	No. of targeted soil samples (primary samples)
Benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN)	24
Total recoverable hydrocarbons (TRH)	24
Polycyclic aromatic hydrocarbons (PAHs)	24
Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc)	24
Nitrogen species (ammonia, nitrate, nitrite, TKN)	12
Leachable arsenic, lead, nickel or zinc	4
Leachable PAHs and TRHs	1

4.2 FIELD OBSERVATIONS

The site-specific geology at the site is summarised below, this is based on the soil investigations conducted at the site. Soil bore logs describing the encountered soil for this targeted soil assessment and the previous ESA (Coffey, 2018) are provided in Appendix B.

A shallow layer of fine sand or sandy silt fill was encountered across most of the targeted assessment area. The thickness of this sand layer was observed to vary from approximately 0.2 m to 0.5 m in these areas. Thickness of the fill layer was observed to be greater at one location in the cattle yards area (BH63, up to 0.8 m) and one location in the former sheep dip area (BH70, up to 1.8 m).

The fill layer was underlain by natural brown / red sandy clay or clayey sand to the limit of the investigation (i.e. 1.0 to 1.8 mbgs).

The PID readings ranged from 0.0 to 0.3 ppmv at the sample locations, which is considered indicative of background levels.

4.3 SITE SPECIFIC GEOLOGY

The generalised subsurface lithology observed at the site during both the current and previously (i.e. Coffey, 2018) field activities is summarised in Table 4-4.

Table 4-4: Generalised site-specific geology

Depth (mbgs)	Soil Description
0.0 – 0.5	FILL: Sand, light brown, fine grained, dry, loose.
0.5 – 10.0	CLAY: Orange-brown, medium to high plasticity, moist, firm.

4.4 SOIL ASSESSMENT CRITERIA

For the purpose of this report we have adopted soil assessment criteria relevant to:

- On-site retention of contaminated soil; and
- Off-site disposal / management of contaminated soil

At the time of preparing this report the prevention and management of contaminated land within the State of Victoria was regulated under the Environment Protection Act 1970 and the *State Environment Protection Policy - Prevention and Management of Contamination of Land* ("the Land SEPP") (Victorian Government, 2002). Further the management of waste soil material was regulated under the Environment Protection (Industrial Waste Resource) Regulations 2009.

It is noted that the Environment Protection Act 2017 (informed by the Environment Protection Amendment Act 2018) takes effect on 1 July 2021. This will include some changes to environmental protection policies and regulations related to the management of contaminated land and waste soil material. In determining and applying the soil assessment criteria for this assessment we have taken into consideration the new regulatory framework to come into effect on 1 July 2021 under the Environment Protection Act 2017, including the following key subordinate legislation tools:

- Environment Protection Regulations 2021
- Environment Reference Standard (No. S 245. May 2021)

4.4.1 On-site retention

The Environment Protection Regulations 2021 and Environment Reference Standard (ERS) (2021) set out the regulatory framework for the protection of environmental values within the State of Victoria, including the prevention and management of contaminated land.

In relation to land, the ERS sets out the environmental values that are sought to be achieved or maintained in Victoria and standards to support those values. The ERS defines environmental values as 'uses, Attributes and functions of the environment that Victorians value'. The environmental values of land requiring protection for the proposed use of the site are:

- Land dependent ecosystems and species – Modified ecosystem
- Human health
- Buildings and structures
- Aesthetics
- Production of food, flora and fibre

The adopted soil assessment criteria associated with each of these environmental values of land are discussed below in reference to the 'indicators' and objectives' outlined in the ERS.

Where the listed guidelines do not provide criteria for specific analytes, alternative criteria have been adopted. Where applicable, these criteria are discussed and referenced below.

Land dependent ecosystems and species (Maintenance of ecosystems)

The protection of the environmental value 'Land dependent ecosystems' is assessed with reference to the Ecological Investigation Levels (EILs) for metals and provided in Schedule B1 of the *National Environmental Protection (Assessment of Site Contamination) Measure 1999, as amended in 2013* (NEPC, 2013).

These guidelines provide a range of site uses including areas of ecological significance, urban residential/public open space and commercial/ industrial. Given the site is being assessed for a range of potential uses, urban residential/public open space and commercial/industrial criteria have been used for comparison with reported soil analytical results.

The NEPM provides an approach for calculating site specific EILs for chromium (III), copper, nickel and zinc based on key physical-chemical soil properties (i.e. pH, cation exchange capacity (CEC), clay content, total organic carbon (TOC) content) and ambient background concentrations. Selected soil samples were analysed for physical-chemical soil properties in the previous ESA (Coffey, 2018).

The physical-chemical soil property values adopted for derivation of the site specific EILs are:

- pH: 5.1
- CEC: 5.7 meq/100g
- Clay: 3.8 %
- TOC: 0.1 %

These represent the lowest values recorded during the previous investigation (Coffey, 2018) and are considered to be sufficiently conservatively to represent the soil types present in the upper 2m on the site where the contaminants of potential concern have been identified (i.e. sandy silty fill).

The ambient background concentrations for low traffic areas in Victoria according to Olszowy et al (1995), were adopted.

Unless otherwise stated EILs for aged contamination (> 2 years) have been adopted.

The site-specific EILs have been calculated using the Ecological Investigation Level calculation spreadsheet sourced from the NEPM toolbox.

It has been acknowledged that the low reliability NEPM ESL for benzo(a)pyrene is outdated, as such the more recent high reliability ecological guideline for benzo(a)pyrene as published in CRC CARE Technical Report No. 39 - Risk-based management and remediation guidance for benzo(a)pyrene (CRC CARE, 2017), have been adopted.

It is emphasised within the NEPM that EILs are not intended for use as default remediation trigger or remediation target criteria but are intended to prompt an appropriate site-specific assessment when they are exceeded. However, it is considered reasonable in the first instance to use these investigation limits as default acceptance criteria, and only consider impacts more closely in the event of an investigation limit being exceeded.

In the absence of Australian specific criteria, the following international criteria have been adopted:

- Canadian Soil Quality Guidelines for the Protection of Environmental Health (CCME, 2013)
- US EPA Ecological Soil Screening Levels (ECO-SSLs) (US EPA, 2005)
- US EPA Region 4 Soil Screening Value for Hazardous Waste Sites, Ecological Risk Assessment (US EPA, 2015)
- Upper ranges necessary for satisfactory plant growth (Charman and Murphy, 2010), in the case of total nitrogen

Human Health

The protection of the environmental value “Human Health” is assessed with reference to the NEPM guidelines. Soil samples were compared to human Health Investigation Levels (HILs) and Health Screening Levels (HSLs), *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC, 2013).

The Health-based Levels (HILs and HSLs) provide for a range of site uses including standard residential (exposure Setting A), residential with minimal soil access (exposure Setting B), public open space (exposure Setting C) and commercial/industrial (exposure Setting D).

Given that the site is being assessed for a range of potential uses, Setting ‘A’, ‘C’ and ‘D’ HILs have been used for comparison with reported soil conditions.

The HSLs for vapour intrusion into buildings related to volatile petroleum hydrocarbons, these are specific to soil type and depth to impact. The criteria for coarse textured (i.e. sand) soils have been adopted based on field observations (i.e. soil logs) and as a conservative measure. The depth range of 0 to <1 m has been conservatively adopted for the screening level assessment of the site.

To indicate the potential risks associated with direct contact with petroleum hydrocarbon impacted soil the Health Screening Levels (HSLs) for direct soil contact have been adopted (CRC CARE, 2011).

It is emphasised within the NEPM that HILs and HSLs are not intended for use as default remediation trigger or remediation target criteria, but are intended to prompt an appropriate site-specific assessment when they are exceeded. However, it is considered reasonable in the first instance to use these investigations limits as default acceptance criteria, and only consider impacts more closely in the event of an investigation limit being exceeded.

In the absence of Australian criteria, the following international criteria have been adopted:

- US EPA Regional Screening Levels for Soils (US EPA, 2021)
- Maximum pathogen level for Grade P1 biosolids, Guidelines for Sewerage System Biosolids Management (NRMMC, 2004), in the case of *E.coli*

Buildings and Structures

The ERS states the objective of the environmental value ‘Buildings and Structures’ as ‘land that is not corrosive to or otherwise adversely affecting the integrity of structures or building materials’ The ERS does not specify specific indicators (i.e. assessment criteria) to be considered..

Field observations and pH analytical results can be used to assess any extreme conditions (such as acidity) that might undermine or corrode structures/buildings. The Australian Standard AS2159-2009 ‘Piling-design and installation’ provide assessment criteria to indicate potential corrosivity to buildings and structures based on pH and sulfate, these have been adopted to the environmental value ‘Buildings and Structures’.

Aesthetics

The ERS states the objectives of the environmental value ‘Aesthetics’ as ‘land that is not offensive to the senses of human beings’. The ERS does not specify specific indicators (i.e. assessment criteria) to be considered.

While aesthetic observations are subjective, it is considered that if there is discolouration, noticeable odour from the soil on the site or if there are obvious components of waste, such as rubble, slag, bagged waste or similar, then there is a potential aesthetic concern.

Aesthetic observations made in the field are detailed on the bore logs (Appendix B) and are considered in our discussion. The TPH Management Limits presented in NEPM 2013 have also been applied to assess scenarios that fall outside of other human and ecological health protection criteria. This includes risk of free phase formation, exposure of workers in trenches to petroleum hydrocarbon vapours, risk of explosion, risk to buried infrastructure, aesthetic considerations and technological factors.

Production of food, flora and fibre

The ERS states the objective of the environmental value 'Production of food, flora and fibre' as the levels specified in the Food Standards Code detected in any food, flora or fibre produced at the sites and levels that do not adversely affect produce quality or yield. For the purpose of this assessment we have adopted the assessment criteria for 'land dependent ecosystems and species' as the criteria for 'Production of food, flora and fibre'.

4.4.2 Off-site disposal

To provide an indication to the soil waste category should any soil be removed and disposed of site we adopted the waste category limits as detailed in EPA Victoria Publication 1828.2 Waste disposal characteristics and thresholds (March 2021).

4.5 RESULTS

Soil analytical results from the targeted soil assessment completed in May 2021 are presented in Tables 1 to 3 (Attached) in conjunction with results from the previous ESA (Coffey, 2018). The analytical results are also shown on Figures 3 to 8 (Attached). Chain of custody documentation and certified laboratory results are included in Appendix D.

The results from the targeted soil assessment are discussed in conjunction with the results from the previous ESA (Coffey, 2018), in Section 5.

4.6 QUALITY ASSURANCE AND QUALITY CONTROL

We have completed a review of the Quality Assurance (QA) procedures and Quality Control (QC) results for the soil assessment according to the following:

- National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC, 2013), Schedule B2

Quality control (QC) samples comprising intra-laboratory duplicated, inter-laboratory triplicates, rinsate blanks and field blanks were collected during the field works and were analysed for selected potential contaminants of concern for the soil assessment.

A detailed analysis of data quality is provided in Appendix E. Results from Quality Control samples are provided in Table 4 and 5 (Attached)

Based on the results from the QA/QC review we considered that the data is of an acceptable standard for the purposes of this assessment.

5. SUMMARY OF SOIL CONTAMINATION STATUS OF SITE

This section provides a summary of the soil contamination status of the site based on the results from the 2018 ESA (Coffey, 2018) and the recent 2021 targeted soil contamination assessment (as detailed in this report). The soil analytical results from the current and historical investigation are presented in Tables 1 to 3 (Attached) and shown on Figures 3 to 8 (Attached).

The soil analytical results have been compared to the assessment criteria specified in Section 4.4 to:

- Assess the potential risks to human health and the environment and suitability for the on-site retention of soil; and
- Provide an indication of the waste hazard category for off-site disposal and management in accordance with EPA Publication 1828.2 Waste disposal categories – characteristics and thresholds.

The analytes detected at concentrations above the laboratory limit of reporting are compared against the adopted soils assessment criteria for the Site in Table 5-1. This confirmed the following contaminants of potential concern (COPC) at the Site which may pose an unacceptable health risk to human health and the environment under the proposed development plans for the site:

- Metals: arsenic, copper, lead, manganese, nickel, zinc
- PAHs: Benzo(a)pyrene, benzo(a)pyrene TEQ
- Petroleum hydrocarbons: TRH C₁₆ – C₃₄
- Nutrients: Total nitrogen

The COPC have been identified within the following four key areas of concern on the site:

- Area A: Cattle yards area
- Area B: Sheep yards area
- Area C: Western boundary of Site (southern extent)
- Area D: Former sheep dip area in south eastern corner of Site
- More marginal and isolated areas of soil impact have also been identified in general areas of the site (Area E).

Data analysis was undertaken for the COPC in each of the areas of concern on the site to further characterise the nature and extent of the soil impact and to guide the need for risk management or remediation. The results from this additional data analysis were compared to the statistical assessment criteria prescribed in Schedule B1 of the NEPM (NEPC, 2013), including:

- No single value being greater than 250% of the investigation level,
- Mean concentration less than the investigation level, and
- Standard deviation less than 50% of the investigation level.

The guidance in the NEPM also recommends calculation of the 95% UCL_{average} concentration for comparison against the nominated investigation level. This additional data analysis was undertaken using ProUCL (Version 5.1.002). The results from the ProUCL analysis are included in Appendix F.

The results for each of the areas of concern are discussed below in relation to:

- Suitability for on-site retention and need for risk management actions
- Indicative waste category for off-site disposal and management
- Estimated area and volume of soil requiring risk management actions

Table 5-1: Soil analytes report above the laboratory limit of reporting (mg/kg) (data from 2018 and 2021)

Analyte	Reported Concentration Range	HIL A Residential	HIL C Recreational	HIL D Commercial / Industrial D	EILs Urban Residential & Open Public Space	EIL Commercial / Industrial (Aged)	Locations exceeding criteria
Arsenic	<2 – 440	100	300	3,000	<u>100</u>	160	BH50_0.2, MW01_3.0, MW01_3.8, BH71_0.2
Boron	<10 - 18	4,500	20,000	300,000	36 ¹	36 ¹	None
Cadmium	<0.4 – 1.5	20	90	900	10 ²	22 ³	None
Chromium	<5 - 81	100 ⁴	300 ⁴	3,600 ⁴	NE ⁵	NE ⁵	None
Cobalt	<5 - 30	100	300	4,000	13 ¹	13 ¹	BH44_0.3
Copper	<5 - 130	6000	17,000	240,000	60 ⁶	80 ⁶	BH14_0.1, BH14_0.2
Iron	4,700 – 39,000	NE	NE	NE	NE	NE	-
Lead	<5 - 720	300	600	1,500	1,100	1,800	BH14_0.1, BH14_0.2
Manganese	6.6 - 540	3,800	19,000	60,000	220 ¹	220 ¹	BH44_0.3
Mercury	<0.1 – 0.6	40	80	730	12 ²	50 ³	-
Nickel	<5 - 150	400	1,200	6,000	50 ⁶	80 ⁶	BH09_0.2, BH10_0.1, BH12_0.35, BH22_0.2, BH24_0.0, BH44_0.3, BH66_0.2, BH71_0.2, BH72_0.2
Zinc	<5 – 1,600	7,400	30,000	400,000	190 ⁶	280 ⁶	BH14_0.1, BH14_0.2, BH65_0.2, BH66_0.2
Benzo(a)pyrene	<0.5 - 56	NE	NE	NE	33 ¹²	172 ¹²	BH29_0.05, BH74_0.2
Benzo(a)pyrene TEQ *	<0.5 - 86	3	3	40	NE	NE	BH14_0.1, BH14_0.2, BH15_0.1, BH26_0.15, BH29_0.05, BH31_0.1, BH34_0.1, BH35_0.2, BH40_0.15, BH60_0.1, BH64_1.0, BH65_0.2, BH66_0.2, BH74_0.2
Naphthalene	<0.5 - 3	1,400 ⁹	1,900 ⁹	11,000 ⁹	170	370 ⁸	None
Total PAHs	<0.5 – 525	300	300	4,000	NE	NE	BH29_0.05, BH74_0.2
TRH >C ₁₀ -C ₁₆ (F2)	<50 - 95	3,300 ⁹	3,800 ⁹	20,000 ⁹	NE	NE	None
TRH >C ₁₆ – C ₃₄	<100 – 2,700	4,500 ⁹	5,300 ⁹	27,000 ⁹	300 ⁸	1,700 ⁸	BH26_0.15, BH29_0.05, BH34_0.1, BH66_0.2, BH74_0.2
TPH C ₃₄ - C ₄₀	<100 - 200	6,300 ⁹	7,400 ⁹	38,000 ⁹	2,800 ⁸	3,300 ⁸	None

Analyte	Reported Concentration Range	HIL A Residential	HIL C Recreational	HIL D Commercial / Industrial D	EILs Urban Residential & Open Public Space	EIL Commercial / Industrial (Aged)	Locations exceeding criteria
Ammonia as N	<5 - 12	NE	NE	NE	NE	NE	-
Kjeldahl Nitrogen Total (TKN)	120 – 11,000	NE	NE	NE	3,000 ⁷	3,000 ⁷	BH01_0.0, BH74_0.2
Nitrate (as N)	<5 - 150	13,000 ¹⁰	13,000 ¹⁰	190,000 ¹¹	NE	NE	None
Nitrogen (Total)	120 – 11,033	NE	NE	NE	3,000 ⁷	3,000 ⁷	BH01_0.0, BH74_0.2
Phosphorous	39 – 1,200	NE	NE	NE	1,500 ⁷	1,500 ⁷	None
Potassium	1,000	NE	NE	NE	NE	NE	-
Sulphate	39 – 3,600	NE	NE	NE	NE	NE	-
E. Coli (mpn/g)	<10 – 1,100	100 ¹³	100 ¹³	100 ¹³	NE	NE	BH01_0.0, BH35_0.2, BH54_0.25

Note: all concentrations are in mg/kg (unless stated otherwise)

1 = US EPA (2015) Region 4 Soil Screening Value for Hazardous Waste Sites, Ecological Risk Assessment Supplement Guidance

2 = CCME 2013 - Canadian Soil Quality Guidelines for the protection of environmental health, residential/ parkland

3 = CCME 2013 - Canadian Soil Quality Guidelines for the protection of environmental health, commercial / industrial

4 – NEPM 2013 - Health Investigation Level for Chromium (VI) adopted

5 = NEPM 2013 – Soil specific Ecological Investigation Level for Cr (III) adopted, based on clay content of xx %, aged contamination

6 = NEPM 2013 – Ecological Investigation Levels, (pH 5.1, clay 3.8%, CEC 5.7 cmol_e/kg, TOC 0.1%, low traffic area of Victoria), aged

7 = Upper range necessary for satisfactory plant growth (Charman and Murphy, 2010)

8 = NEPM 2013 – Ecological Screening Level

9 = Friebe and Nadebaum (2011) Health Screening Level, Direct soil contact

10 = US EPA (2021) Regional Screening Level for Residential Soil

11 = US EPA (2021) Regional Screening Level for Industrial Soils

12 = CRC CARE (2017) High reliability ecological guideline for fresh B(a)P

13 = NRMCC (2004) Maximum pathogen level for Grade P1 biosolids, Guidelines for Sewerage Systems Biosolids Management

NE = Guidelines not established

Shading denotes analytical results that exceeded the adopted site criteria.

* Benzo(a)pyrene (TEQ) = Benzo(a)pyrene Toxicity Equivalence refers to the concentration of carcinogenic PAH compounds expressed in relation to potency relative to Benzo(a)pyrene (the most potent carcinogenic PAH)

5.1 AREA A: CATTLE YARDS

In relation to the cattle yards area the following COPC were identified in relation to on-site risks:

- Nickel
- Zinc
- Benzo(a)pyrene
- Benzo(a)pyrene (TEQ)
- Total PAHs
- TRH C₁₆ - C₃₄
- Total nitrogen

These COPC were identified in shallow fill to a depth of 1.0 mbgs.

Further data analysis was undertaken for these COPC incorporating sample locations considered to be located within this defined area of concern on the site. The results from the data analysis are summarised in Table 5-2.

Based on the data analysis nickel, zinc, benzo(a)pyrene, total PAHs and total nitrogen are not considered to be COPC requiring risk management for on-site retention. This is based on the 95% UCL _{average} concentrations being below the adopted soil assessment criteria and the maximum concentrations being less than 250% of the soil assessment criteria. (It is noted that in the case of benzo(a)pyrene, the HIL is set in relation to -- benzo(a)pyrene (TEQ), which includes the contribution of benzo(a)pyrene and related carcinogenic PAH compounds.)

Benzo(a)pyrene (TEQ) and total PAHs are considered COPC requiring risk management in the shallow fill within the cattle yards area. This is due to the 95% UCL _{average} concentrations exceeding the adopted HILs for residential and recreational land use. TRH C₁₆ – C₃₄ was identified as a COPC requiring risk management due to the 95% UCL _{average} exceeding the adopted EIL for residential and open space. The risk management options are discussed in Section 6.

To inform the assessment of risk management / remediation options, we compared the COPC identified in the soil to the waste hazard category thresholds in EPA Publication 1828.2. This has been undertaken to provide an indication of the waste hazard category should the soil need to be disposed and/or managed off-site. The results from this are summarised in Table 5-3, including leachable zinc results for one sample (BH66-0.2). This indicates that the shallow impacted soil in this area of the site (i.e. fill layer) is likely to be categorised as Category D for off-site disposal and management. This is an indicative waste categorisation only and will need to be confirmed by further sampling and analysis for the specific volume of waste soil requiring management. This is discussed further in Section 6.

The area of impacted soil expected to require remediation / management is shown in Figure 11 (attached). This encompasses an area of approximately 2,750 m². Soil impacts have generally been encountered in surficial soil (i.e. ≤ 0.2 mbgs) however some localised impacts in deeper soils (i.e. 0.5 to 1.0 mbgs) have been identified. It has been estimated that the volume of soil requiring remediation / management is likely to be 1,375 m³ assuming the average depth of impacted soil to be 0.5 mbgs.

Table 5-2: Area A: Cattle yards - soil data analysis (Shallow fill)

COPC	HIL A Residential	HIL C Recreational	HIL D Commercial/ Industrial D	EILs Urban Residential & Open Public Space	EIL Commercial/ Industrial	Max	Mean	SD	95% UCL	Risk management required
Nickel (n=22)	400	1,200	6,000	50	80	110	21	23	30	No
Zinc (n=22)	7,400	30,000	400,000	190	280	380	42	85	121	No
Benzo(a)pyrene (n=22)	NE	NE	NE	33	172	56	5	12	16	No
Benzo(a)pyrene (TEQ) (n=22)	3	3	40	NE	NE	86	8	19	25	Yes, UCL > HIL A & C
Total PAHs (n=22)	300	300	4,000	NE	NE	525	45	121	210	No
TRH C ₁₆ – C ₃₄ (n=22)	4,500	5,300	27,000	300	1,700	2,700	287	571	818	Yes, UCL > EIL Residential/Open Space
Nitrogen (Total) (n=18)	NE	NE	NE	3,000	3,000	4,100	711	901	1,107	No

NE = Not established

Table 5-3: Area A: Cattle yards - indicative waste categorisation (Shallow fill)

COPC	No. samples exceeding Fill material upper limit	Total concentration (mg/kg)		Leachable concentration (mg/L) -	Indicative waste category
		Max	95% UCL		
Arsenic (n=22)	5	77	23	-	Category D
Nickel (n=22)	1	110	30	-	Fill material
Zinc (n=22)	1	380	121	1.4 mg/L BH66-0.2 (total concentration 380 mg/kg)	Fill material
Benzo(a)pyrene (n=22)	8	56	16	-	Category D
TPH C ₁₀ – C ₃₆ (n=22)	1	3,233	945	-	Fill material

NE = Not established

5.2 AREA B: SHEEP YARDS

In relation to the sheep yards area the following COPC were identified in relation to on-site risks:

- Benzo(a)pyrene
- Benzo(a)pyrene (TEQ)
- Total PAHs
- TRH C₁₆ - C₃₄
- Total nitrogen

These COPC were identified in shallow fill to a depth of 0.2 mbgs.

Further data analysis was undertaken for these COPC incorporating sample locations considered to be located within this defined area of concern on the site. The results from the data analysis are summarised in Table 5-4.

Based on the data analysis benzo(a)pyrene is not considered to be a COPC requiring risk management for on-site retention, This is based on the 95% UCL *average* concentrations being below the adopted soil assessment criteria and the maximum concentrations being less the 250% of the soil assessment criteria. Benzo(a)pyrene (TEQ) and total PAHs are considered COPC requiring risk management in the shallow fill within the sheep yards area due to the 95% UCL *average* concentrations exceeding the adopted HILs for residential and recreational land use. TRH C₁₆ – C₃₄ and total nitrogen were identified as a COPC requiring risk management due to the 95% UCL *average* concentrations exceeding the adopted EIL for residential and open space. The risk management options are discussed in Section 6.

To inform the assessment of risk management / remediation options we compared the COPC identified in the soil to the waste hazard category thresholds in EPA Publication 1828.2. This has been undertaken to provide an indication of the waste hazard category should the soil need to be disposed and/or management off-site. The results from this are summarised in Table 5-5, including leachable benzo(a)pyrene results for one sample (BH74-0.2). This indicates that the shallow impacted soil in this area of the site (i.e. fill layer) is likely to be categorised as Category D for off-site disposal and management. This is an indicative waste categorisation only and will need to be confirm by further sampling and analysis for the specific volume of waste soil requiring management. This is discussed further in Section 6.

The area of soil impacted expected to require remediation / management is shown in Figure 11 (attached). This encompasses an area of approximately 1,900 m². Soil impacts have generally been encountered in surficial soil (i.e. ≤ 0.2 mbgs). It has been estimated that the volume of soil requiring remediation / management is likely to be 380 m³ assuming the average depth of impacted soil being 0.2 mbgs.

Table 5-4: Area B: Sheep yards - soil data analysis (Shallow fill)

COPC	HIL A Residential	HIL C Recreational	HIL D Commercial/Industrial D	EILs Urban Residential & Open Public Space	EIL Commercial/Industrial	Max	Mean	SD	95% UCL	Risk management required
Benzo(a)pyrene (n=16)	NE	NE	NE	33	172	42	5	11	16	No
Benzo(a)pyrene (TEQ) (n=20)	3	3	40	NE	NE	67	8	17	26	Yes, UCL > HIL A & C
Total PAHs (n=16)	300	300	4,000	NE	NE	411	48	111	324	Yes, UCL > HIL A & C
TRH C16 – C34 (n=20)	4,500	5,300	27,000	300	1,700	1,400	235	366	661	Yes, UCL > EIL Residential/Open Space
Nitrogen (Total) (n=18)	NE	NE	NE	3,000	3,000	11,033	1,253	2,957	4,828	Yes, UCL > EIL Residential/Open Space

Table 5-5: Area B: Sheep yards - indicative waste categorisation (Shallow fill)

COPC	No. samples exceeding Fill material upper limit	Total concentration (mg/kg)		Leachable concentration (mg/L)	Indicative waste category
		Max	95% UCL		
Arsenic (n=17)	4	39	19.8		Fill material
Benzo(a)pyrene (n=16)	6	42	16	<0.001 mg/L BH74-0.2 (total concentration 42 mg/kg)	Category D
TPH C10 – C36 (n=14)	1	1,562	725		Fill material

5.3 AREA C: WESTERN BOUNDARY OF SITE

In relation to the western boundary of site (southern extent) area the following COPC were identified in relation to on-site risks:

- Copper
- Lead
- Zinc
- Benzo(a)pyrene (TEQ)

These COPC were identified in shallow fill to a depth of 0.2 mbgs.

Further data analysis was undertaken for these COPC incorporating sample locations considered to be located within this defined area of concern on the site. The results from the data analysis are summarised in Table 5-6.

Based on the data analysis copper and nickel are not considered to be COPC requiring risk management for on-site retention. This is based on the 95% UCL _{average} concentrations being below the adopted soil assessment criteria and the maximum concentrations being less than 250% of the soil assessment criteria. Lead and benzo(a)pyrene are considered COPC requiring risk management in shallow fill within the area due to the 95% UCL _{average} concentrations exceeding the adopted HILs for residential and recreational land use. The 95% UCL _{average} for arsenic also exceeded the HILs for commercial/industrial land use and the EIL for recreation and public open space. Zinc was also identified as a COPC requiring risk management due to the 95% UCL _{average} concentrations exceeding the adopted EIL for residential and open space and commercial/industrial land uses. The risk management options are discussed in Section 6.

To inform the assessment of risk management / remediation options we compared the COPC identified in the soil to the waste hazard category thresholds in EPA Publication 1828.2. This has been undertaken to provide an indication of the waste hazard category should the soil need to be disposed and/or management off-site. The results from this are summarised in Table 5-7, including leachable nickel results for one sample (BH72-0.2). This indicates that the shallow impacted soil in this area of the site (i.e. fill layer) is likely to be categorised as Category D for off-site disposal and management. This is an indicative waste categorisation only and will need to be confirmed by further sampling and analysis for the specific volume of waste soil requiring management. This is discussed further in Section 6.

The area of soil impacted expected to require remediation / management is shown in Figure 11 (attached). This encompasses an area of approximately 1,300 m². Soil impacts have generally been encountered in surficial soil (i.e. ≤ 0.2 mbgs). It has been estimated that the volume of soil requiring remediation / management is likely to be 260 m³ assuming the average depth of impacted soil being 0.2 mbgs.

Table 5-6: Area C: Western boundary of site - soil data analysis

COPC	HIL A Residential	HIL C Recreational	HIL D Commercial/Industrial D	EILs Urban Residential & Open Public Space	EIL Commercial/Industrial	Max	Mean	SD	95% UCL	Risk management required
Copper (n=13)	6,000	17,000	240,000	60	80	130	28	44	81	No
Lead (n=13)	300	600	1,500	1,100	1,800	720	123	230	757	Yes, UCL > HIL A & HIL C
Nickel (n=13)	400	1,200	6,000	50	80	130	21	34	37	No
Zinc (n=13)	7,400	30,000	400,000	190	280	1,600	200	446	1,430	Yes, UCL > EIL Residential/Open Space and Commercial/Industrial
Benzo(a)pyrene (TEQ) (n=13)	3	3	40	NE	NE	6.3	2	2	4	Yes, UCL > HIL A & C

Table 5-7: Area C: Western boundary of site - indicative waste categorisation

COPC	No. samples exceeding Fill material upper limit	Total concentration (mg/kg)		Leachable concentration (mg/L)	Indicative waste category
		Max	95% UCL		
Arsenic (n=14)	4	29	21		Category D
Copper (n=14)	2	130	81		Fill material
Lead (n=14)	2	720	757		Category D
Nickel (n=14)	1	130	37	0.04 mg/L BH72-0.2 (total concentration 130 mg/kg)	Fill material
Zinc (n=14)	2	1,600	1430		Category D
Benzo(a)pyrene (n=14)	6	6	4		Category D

5.4 AREA D: FORMER SHEEP DIP

In relation to the former sheep dip area (south-eastern corner of site) the following COPC were identified in relation to on-site risks:

- Arsenic

This COPC was identified in shallow and deep fill to a depth of 3.8 mbgs.

Further data analysis was undertaken for this COPC incorporating sample locations considered to be located within this defined area of concern on the site. The results from the data analysis are summarised in Table 5-8. Table 5-7

Based on the data analysis arsenic was considered a COPC requiring risk management in the area due to the 95% UCL *average* concentrations exceeding the adopted HIL for residential land use and exceeding the adopted EILs for residential and public open space and commercial/industrial land uses. The risk management options are discussed in Section 6.

To inform the assessment of risk management / remediation options we compared the COPC identified in the soil to the waste hazard category thresholds in EPA Publication 1828.2. This has been undertaken to provide an indication of the waste hazard category should the soil need to be disposed and/or management off-site. The results from this are summarised in Table 5-9, including leachable arsenic results for one sample (BH71-0.2); this indicates that the impacted soil in this area is likely to be categorised as Category B for off-site disposal and management, due to leachable arsenic concentrations. This is an indicative waste categorisation only and will need to be confirmed by further sampling and analysis for the specific volume of waste soil requiring management. This is discussed further in Section 6.

The area of soil impacted expected to require remediation / management is shown in Figure 11 (attached). This encompasses an area of approximately 600 m². Soil impacts have generally been encountered at depths of up to 3 to 4 mbgs, however risk management would likely be focussed on upper 2m. It has been estimated that the volume of soil requiring remediation / management is likely to be 1,200 m³ assuming the average depth of impacted soil being 2 mbgs.

Table 5-8: Area D: Former sheep dip area - soil data analysis

COPC	HIL A Residential	HIL C Recreational	HIL D Commercial/ Industrial D	EILs Urban Residential & Open Public Space	EIL Commercial/ Industrial	Max	Mean	SD	95% UCL	Risk management required
Arsenic (n=17)	100	300	3,000	100	160	440	103	153	222	Yes, UCL > HIL A and > EIL Residential/Open Space and Commercial / Industrial

Table 5-9: Area D: Former sheep dip area - indicative waste categorisation

COPC	No. samples exceeding Fill material upper limit	Max	95% UCL	Leachable concentration (mg/L)	Indicative waste category
Arsenic (n=17)	9	430	222	2.8 mg/L BH71_0.2 (total concentration 440 mg/kg)	Category B
Benzo(a)pyrene (n=15)	2	2	0.8		Fill material

5.5 AREA E – GENERAL SITE AREAS

In relation to the general areas of the site (i.e. outside of areas A to C) the following COPC were identified in relation to on-site risks:

- Cobalt
- Manganese
- Nickel

These COPC were identified in shallow fill to a depth of 0.3 mbgs. The results for these COPC for the general areas of the site are summarised in Table 5-10. Further statistical data analysis was not undertaken for the Area E results due to the limited nature of the data set available and that the results related to various areas of the site, rather than a defined area (and therefore there is no definable domain for statistical analysis). Cobalt, manganese and nickel are identified as COPC in the general areas of the site that require further assessment to evaluate the risk and need for risk management measures. This was outside of the scope of the targeted soil assessment presented in this report.

For the same reasons as outlined above, we have not provided an indication of the waste category (i.e. per EPA Publication 1828.2) in relation to the shallow impacted soils identified.

Table 5-10: Area E: General areas of site - soil data analysis

COPC	HIL A Residential	HIL C Recreational	HIL D Commercial/ Industrial D	EILs Urban Residential & Open Public Space	EIL Commercial/ Industrial	Max	Mean	SD	95% UCL	Risk management required
Cobalt (n=4)	100	300	4,000	13	13	30	ND	ND	ND	Further assessment required
Manganese (n=4)	3,800	19,000	60,000	220	220	540	ND	ND	ND	Further assessment required
Nickel (n=33)	400	1,200	6,000	50	80	150	ND	ND	ND	Further assessment required

ND = Not determined

6. REMEDIATION OPTIONS ASSESSMENT

6.1 OPTIONS ASSESSMENT BASIS

The previous ESA report (Coffey, 2018) included a preliminary remediation / environmental management options assessment which considered:

- Regulatory requirements
- Further environmental assessment and/or risk assessment works
- Remediation and/or management options for identified contamination of concern

Based on the additional site assessment works, as reported above, the refined saleyards precinct plan and key environmental and site condition constraints, we have further refined the preliminary remediation options assessment as presented below. The remediation options assessment, and associated indicative cost estimates presented, is intended to be preliminary high-level only for the purposes of further precinct planning and land disposal considerations for COGG.

6.1.1 Future Use

The remediation options assessment has been considered in the context of the future use of the site, as described by the Saleyards Draft Precinct Plan (Council, 2020) and as summarised in Section 3.1.

Key aspects of the precinct plan are as follows:

- Key heritage items are to remain onsite, namely:
 - Two rows of cattle yards
 - One timber cattle ramp
 - Central thoroughfare
 - Bluestone paved drain in the sheep yards
 - The Latrines shed.
- A portion of the site will be retained as open space (i.e. the central park and green-links)
- Parts of the site will be redeveloped for roadways (and contain utility services)
- Where developments are to occur, these will be either mixed use or high-density residential developments, which may be as follows:
 - Two and three storey row housing and maisonettes
 - Apartments, 4-6 storeys with basement or semi-basement carparking
 - Mixed use buildings with active frontages.
- A drainage reserve in the northern end of the Precinct that could be reshaped with landscape enhancements and possible wetlands development with walking loops
- A parcel of crown land in the southern end of the Precinct that could be developed to add to the public open space of the Precinct

On the basis of the proposed future site use, we have made the following key assumptions:

- Should contamination be present beneath (and immediately surrounding) the key heritage items that will remain onsite we have assumed that intrusive remediation efforts will not be undertaken (i.e. due to the potential for damage to the heritage items). Further characterisation of the risk profile associated with contamination in these areas may be required and on-going environmental management controls are likely to be required.
- Contamination present within locations where residential lots are identified will likely require remediation / management where the concentrations of contaminants of concern are reported to exceed the applicable health and/or ecological assessment criteria and/or subject to the outcomes of a site specific risk assessment.
- Contamination present beneath proposed open space areas will likely require remediation / management, where the concentrations of contaminants of concern are reported to exceed the applicable health and/or ecological assessment criteria and/or subject to the outcomes of a site-specific risk assessment.
- Should contaminated soils be retained on-site we have assumed that this is mostly likely to be within designated areas of the Precinct which will remain under long-term management control by COGG, such as within the crown land open space / drainage reserves and/or beneath roadways.
- That further soil investigations will not identify other significant areas of contaminated soil
- That no active groundwater remediation will be required

6.1.2 Regulatory Considerations

Victoria's environmental regulatory framework is currently being updated and is in the process of transition. Specifically, the Environmental Protection Act 2017 (informed by the Environment Protection Amendment Act 2018) and subordinate Environmental Protection Regulations 2021 takes effect on 1 July 2021.

As the new regulatory framework shall be in place at the time of the future redevelopment, the current understanding of how the new system will operate and the key implications on the site remediation and redevelopment have been identified as follows:

- Under the Environmental Protection Act 2017 and Environmental Protection Regulations 2021 there is a General Environmental Duty (GED) for landholders which has the effect of requiring any activities undertaken to be done in a way which reduces the risk of harm to human health or the environment so far as reasonably practicable. This includes a Duty to notify EPA of Prescribed Notifiable Contamination and a Duty to manage contamination. Based on the contamination identified at the site we consider that COGG will have Duty to notify EPA, because the soil contamination would be classed as 'prescribed notifiable contamination' (by exceeding applicable investigation levels identified in the NEPM). The exceedance of the levels also means that COGG would have a Duty to manage this contamination. Duty to Manage includes a range of obligations including both minimising potential for harm, and advising any affected stakeholders of all relevant information – for instance, future buyers of contaminated land would need to be advised of that status.
- The site is currently zoned as industrial. Should redevelopment of the site into a more sensitive use (i.e. residential) be undertaken, as is proposed, a statutory environmental audit will be required to confirm that the site's environmental condition is suitable for the more sensitive use. This process would require engagement of an EPA appointed Environmental Auditor to complete the audit, and an assessment consultant to complete additional environmental assessment works to inform the audit. The further assessment works would likely require further soil and groundwater investigation. As part of the environmental audit it may be necessary for the status of groundwater in respect of Clean Up So Far As Reasonably Practicable (previously 'CUTEP').

Tetra Tech Coffey understands from EPA Publication 1977 (June 2021) that EPA will no longer identify/determine Groundwater Quality Restricted Use Zones (GQRUZs), but may rather rely on audit recommendations and the Duty to Manage requirement to provide information to affected parties. There is expected to be further clarity when guidelines for the conduct of audits are published (this had not occurred by late June 2021). The further assessments works would likely require the need for a site-specific human health and ecological risk assessment (HHERA). An outcome of the audit is likely to recommendations for environmental management measures for all or part of the site, as part of a statement of environmental audit. It is understood that in some circumstances, EPA may pick up audit recommendations and include them in a Site Management Order (SMO). Where an SMO is issued, it is understood that this will be noted on the land title.

- Any waste soils generated by construction activities to be disposed/managed off-site and/or temporarily stockpiled on-site will need to be sampled and analysed to determine the waste hazard category (i.e. Category A, B, C, D or Fill Material) in accordance EPA Publication 1828.2 Waste disposal categories – characteristics and thresholds. If any asbestos was identified, but no other contaminants in Categories A-D, for some soils, those soils would be recognised as soil containing asbestos only. The waste soil will then to be managed in accordance with the Environmental Protection Regulations in relation to industrial and priority waste. This will include a requirement to dispose the waste soil at a lawful place – for priority waste this will be a facility permitted by EPA to receive the relevant category of waste. It is noted that there are currently no facilities specifically licenced to received Category D waste soil, although it is understood that in the event of off-site disposal, Category D waste soil will be able to be received at a Category C landfill.
- Should contaminated soils be retained on-site there would likely be a requirement to obtain an appropriate permission from EPA under the requirements of Chapter 3 and Schedule 1 of the Environmental Protection Regulations 2021. Depending on the nature and extent of contamination and volume of soil and remediation/management options considered for the site, this is like to be one (or both) of the following schedule activities:
 - Activity L02: Contaminated Sites on-site soil retention. On-site retention of contaminated soil (other than fill material) in a structure designed to contain at least 1,000 m³ of soil and to prevent further contamination. This is identified as being a 'Prescribed development activity' and would require a Development Licence from EPA to proceed (equivalent to a Works Approval). It is understood that for soil volumes less than 1000 m³, it may be possible to retain contaminated soils on a site without a need for a permission, and subject only to the GED and Duty to Manage.
 - Activity A17: Containment of Category D waste soils. Containment of Category D waste soil generated at that project site. This is identified as being a 'Prescribed permit activity' and would require a permit from EPA to proceed, although it is noted that the use of Category D under this arrangement is somewhat unclear (one interpretation is that the Category D option is primarily for retention of soils from different non-contiguous parts of an infrastructure site). It is also assumed that EPA consider this to be a relevant schedule activity for long-term containment, as opposed to temporary containment. These aspects have not yet been fully clarified by EPA. It is noted that Category D is a new priority waste category applying only to soil and covers the least hazardous soils (other than Fill material).

6.1.3 Site Specific Setting

On the basis of the most recent site assessment and the review of available historical information, key site-specific setting constraints that require consideration in the site's future remedial management are summarised, for the Site and each specific area, as follows:

- The generalised subsurface lithology observed at the site is:
 - FILL: Sand, light brown, fine grained, dry loose (~0 – 0.2 metres below ground surface (mbgs))
 - CLAY: Orange-brown, medium to high plasticity, moist, firm (~0.2 – 10 mbgs)
 - Extraneous material has been identified in the upper 0.4m of fill at some locations, including glass fragments, nails, timber, metal, ash and/or charcoal
- Groundwater underlying the site has been identified at a depth of 4 to 8 m below the surface
- The salinity of groundwater underlying the site has been identified to range from 6,325 mg/L to 10,368 mg/L total dissolved solids (TDS) and classified as Segment D in accordance with SEPP Waters (2018).
- Where shallow impacted soil (i.e. fill layer) is to be disposed of off-site or managed, it is likely to be categorised as Category D soils. The exception being the former sheep dip area in the south-east portion of the site where the impacted soils are likely to be categorised as Category B.

A summary of the key areas of soil contamination on the site is provided in Table 6-1.

Table 6-1: Summary of key areas of soil contamination

Area	COPCs	Area / Volume of Contaminated Soils
Area A – Cattle Yards	• Benzo(a)pyrene (TEQ) and total PAHs may require risk management due to the 95% UCL concentrations exceeding the adopted HILs for residential and recreational land use. • TRH C₁₆ – C₃₄ may require risk management due to the 95% UCL exceeding the adopted EIL for residential and open space. • Should shallow impacted fill need to be disposed and/or managed off-site it is likely to be categorised as Category D • Impacts encountered are generally relatively surficial (i.e. ~ ≤ 0.2 mbgs). Some localised impacts in deeper soils (i.e. 0.5 to 1.0 mbgs) have been identified.	• The area and volume of soil that may require risk management within Area A is approximately 2,750 m² and 1,375 m³ (assuming an average depth of impacted soil being 0.5 mbgs). • On the basis of the current future use plans and known distribution of the COPCs, approximately: ○ ~350 m² of the contaminated area is considered to be inaccessible for intrusive remedial activity (beneath heritage area) ○ ~2,2500 m² is present beneath residential redevelopment areas and will require management. ○ ~150 m² is present within proposed open space areas and will require management.
Area B – Sheep Yards	• Benzo(a)pyrene (TEQ) and total PAHs may require risk management due to the 95% UCL concentrations exceeding the adopted HILs for residential and recreational land use. • TRH C₁₆ – C₃₄ and total nitrogen may require risk management due to the 95% UCL exceeding the adopted EIL for residential and open space. • Should shallow impacted fill need to be disposed and/or managed off-site it is likely to be categorised as Category D. • Impacts encountered are relatively surficial (i.e. ~ ≤ 0.2 mbgs).	• The area and volume of soil that may require risk management within Area B is approximately 1,900 m² and 380 m³ (assuming an average depth of impacted soil being 0.2 mbgs). • On the basis of the current future use plans and known distribution of the COPCs, approximately: ○ 950 m² of the contaminated area is considered to be inaccessible for intrusive remedial activity (beneath heritage area) ○ 950 m² is present beneath residential redevelopment areas or within proposed open space areas and will require management.

Area	COPCs	Area / Volume of Contaminated Soils
Area C – Western Boundary of site	- Lead and benzo(a)pyrene (TEQ) may require risk management due to the 95% UCL concentrations exceeding the adopted HILs for residential and recreational land use. - Zinc may require risk management due to the 95% UCL exceeding the adopted EIL for residential and open space. - Should shallow impacted fill need to be disposed and/or managed off-site it is likely to be categorised as Category D. - Impacts encountered are relatively surficial. (i.e. $\sim \leq 0.2$ mbgs).	- The area and volume of soil that may require risk management within Area C is approximately 1,300 m² and 260 m³ (assuming an average depth of impacted soil being 0.2 mbgs). - On the basis of the current future use plans and known distribution of the COPCs, approximately: 380 m² of the contaminated area is considered to be beneath roadways and therefore 'capped' beneath a barrier. 920 m² is present beneath residential redevelopment areas and within proposed open space areas and will require management.
Area D – Former Sheep Dip	- Arsenic may require risk management due to the 95% UCL concentrations exceeding the adopted HILs for residential land use and EILs for residential and public open space and commercial/industrial land uses. - Should impacted fill need to be disposed and/or managed off-site it is likely to be categorised as Category B. Impacts encountered are comparatively deep (i.e. up to 3 to 4 mbgs, however, management would be localised towards the top 2 m (if management is warranted).	- The area and volume of soil that may require risk management within Area D is approximately 600 m² and 1,200 m³, respectively (assuming an average depth of impacted soil being 2 mbgs). - On the basis of the current future use plans and known distribution of the COPCs, approximately: 600 m² is present beneath residential redevelopment areas and will require management.

6.2 REMEDIATION OPTIONS

Each potential land use may require varying degrees of remediation / management. Based on the current understanding of the site and the distribution of contamination, remediation and / or management activities may include a combination of the following main options:

- Administrative controls (leave the contamination undisturbed and implemented long-term management controls)
- Excavation and off-site disposal of contaminated soils to a licenced facility
- Excavation and on-site retention of contaminated soils (in a designated area/s)
- Construction of an impermeable barrier (e.g. capping) to prevent direct contact with contaminated soils (i.e. engineered facility).

While each of the above remediation options may be considered practicable for adoption, some options are likely to be more suitable and cost effective, when reviewed in the context of the above options assessment basis. These considerations are summarised in Table 6-2.

Table 6-2: Summary of remediation / management options for contaminated soil

Remediation Option	Option Description	Option Retained?		
		Open space areas	Under roadways	Residential areas
Administrative controls (leave contamination undisturbed)	Contamination is to remain in-situ and undisturbed (unless during construction activities, whereby it will require appropriate management). Option includes, where practicable: - The registration of contamination within dial-before-you-dig requests, such that third-parties undertaking intrusive works are aware of the presence of residual soil contamination. - Inclusion of relevant aspects to prevent direct contact with contamination and to enact long-term environmental management controls via Council environmental management plans (e.g. for open space and crown land) and/or via statement of environmental audit conditions for residential lots/development areas.	Option not retained for this area. Risks associated with direct contact / ingestion remain and are unlikely to be acceptable to EPA and future land owners in consideration of retained liability and ability to manage risk.	Option retained for this area. - Although risks associated with direct contact / ingestion remain the potential pathways are unlikely to exist. - Areas will remain within Council and/or body corporate control and appropriate environmental risk management measures could be incorporated into Council's environmental management plans and standard operating procedures in the event of intrusive works within the contaminated areas. The retention of contaminated soil in these areas would be subject to endorsement by EPA and an environmental auditor.	Option not retained for this area. The risk associated with the presence of impacted material remaining in-situ within the residential areas (storey apartment / storey maisonette / storey row houses), is currently assumed to be unacceptable and would require risk management controls at the individual lot level. This is unlikely to be supported by an environmental auditor and EPA. Further, we understand that Council's preference that the material is removed from these areas prior to divestment / redevelopment to reduce potential future management liabilities.
Excavation and off-site disposal	Contaminated material would be removed and disposed of to an appropriately licensed facility following categorisation in accordance with EPA Publication 1828.2 Waste disposal characteristics and thresholds. Clean fill material shall be imported to achieve the final form elevation.	Option retained for this area. - Risks associated with direct contact / ingestion are removed - The material is disposed off-site and Council will not retain future liabilities associated with retention of this material onsite - Off-site disposal will not require the construction of purpose built onsite retention area/s, which would trigger the need for EPA approvals and long-term environmental management controls	Option retained for this area. - As per open space areas - Option can be applied to all areas or specifically in areas that will only be disturbed during construction activities.	Option retained for this area. As per open space areas
Excavation and on-site retention	Contaminated material would be removed and placed within an appropriately designed and constructed form within an on-site area that will remain in Council's control. This would require development and design of an on-site retention strategy, which would be subject to EPA approval and would require long-term environmental management controls. Clean fill material shall be imported to achieve the final form elevation.	Option retained for this area. - Risks associated with direct contact / ingestion are removed - The material is retained onsite - Option will require the construction of a designated onsite retention area/s, which would trigger the need for EPA approvals	Option retained for this area. - As per open space areas - Option can be applied to all areas or specifically in areas that will only be disturbed during construction activities.	Option retained for this area. - As per open space areas - Consideration shall be made to implementing stabilisation technologies to address Area D soils to reduce potential for future arsenic leachate issues.
Impermeable barriers	Contaminated material is effectively 'capped', such that known risk pathways are not realised. Impermeable barriers may include the construction of hardstand, plastic liners, or importation of layers of clean fill material. The impermeable barriers would need to be engineered, and verified, to designated specifications	Option retained for this area. - Risks associated with direct contact / ingestion are 'intercepted' - The material shall remain in-situ and Council will therefore retain future liabilities associated with retention of this material onsite - Option will require routine maintenance to ensure integrity of the barriers - Option may trigger the need for EPA approvals as an engineered 'containment' facility	Option retained for this area. - The construction of roadways will effectively 'cap' any contaminated material. - The material shall remain in-situ and Council will therefore retain future liabilities associated with retention of this material onsite - Option will require routine maintenance to ensure integrity of the barriers - Option would trigger the need for EPA approvals as an engineered 'containment' facility	Option not retained for this area. The risk associated with the presence of impacted material remaining in-situ within the residential areas (storey apartment / storey maisonette / storey row houses with rear courtyard, beneath the slabs), is currently assumed to be unacceptable and would require risk management controls at the individual lot level. This is unlikely to be supported by an environmental auditor and EPA. Further, we understand that Council's preference that the material is removed from these areas prior to divestment / redevelopment to reduce potential future management liabilities.

On the basis of the above technical and logistical assessment, there appear to be two (2) main potentially feasible approaches for the different final-form areas of the site:

Approach A: Off-site disposal

This approach will involve the following:

- Within open space areas and residential areas, (the areas of known contamination shall be excavated, typically to a depth of between 0.2 and 0.5 m (but to a maximum depth of 2 m, with final excavation depth pending validation sampling) and the material shall be disposed to off-site licenced facility. Clean fill material shall be imported to achieve the final form elevation for these areas.
- Under roadways, where contaminated material is encountered and disturbed during construction activities (e.g. trenching during installation of services), the material shall be disposed to off-site licenced facility.
- Within areas that contamination shall remain (e.g. under roadways or within the vicinity of heritage areas), administrative controls shall be applied.
- Contaminated soils within Area D may potentially be classified as Category B soils (for disposal purposes). These shall be pre-treated to reduce the leachable content. The soils would then be reclassified and subsequently disposed of to an appropriately licenced facility.

Approach B: Retain contaminated material onsite

This option is essentially as per Approach A, however, the contaminated soil material shall be retained onsite (in comparison to off-site disposal to a licenced facility) in a controlled manner.

There appears to be two (2) general locations where the contaminated material can be appropriately retained onsite being:

- The drainage reserve in the northern end of the Precinct
- The parcel of open space crown land in the southern end of the Precinct

These two areas are considered likely to remain under long-term Council management control and are areas where the potential for landscaping enhancements have been identified. As such we consider it is feasible that contaminated soil could be reasonably retained in these areas incorporated into the landscaping features under a long-term on-site retention strategy. It may also be possible to retain contaminated soil under designated roadways, however this is not preferred given the high potential for future subsurface disturbance for road maintenance works. Given the volumes of material to be retained, this would be expected to require EPA approval through a Development Licence.

Given the expected need for an environmental audit to determine acceptable approaches for the site to be developed and considered suitable, any final decision regarding which approach to adopt would logically be undertaken in consultation with the appointed auditor. It is noted that any further information obtained during investigations which may be required to achieve an audit outcome may affect the factors considered to date regarding the likely merits of the respective approaches.

6.3 HIGH-LEVEL REMEDIATION COST ESTIMATE

The following cost estimates are considered preliminary and is a very high-level indicative estimate only provided for the preliminary planning purposes. A probabilistic cost modelling has not been undertaken and the high-level estimate provided may vary once completed. The high-level estimate is based on the current understanding of the site and the potential land use constraints and is summarised in Table 6-3. The estimated costs may require revision when further information is obtained.

Table 6-3: High-Level Remediation Cost Estimate Summary *

Aspect	Approach A	Approach B
Conduct further environmental site assessment and environmental audit	\$250,000 – \$400,000 Includes Audit fees and associated detailed assessment of each parcel of land in accordance with the Australian Standards for soil sampling density, assumes further groundwater assessment will be required.	
Remediation of residential and open spaces	\$1,155,000 - \$1,485,000 Includes: - excavation and off-site disposal of ~2,900 m³ of Category D soils to an appropriately licenced facility. - importation of ~ 2,900 m³ of clean fill to achieve the final form. - contractor costs to excavate and backfill - Project management cost for managing tendering and managing contractors and consultants	\$715,000 - \$1,210,000 Includes: - excavation and on-site retention of ~2,900 m³ of Category D soils - importation of ~ 2,900 m³ of clean fill to achieve the final form. - contractor costs to excavate and backfill - Consulting / contractor costs associated with design of on-site retention areas/s, seeking EPA approvals and preparation of environmental management plan documentation - Contractors costs associated with the constructions of on-site retention areas - Project management cost for managing tendering and managing contractors and consultants
Under roadways	\$0 Costs associated with excavation of trenches to install services and the associated disposal of material is not included in this cost estimate as this would be considered a construction element / development cost.	
Total	\$1,405,000 - \$1,885,000	\$965,000 - \$1,610,000

*** Key assumptions:**

- We have based the cost estimates on currently assumed quantities of contaminated soil, this may change based on further data
- We have assumed that in each area of concern on the site that 10% of the area will be roadway and/or beneath a heritage feature, as such contaminated soil could potential be retained in these areas
- We have assumed all soil to be disposed off-site will be Category D, following further sampling and analysis, we a disposal rate of \$160 to \$190/tonne (load, cart and dispose)
- We have assumed that the soil currently categorised as Category B in Area D will be able to be categorised as Category D following further sampling, analysis and statistical assessment
- We have assumed that the volume of Category D soil to be removed will need to be replaced by clean fill sourced off-site
- We have notionally assumed an allowance for contractor cost to excavate and backfill as 15% to 20% of the total cost for Category D off-site disposal and clean fill importation
- In relation to on-site retention of contaminated soil: the low end of the range is based on a retention strategy that does not require specific engineering design, such as a landscaped mound (or similar). The upper end of the range assumes an engineered 'containment facility' which including design and construct of an engineered cap and that an engineered liner will not be required
- The remediation estimates are based on addressing the four key areas of concern only (i.e. Area A to Area D), remediation may be required in other areas of the site following further investigation

7. CONCLUSIONS

This report presents the findings from an environment site assessment to further characterise the extents of previously identified areas of soils contamination on the Site and to provide further advice on the nature and extent of the remediation / environmental management works likely to be required for the Site. This has been undertaken in the context of the proposed Geelong saleyards Precinct Plan.

A summary of the key findings from the further environmental site assessment and remediation options assessment are provided below.

7.1 EXTENTS OF SOIL CONTAMINATION

The further environmental site assessment included intrusive soil investigations to further characterise the extents of soil contamination in the following areas of concern on the Site:

- Area A – Cattle yards
- Area B – Sheep yards
- Area C – Western boundary of site
- Area D – Former sheep dip
- Area E – General areas of site

For each of these areas of concern the data from the current and historical soil investigations were considered and a refined evaluation of COPC and area / volume of impacted soil considered likely to require risk management on the proposed site development evaluation. Further, the indicative waste category for impacted soil was determined with reference to in EPA Victoria Publication 1282.2 Waste disposal characteristics and thresholds (June 2020) (which will apply for 1 July 2021). A summary of the conclusions regarding the identified soil contamination in the areas of concern on the Site is provided in Table 7-1.

Table 7-1: Summary of soil contamination in areas of concern

Area of concern	COPCs	Indicative waste category (off-site disposal)	Area / volume of Contaminated soils
Area A – Cattle Yards	• Benzo(a)pyrene (TEQ) and total PAHs exceeding the adopted HILs for residential and recreational land use. • TRH C₁₆ – C₃₄ exceeding the adopted EIL for residential and open space.	• Should shallow impacted fill need to be disposed and/or managed off-site it is likely to be categorised as Category D	• The area and volume of soil that may require risk management within Area A is 2,750 m² and 1,375 m³ (assuming an average depth of impacted soil being 0.5 mbgs).
Area B – Sheep Yards	• Benzo(a)pyrene (TEQ) and total PAHs exceeding the adopted HILs for residential and recreational land use. • TRH C₁₆ – C₃₄ and total nitrogen exceeding the adopted EIL for residential and open space.	• Should shallow impacted fill need to be disposed and/or managed off-site it is likely to be categorised as Category D	• The area and volume of soil that may require risk management within Area B is approximately 1,900 m² and 380 m³ (assuming an average depth of impacted soil being 0.2 mbgs).

Area of concern	COPCs	Indicative waste category (off-site disposal)	Area / volume of Contaminated soils
Area C – Western Boundary of site	- Lead and benzo(a)pyrene (TEQ) exceeding the adopted HILs for residential and recreational land use. - Zinc exceeding the adopted EIL for residential and open space.	Should shallow impacted fill need to be disposed and/or managed off-site it is likely to be categorised as Category D	The area and volume of soil that may require risk management within Area C is approximately 1,300 m² and 260 m³ (assuming an average depth of impacted soil being 0.2 mbgs).
Area D – Former Sheep Dip	Arsenic exceeding the adopted HILs for residential land use and EILs for residential and public open space and commercial/industrial land uses.	Should impacted fill need to be disposed and/or managed off-site it is likely to be categorised as Category B	The area and volume of soil that may require risk management within Area D is approximately m² and 1,200 m³, respectively (assuming an average depth of impacted soil being 2 mbgs).
Area E – General areas of the site	Cobalt, manganese and nickel may require risk management due to maximum concentrations exceeding the adopted EILs for residential and public open space	The indicative waste category has not been determined due to the limited nature of the data set	The area and volume of soil that may require risk management has not been determined

7.2 REMEDIATION OPTIONS ASSESSMENT

Based on the additional site assessment works, as reported above, the refined saleyards precinct plan and key environmental and site condition constraints, we have further refined the preliminary remediation options. This is focussed on the remediation options and associated indicative costs to address soil contamination on the four main areas of the site (i.e. Area A to D), as defined in Table 7-1.

Based on the current understanding of the site and the distribution of contamination, remediation and / or management activities the following main remediation / management options were considered:

- Administrative controls (leave the contamination undisturbed and implemented long-term management controls)
- Excavation and off-site disposal of contaminated soils to a licenced facility
- Excavation and on-site retention of contaminated soils (in a designated area/s)
- Construction of an impermeable barrier (e.g. capping) to prevent direct contact with contaminated soils (i.e. engineered facility).

Based on a technical and logistical assessment of these various options we identified two main potentially feasible remediation/management approaches for the contaminated soil, as summarised in Table 7-2. This includes preliminary / very-high level indicative cost estimates for each approach.

Table 7-2: Summary of main remediation/management approaches *

	Approach A: Off-site disposal	Approach B: On-site retention
Description	• Further environmental site assessment and completion of environmental audit • Excavation and off-site disposal of contaminated soil (Areas A to D) • Some on-site retention beneath designated roadways	• Further environmental site assessment and completion of environmental audit • Excavation and on-site retention of contaminated soil (Areas A to D) • Significant on-site retention of contaminated soil within designated areas of the Precinct. • Requirement for EPA approval of on-site retention strategy • Requirement for long-term environmental management plan and controls
High-level remediation cost estimate	\$1,405,000 - \$1,885,000	\$965,000 - \$1,610,000

* Key assumptions:

- We have based the cost estimates on currently assumed quantities of contaminated soil, this may change based on further data
- We have assumed that in each area of concern on the site that 10% of the area will be roadway and/or beneath a heritage feature, as such contaminated soil could potential be retained in these areas
- We have assumed all soil to be disposed off-site will be Category D, following further sampling and analysis, we a disposal rate of \$160 to \$190/tonne (load, cart and dispose)
- We have assumed that the soil currently categorised as Category B in Area D will be able to be categorised as Category D following further sampling, analysis and statistical assessment
- We have assumed that the volume of Category D soil to be removed will need to be replaced by clean fill sourced off-site
- We have notionally assumed an allowance for contractor cost to excavate and backfill as 15% to 20% of the total cost for Category D off-site disposal and clean fill importation
- In relation to on-site retention of contaminated soil: the low end of the range is based on a retention strategy that does not require specific engineering design, such as a landscaped mound (or similar). The upper end of the range assumes an engineered 'containment facility' which including design and construct of an engineered cap and that an engineered liner will not be required
- The remediation estimates are based on addressing the four key areas of concern only (i.e. Area A to Area D), remediation may be required in other areas of the site following further investigation

It is noted that the main remediation / management approaches are been developed based on currently identified soil contamination in the four main areas of the site (i.e. Area A to D) and considered chemical contamination only (i.e. we have not considered physical and/or biological contaminants). The approaches described are those we believe most feasible based on our professional judgement and interpretation of EPA requirements and environmental regulations. However, the approaches suggested will need to be confirmed through the environmental audit process and with EPA (where permissions are required, such as for a retention structure). Further assessment work undertaken as part of an audit may change the data on which indicative cost estimates have been based, and so the costs should not be taken as upper limits, but rather indicative relative likely costs. Final costs required will depend on the full detail of site conditions which is not in hand currently. As well, EPA has not finalised a number of publications, nor commenced its permissions system at the time of this report. While Tetra Tech Coffey has endeavoured to represent the likely details of the future system, there remain a number of areas where EPA confirmation of intended processes is needed before any certainty can be assumed for eventual project requirements.

This report must be read in conjunction with the attached 'Important information about your Tetra Tech Coffey Report'

8. REFERENCES

- ANZECC 2000**, *Australian and New Zealand Water Quality Guidelines for Fresh and Marine Waters*, National Water Quality Management Strategy, Australian and New Zealand Environment and Conservation Council (ANZECC).
- CCME (2013)** *Canadian Soil Quality Guidelines for the protection of environmental health, residential/ parkland*. Canadian Council of Ministers of the Environment, Environment Canada.
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- Coffey (2018)** *Geelong Saleyards, Phase 1 & 2 Environmental Site Assessment*
- COGG (2020)** *The City of Greater Geelong Saleyards Precinct Plan (First Draft, May 2020)*
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- EPA (2021)** *EPA Publication 1828.2 Waste disposal categories – characteristics and thresholds*
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- NRMMC (2004)** *Maximum pathogen level for Grade P1 biosolids, Guidelines for Sewerage Systems Biosolids Management*. Natural Resource Management Ministerial Council.
- Olszowy, H, Torr, P, Imray, P. (1995)** *Trace element concentrations in soils from rural and urban areas of Australia*. Contaminated sites monograph no.4, South Australian Health Commission.
- Standard Australia (2005)** *Guide to the Sampling and Investigation of Potentially Contaminated Soil. Part 1: Non-volatile and semi-volatile compounds*, AS 4482.1-2005, Standard Australia.
- State Environment Protection Policy (Prevention and Management of Contamination of Land)**. S95, 4th June 2002.
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- The Noa Group (2020)** *Geelong Saleyards Draft Precinct Plan Engagement Report (October 2020)*
- US EPA (2015)** *Region 4 Soil Screening Value for Hazardous Waste Sites, Ecological Risk Assessment Supplement Guidance*. US Environmental Protection Agency.
- US EPA (2021)** *Regional Screening Level for Residential Soil*. US Environmental Protection Agency.
- US EPA (2021)** *Regional Screening Level for Industrial Soils*. US Environmental Protection Agency.
- US EPA (2017)** *Toxicological Review of Benzo(a)pyrene, Executive Summary*. US Environmental Protection Agency.

LIMITATIONS

IMPORTANT INFORMATION ABOUT YOUR TETRA TECH COFFEY ENVIRONMENTAL REPORT

Introduction

This report has been prepared by Tetra Tech Coffey for you, as Tetra Tech Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice.

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Tetra Tech Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Tetra Tech Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Tetra Tech Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Tetra Tech Coffey should be kept apprised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statutes and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Tetra Tech Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Tetra Tech Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Tetra Tech Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Tetra Tech Coffey prepared the report and has familiarity with the site, Tetra Tech Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Tetra Tech Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

Responsibility

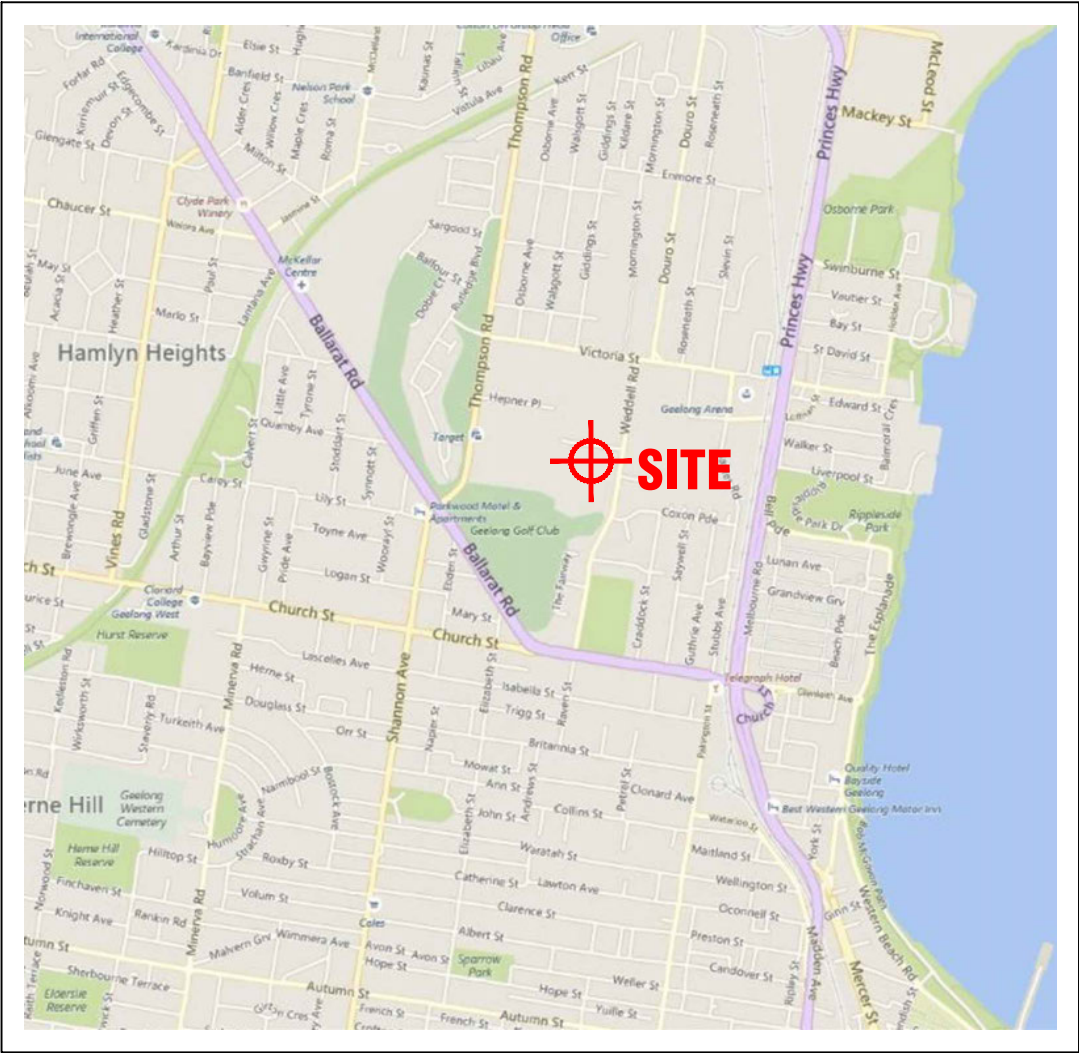
Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

FIGURES

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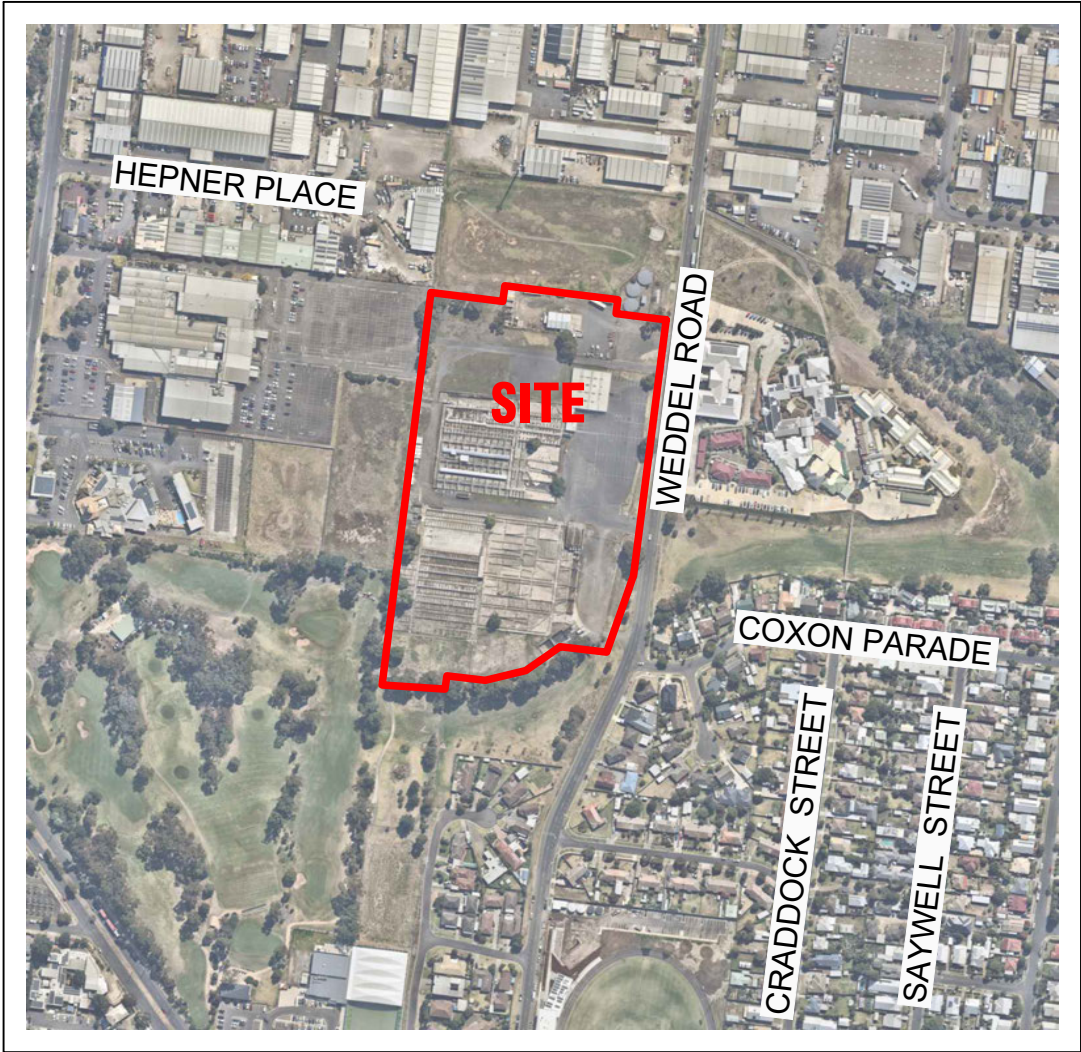
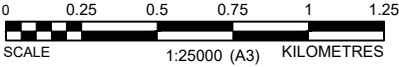


GENERAL AREA MAP



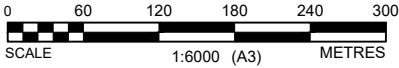
REGIONAL AREA MAP

© Bing Maps, downloaded 26.03.18

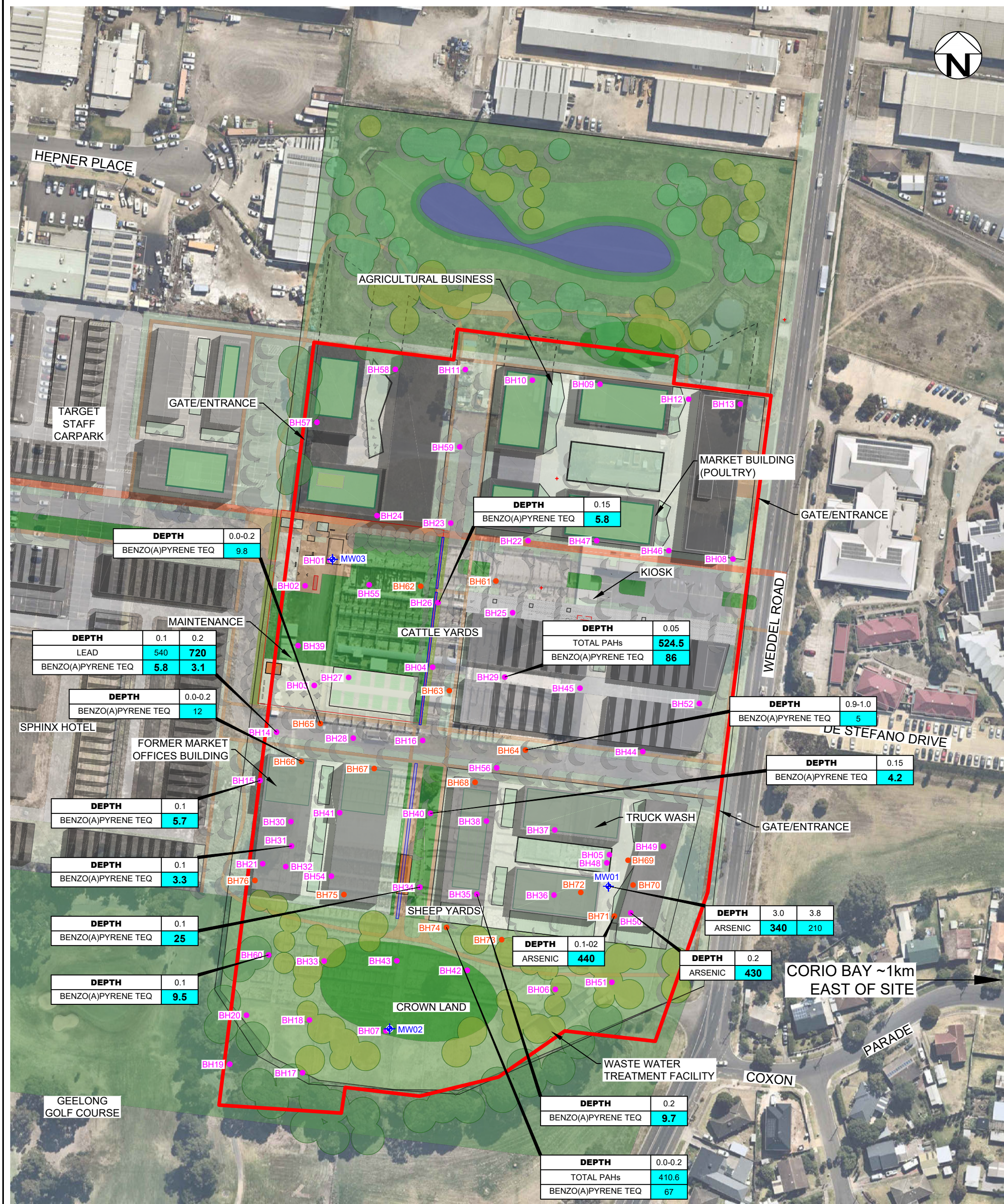


LOCAL AREA MAP

© Nearmap, captured 11.03.21



revision	no.	description	drawn	approved	date	drawn	JO	 A TETRA TECH COMPANY	client: CITY OF GREATER GEELONG		
	A	ORIGINAL ISSUE	JO	AW	24/06/2021	approved	AW		project: GEELONG SALEYARDS FURTHER ESA 125-135 WEDDELL ROAD, NORTH GEELONG, VICTORIA		
						date	24/06/2021		title: SITE BOUNDARY/LOCALITY		
						scale	AS SHOWN		project no: 754-GEXEN282929-R01		
						original size	A3		figure no: FIGURE 1		rev: A



no.	description	drawn	approved	date
A	ORIGINAL ISSUE	JO	AW	24/06/2021

LEGEND

MW GROUNDWATER MONITORING WELL

BH SOIL BORE LOCATION (2018)

BH SOIL BORE LOCATION (2021)

SITE BOUNDARY

mg/kg MILLIGRAMS PER KILOGRAM

HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED CRITERIA:

12	NEPM 2013 HILLS RESIDENTIAL A SOIL
12	NEPM 2013 HILLS RECREATIONAL C SOIL

drawn	JO
approved	AW
date	24/06/2021
scale	AS SHOWN
original size	A3

A TETRA TECH COMPANY

client:	CITY OF GREATER GEELONG		
project:	GEELONG SALEYARDS FURTHER ESA 125-135 WEDDELL ROAD, NORTH GEELONG, VICTORIA		
title:	SOIL RESULTS - HILLS RESIDENTIAL AND RECREATIONAL CRITERIA EXCEEDANCES		
project no:	754-GEXEN282929-R01	figure no:	FIGURE 3
rev:	A		

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no.	description	drawn	approved	date
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revision

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SCALE

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METRES

drawn	JO
approved	AW
date	24/06/2021
scale	AS SHOWN
original size	A3

coffey

A TETRA TECH COMPANY

LEGEND

MW

GROUNDWATER MONITORING WELL

BH

SOIL BORE LOCATION (2018)

BH

SOIL BORE LOCATION (2021)

SITE BOUNDARY

mg/kg

MILLIGRAMS PER KILOGRAM

HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED CRITERIA:

12

NEPM 2013 EILS URBAN RESIDENTIAL AND OPEN PUBLIC SPACES (AGED)

client:

CITY OF GREATER GEELONG

project:

GEELONG SALEYARDS FURTHER ESA
125-135 WEDDELL ROAD,
NORTH GEELONG, VICTORIA

title:

SOIL RESULTS - EILS URBAN RESIDENTIAL AND OPEN PUBLIC SPACES CRITERIA EXCEEDANCES

project no:

754-GEXEN282929-R01

figure no:

FIGURE 4

rev:

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revision

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SCALE

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METRES

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date	24/06/2021
scale	AS SHOWN
original size	A3

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A TETRA TECH COMPANY

client:	CITY OF GREATER GEELONG		
project:	GEELONG SALEYARDS FURTHER ESA 125-135 WEDDELL ROAD, NORTH GEELONG, VICTORIA		
title:	SOIL RESULTS - HILLS COMMERCIAL/INDUSTRIAL D SOIL CRITERIA EXCEEDANCES		
project no:	754-GEXEN282929-R01	figure no:	FIGURE 5
rev:	A		

LEGEND

MW

GROUNDWATER MONITORING WELL

BH

SOIL BORE LOCATION (2018)

BH

SOIL BORE LOCATION (2021)

SITE BOUNDARY

mg/kg

MILLIGRAMS PER KILOGRAM

HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED CRITERIA:

12

NEPM 2013 HILLS COMMERCIAL/ INDUSTRIAL D SOIL



no.	description	drawn	approved	date
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scale	AS SHOWN
original size	A3

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SCALE1:1500 (A3)METRES

coffey

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client:

CITY OF GREATER GEELONG

project:

GEELONG SALEYARDS FURTHER ESA
125-135 WEDDELL ROAD,
NORTH GEELONG, VICTORIA

title:

SOIL RESULTS - EILS COMMERCIAL AND
INDUSTRIAL CRITERIA EXCEEDANCES

project no:

754-GEXEN282929-R01

figure no:

FIGURE 6

rev:

A

LEGEND

MW

GROUNDWATER MONITORING WELL

BH

SOIL BORE LOCATION (2018)

BH

SOIL BORE LOCATION (2021)

SITE BOUNDARY

mg/kg

MILLIGRAMS PER KILOGRAM

HIGHLIGHTED VALUES INDICATE
CONCENTRATIONS EXCEED CRITERIA:
NEPM 2013 EILS COMMERCIAL AND
INDUSTRIAL (AGED)

12

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no.

description

drawn

approved

date

revision

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ORIGINAL ISSUE

JO

AW

24/06/2021

LEGEND

MW

BH

BH

GROUNDWATER MONITORING WELL

SOIL BORE LOCATION (2018)

SOIL BORE LOCATION (2021)

SITE BOUNDARY

mpn/g

MOST PROBABLE NUMBER PER GRAM

HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED CRITERIA:

12

NEPM 2013 HILS RESIDENTIAL A SOIL

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75

SCALE

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METRES

drawn

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approved

AW

date

24/06/2021

scale

AS SHOWN

original size

A3

client:

CITY OF GREATER GEELONG

project:

GEELONG SALEYARDS FURTHER ESA
125-135 WEDDELL ROAD,
NORTH GEELONG, VICTORIA

title:

SOIL RESULTS - PATHOGENS

project no:

754-GEXEN282929-R01

figure no:

FIGURE 7

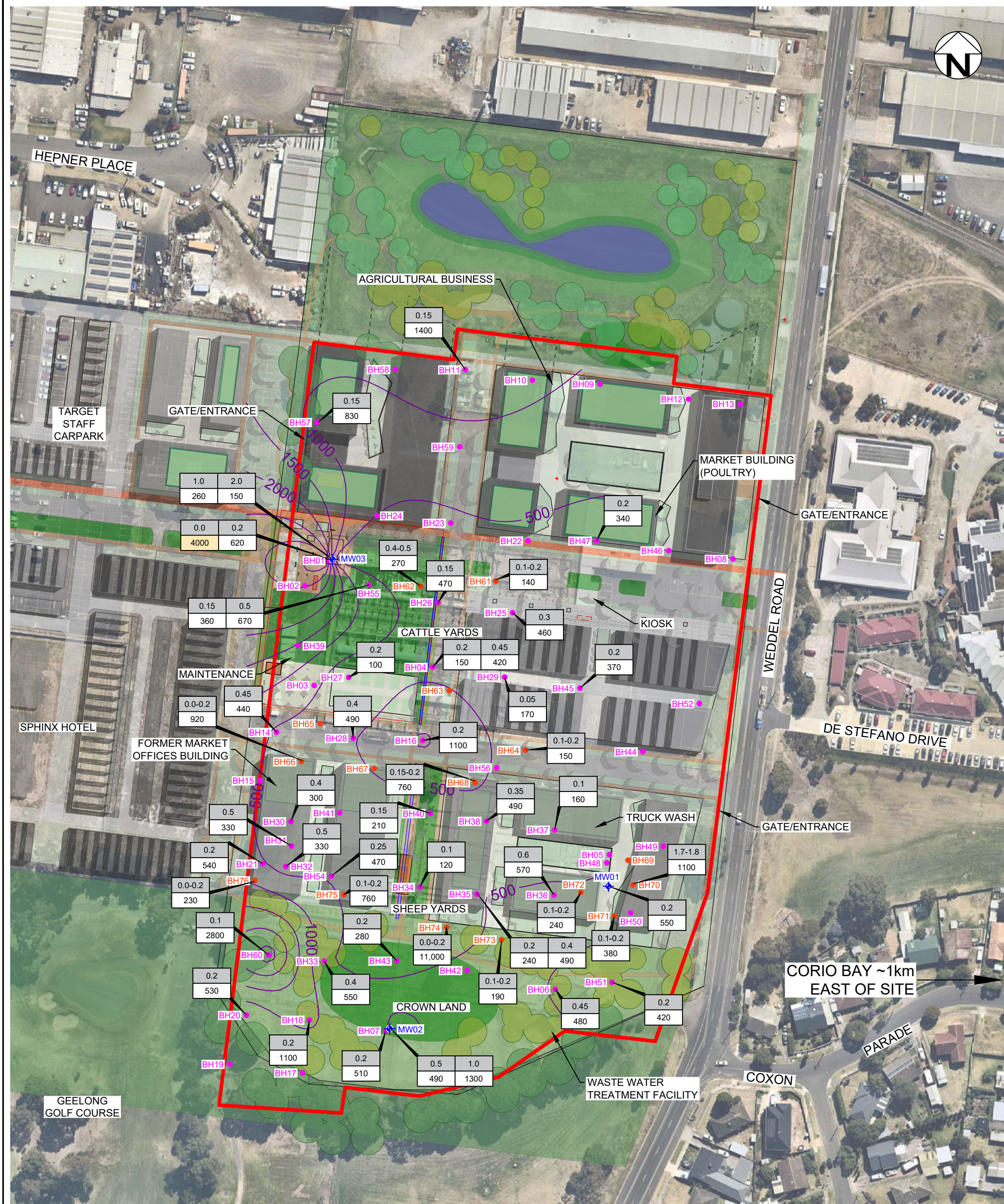
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approved	AW
date	24/06/2021
scale	AS SHOWN
original size	A3

LEGEND

MW

GROUNDWATER MONITORING WELL

BH

SOIL BORE LOCATION (2018)

BH

SOIL BORE LOCATION (2021)

SITE BOUNDARY

mg/kg

MILLIGRAMS PER KILOGRAM

HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED CRITERIA:

12

NEPM 2013 EILS COMMERCIAL AND INDUSTRIAL (AGED)

1000

INTERPRETED TOTAL KJELDAHL NITROGEN CONCENTRATION CONTOUR (mg/kg)

DEPTH (m)

TKN

client:

CITY OF GREATER GEELONG

project:

GEELONG SALEYARDS FURTHER ESA
125-135 WEDDELL ROAD,
NORTH GEELONG, VICTORIA

title:

SOIL RESULTS - TOTAL KJELDAHL NITROGEN (TKN)

project no:

754-GEXEN282929-R01

figure no:

FIGURE 8

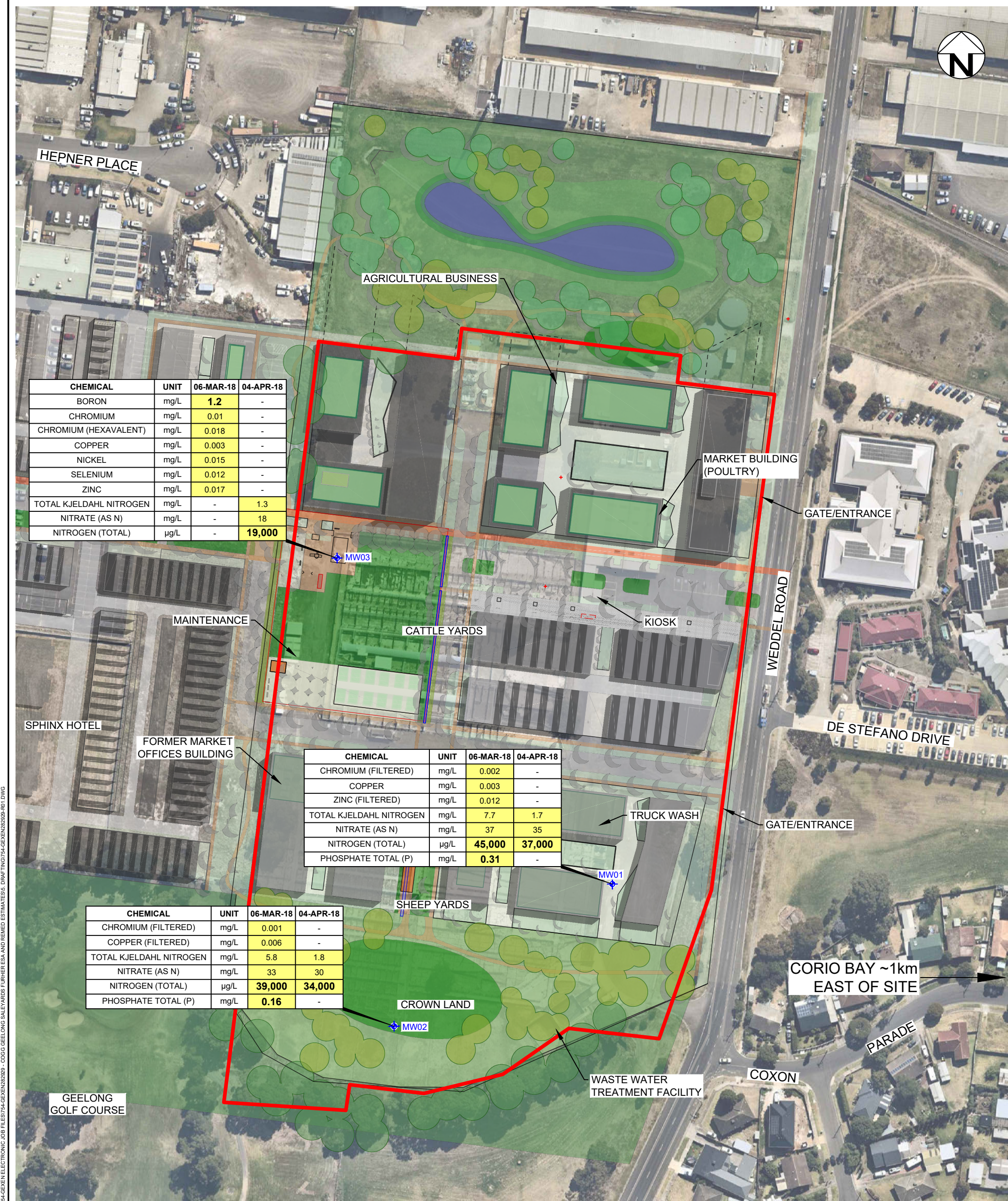
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CHEMICAL	UNIT	06-MAR-18	04-APR-18
BORON	mg/L	1.2	-
CHROMIUM	mg/L	0.01	-
CHROMIUM (HEXAVALENT)	mg/L	0.018	-
COPPER	mg/L	0.003	-
NICKEL	mg/L	0.015	-
SELENIUM	mg/L	0.012	-
ZINC	mg/L	0.017	-
TOTAL KJELDAHL NITROGEN	mg/L	-	1.3
NITRATE (AS N)	mg/L	-	18
NITROGEN (TOTAL)	µg/L	-	19,000

CHEMICAL	UNIT	06-MAR-18	04-APR-18
CHROMIUM (FILTERED)	mg/L	0.002	-
COPPER	mg/L	0.003	-
ZINC (FILTERED)	mg/L	0.012	-
TOTAL KJELDAHL NITROGEN	mg/L	7.7	1.7
NITRATE (AS N)	mg/L	37	35
NITROGEN (TOTAL)	µg/L	45,000	37,000
PHOSPHATE TOTAL (P)	mg/L	0.31	-

CHEMICAL	UNIT	06-MAR-18	04-APR-18
CHROMIUM (FILTERED)	mg/L	0.001	-
COPPER (FILTERED)	mg/L	0.006	-
TOTAL KJELDAHL NITROGEN	mg/L	5.8	1.8
NITRATE (AS N)	mg/L	33	30
NITROGEN (TOTAL)	µg/L	39,000	34,000
PHOSPHATE TOTAL (P)	mg/L	0.16	-

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	JO	AW	24/06/2021

LEGEND

MW GROUNDWATER MONITORING WELL

BH SOIL BORE LOCATION (2018)

BH SOIL BORE LOCATION (2021)

SITE BOUNDARY

µg/L MICROGRAMS PER LITRE

mg/L MILLIGRAMS PER LITRE

HIGHLIGHTED VALUES INDICATE CONCENTRATIONS EXCEED CRITERIA:

12	ANZECC 2000 FRESHWATER 95%
12	ANZECC 2000 PRIMARY INDUSTRY (IRRIGATION)

drawn	JO
approved	AW
date	24/06/2021
scale	AS SHOWN
original size	A3

client:	CITY OF GREATER GEELONG		
project:	GEELONG SALEYARDS FURTHER ESA 125-135 WEDDELL ROAD, NORTH GEELONG, VICTORIA		
title:	GROUNDWATER EXCEEDANCES		
project no:	754-GEXEN282929-R01	figure no:	FIGURE 9
rev:	A		

PLOT DATE: 24/06/2021 12:40:05 PM DWG FILE: \\TTS794F82.TT\LOCAL\DATA\ENVI\GEELONG JOB FILES\754-GEXEN\ELECTRONIC JOB FILES\754-GEXEN\282929 - COGG GEELONG SALEYARDS FURTHER ESA AND REMED ESTIMATES.dwg DRAFTING\754-GEXEN\282929-R01.DWG



no.	description	drawn	approved	date
A	ORIGINAL ISSUE	JO	AW	24/06/2021

revision	no.	description	drawn	approved	date

LEGEND

MW GROUNDWATER MONITORING WELL

BH SOIL BORE LOCATION (2018)

BH SOIL BORE LOCATION (2021)

SITE BOUNDARY

INFERRED GROUNDWATER FLOW DIRECTION

INFERRED GROUNDWATER ELEVATION CONTOUR (mAHd)

DTSWL GAUGED DEPTH TO WATER (METRES)

SWL mAHd GROUNDWATER ELEVATION (mAHd)

0 15 30 45 60 75
SCALE 1:1500 (A3) METRES

drawn	JO
approved	AW
date	24/06/2021
scale	AS SHOWN
original size	A3

A TETRA TECH COMPANY

client:	CITY OF GREATER GEELONG		
project:	GEELONG SALEYARDS FURTHER ESA 125-135 WEDDELL ROAD, NORTH GEELONG, VICTORIA		
title:	GROUNDWATER CONTOUR MAP		
project no:	754-GEXEN282929-R01	figure no:	FIGURE 10
rev:	A		

PLOT DATE: 24/06/2021 12:40:07 PM DWG FILE: \\TTS794F82.TT\LOCAL DATA\ENVI\GEELONG JOB FILES\754-GEXEN\ELECTRONIC JOB FILES\754-GEXEN\282929 - COGG GEELONG SALEYARDS FURTHER ESA AND REMED ESTIMATES\5. DRAFTING\754-GEXEN\282929-R01.DWG



no.	description	drawn	approved	date
A	ORIGINAL ISSUE	JO	AW	24/06/2021

01530456075

SCALE1:1500 (A3)METRES

drawnJO

approvedAW

date24/06/2021

scaleAS SHOWN

original sizeA3

coffey

A TETRA TECH COMPANY

client:CITY OF GREATER GEELONG

project:GEELONG SALEYARDS FURTHER ESA
125-135 WEDDELL ROAD,
NORTH GEELONG, VICTORIA

title:AREAS REQUIRING REMEDIATION AND/OR RISK MANAGEMENT -
RESIDENTIAL, PUBLIC OPEN SPACE AND OTHER SENSITIVE LAND USE

project no:754-GEXEN282929-R01

figure no:FIGURE 11

rev:A

LEGEND

MW

GROUNDWATER MONITORING WELL

BH

SOIL BORE LOCATION (2018)

BH

SOIL BORE LOCATION (2021)

SITE BOUNDARY

APPROXIMATE AREA REQUIRING REMEDIATION AND/OR RISK MANAGEMENT

SUSPECTED HISTORICAL SHEEP DIP AREA

TABLES

		Volatile							TPH					TRH					Metals																			
		Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Naphthalene-MAH	C6 - C9	C10 - C14	C15 - C28	C29 - C36	C10 - C36 (Sum of total)	F1 (C6 - C10)	F1 (C6 - C10) less BTEX	F2 (C10 - C16)	F2 C10 - C16 (minus Naphthalene)	F3 (C16 - C34)	F4 (C34 - C40)	C10 - C40 (Sum of total)	Arsenic	Beryllium	Boron	Cadmium	Chromium (III+VI)	Chromium (hexavalent)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Silver	Selenium	Tin	Zinc
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL		0.1	0.1	0.1	0.1	0.2	0.3	0.5	20	20	50	50	50	20	20	50	50	100	100	100	2	2	10	0.4	5	1	5	5	20	5	5	0.1	5	5	0.2	2	10	5
NEPM 2013 Hills Residential A Soil										3,330 ⁹	4,500 ⁹	6,300 ⁹				3,330 ⁹	3,300 ⁹	4,500 ⁹	6,300 ⁹		100	60	4500	20	100 ⁴	100	100	6000	300	3800	40		400		200		7400	
NEPM 2013 Hills Recreational C Soil										3,800 ⁹	5,300 ⁹	7,400 ⁹				3,800 ⁹	3,800 ⁹	5,300 ⁹	7,400 ⁹		300	90	20000	90	300 ⁴	300	300	17000		600	19000	80		1200		700		30000
NEPM 2013 Hills Commercial/Industrial D Soil										20,000 ⁹	27,000 ⁹	38,000 ⁹				20,000 ⁹	20,000 ⁹	27,000 ⁹	38,000 ⁹		3000	500	300000	900	3,600 ⁴	3600	4000	240000		1500	60000	730		6000		10000		400000
NEPM 2013 EILs Commercial and Industrial (Aged)										170 ⁸	1,700 ⁸	3,330 ⁸				170 ⁸	1,700 ⁸	3,330 ⁸		160		36 ¹	22 ¹	NE ⁵	13 ¹	80 ⁵			220 ¹	50 ³		80 ⁵				280 ⁵		
NEPM 2013 EILs Urban residential and open public spaces (Aged)										120 ⁸	300 ⁸	2,800 ⁸				120 ⁸	300 ⁸	2,800 ⁸		100		36 ¹	10 ²	NE ⁵	13 ¹	60 ⁵			1100	220 ¹	12 ²		50 ⁵				190 ⁵	
NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 0 to <1m, Sand		0.5	160	55			40			110					45		110																					
Field_ID	Sampled_Date																																					
BH01_0.0	7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH01_0.2	7/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	55	55	<20	<20	<50	<50	<100	<100	-	6.1	-	-	<0.4	9.5	-	-	10	-	67	-	<0.1	-	16	-	-	-	47
BH01_0.5	7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,000	-	-	-	-	-	-	-	-	-	
BH02_0.25	7/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	24	-	-	<0.4	53	-	-	<5	-	17	-	<0.1	-	21	-	-	16	
BH03_0.2	7/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	26	-	-	<0.4	12	-	-	<5	-	12	-	<0.1	-	5	-	-	25	
BH04_0.2	7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH04_0.45	7/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	28	-	-	<0.4	44	-	-	<5	-	12	-	<0.1	-	13	-	-	17	
BH05_0.5	23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	8.1	-	-	<0.4	27	-	-	<5	17,000	6	-	<0.1	-	12	-	-	8.5	
BH06_0.45	7/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	19	-	-	<0.4	34	-	-	8.3	23,000	21	-	<0.1	-	32	-	-	67	
BH07_0.0	7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH07_0.2	7/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	10	-	-	<0.4	28	-	-	6.2	18,000	19	-	<0.1	-	21	-	-	39	
BH08_0.25	8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	66	-	-	<0.4	81	-	-	6.1	-	15	-	<0.1	-	32	-	-	22	
BH09_0.2	8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	130	190	320	<20	<20	<50	<50	280	<100	-	4.9	-	-	<0.4	38	-	-	32	-	20	-	<0.1	-	70	-	-	110	
BH10_0.1	8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	59	59	<20	<20	<50	<50	<100	<100	-	7.5	-	-	<0.4	34	-	-	29	-	79	-	<0.1	-	65	-	-	140	
BH11_0.15	8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	23	-	-	<0.4	40	-	-	7.4	24,000	22	-	<0.1	-	17	-	-	65	
BH12_0.35	8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	<2	-	-	<0.4	29	-	-	35	-	<5	-	<0.1	-	110	-	-	61	
BH13_0.3	8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	15	-	-	1.5	26	-	-	16	-	5.4	-	<0.1	-	46	-	-	73	
BH14_0.1	8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	<2	10	<0.4	17	<1	7.5	120	-	540	140	0.6	-	13	-	<2	-	1600
BH14_0.2	8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	65	66	131	<20	<20	<50	<50	120	<100	-	8.6	-	-	<0.4	13	-	-	130	-	720	-	0.5	-	6.5	-	-	560	
BH14_0.45	8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	18	-	-	<0.4	54	-	-	7	-	29	-	<0.1	-	14	-	-	25	
BH15_0.1	8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	110	89	199	<20	<20	<50	<50	180	<100	-	6.3	-	-	<0.4	8.2	-	-	9.9	-	110	-	0.2	-	<5	-	-	91	
BH15_0.25	8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	5.6	-	-	<0.4	5	-	-	<5	4800	41	-	<0.1	-	<5	-	-	32	
BH16_0.2	8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	53	53	<20	<20	<50	<50	<100	<100	-	11	-	-	<0.4	27	-	-	9.4	-	24	-	<0.1	-	28	-	-	25	
BH17_0.15	9/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3																															

		Volatile							TPH					TRH					Metals																				
		Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Naphthalene-MAH	C6 - C9	C10 - C14	C15 - C28	C29 - C36	C10 - C36 (Sum of total)	F1 (C6 - C10)	F1 (C6 - C10) less BTEX	F2 (C10 - C16)	F2 C10 - C16 (minus Naphthalene)	F3 (C16 - C34)	F4 (C34 - C40)	C10 - C40 (Sum of total)	Arsenic	Beryllium	Boron	Cadmium	Chromium (III+VI)	Chromium (hexavalent)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Silver	Selenium	Tin	Zinc	
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL		0.1	0.1	0.1	0.1	0.2	0.3	0.5	20	20	50	50	50	20	20	50	50	100	100	100	2	2	10	0.4	5	1	5	5	20	5	5	0.1	5	5	0.2	2	10	5	
NEPM 2013 HILs Residential A Soil									3,330 ⁹	4,500 ⁷	6,300 ⁹					3,330 ⁹	3,300 ⁹	4,500 ⁷	6,300 ⁹		100	60	4500	20	100 ⁴	100	100	6000	300	3800	40		400		200		7400		
NEPM 2013 HILs Recreational C Soil									3,800 ⁹	5,300 ⁷	7,400 ⁹					3,800 ⁹	3,800 ⁹	5,300 ⁷	7,400 ⁹		300	90	20000	90	300 ⁴	300	300	17000		600	19000	80		1200		700		30000	
NEPM 2013 HILs Commercial/Industrial D Soil									20,000 ⁹	27,000 ⁹	38,000 ⁹					20,000 ⁹	20,000 ⁹	27,000 ⁹	38,000 ⁹		3000	500	300000	900	3,600 ⁴	3600	4000	240000		1500	60000	730		6000		10000		400000	
NEPM 2013 EILs Commercial and industrial (Aged)									170 ⁸	1,700 ⁷	3,330 ⁹					170 ⁸	1,700 ⁷	3,300 ⁹	3,300 ⁹		160			36 ¹	22 ²	NE ⁵	13 ¹	80 ⁶		220 ¹	50 ³		80 ⁶				280 ⁶		
NEPM 2013 EILs Urban residential and open public spaces (Aged)									120 ⁸	300 ⁸	2,800 ⁸					120 ⁸		300 ⁸	2,800 ⁸		100			36 ¹	10 ²	NE ⁵	13 ¹	60 ⁶		1100	220 ¹	12 ²		50 ⁶				190 ⁶	
NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 0 to <1m, Sand		0.5	160	55			40			110					45		110																						
Field_ID	Sampled_Date																																						
BH50_0.2	23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	56	<50	56	<20	<20	<50	<50	<100	<100	-	430	-	-	<0.4	34	-	-	5.7	-	19	-	0.1	-	15	-	-	-	-	23
BH51_0.2	23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	15	-	-	<0.4	29	-	-	13	-	55	-	<0.1	-	43	-	-	-	71	
BH52_0.15	23/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.5	<2	18	<0.4	17	<1	9.6	26	-	60	180	0.5	-	46	-	<2	-	59	
BH52_0.3	23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	9.5	-	-	<0.4	24	-	-	5.3	-	8	-	<0.1	-	21	-	-	-	16	
BH54_0.15	28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	12	-	-	<0.4	13	-	-	<5	15,000	5.3	-	<0.1	-	16	-	-	-	12	
BH54_0.25	28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	39	-	-	<0.4	50	-	-	<5	-	16	-	<0.1	-	11	-	-	-	12	
BH55_0.15	28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	4.2	-	-	<0.4	5.9	-	-	<5	4700	12	-	<0.1	-	<5	-	-	-	5.9	
BH55_0.5	28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	15	-	-	<0.4	30	-	-	<5	-	9.3	-	<0.1	-	8.9	-	-	-	8.2	
BH57_0.15	28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	7.6	-	-	<0.4	14	-	-	12	-	14	-	<0.1	-	26	-	-	-	26	
BH58_0.3	28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	-	12	-	-	<0.4	29	-	-	19	29,000	14	-	<0.1	-	65	-	-	-	46	
BH59_0.3	28/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	46	<2	<10	<0.4	23	<1	9.8	14	-	26	150	<0.1	-	32	-	<2	-	37	
BH60_0.1	6/03/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	160	87	247	<20	<20	<50	<50	210	<100	-	10	-	-	<0.4	16	-	-	5	-	11	-	<0.1	-	6.3	-	-	-	93	
BH61-0.1-0.2	11/05/2021	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	<100	15	-	-	<0.4	16	-	-	22	-	70	-	<0.1	-	38	-	-	-	69	
BH62-0.1-0.2	11/05/2021	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	<100	2.5	-	-	<0.4	5.6	-	-	<5	-	<5	-	<0.1	-	<5	-	-	-	8.4	
BH62-0.4-0.5	11/05/2021	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	<100	24	-	-	<0.4	47	-	-	<5	-	14	-	<0.1	-	22	-	-	-	11	
BH63-0.15-0.2	11/05/2021	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	<100	6.4	-	-	<0.4	32	-	-	<5	-	7.9	-	<0.1	-	7.3	-	-	-	7.3	
BH64-0.1-0.2	11/05/2021	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	<100	7.2	-	-	<0.4	34	-	-	<5	-	8.2	-	<0.1	-	15	-	-	-	8.4	
BH64-0.9-1.0	11/05/2021	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	78	72	150	<20	<20	<50	<50	130	<100	<100	130	4.2	-	-	<0.4	7.4	-	-	<5	-	5.7	-	<0.1	-	6.7	-	-	-	14
BH65-0.0-0.2	10/05/2021	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	210	98	308	<20	<20	<50	<50	290	<100	<100	290	5.7	-	-	<0.4	14	-	-	15	-	160	-	<0.1	-	32	-	-	-	190
BH66-0.0-0.2	10/05/2021	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	22	480	470	972	<20	<20	<50	<50	790	<100	160	950	5.5	-	-	0.9	22	-	29	-	51	-	<0.1	-	56	-	-	-	380	
BH66-0.3-0.5	10/05/2021	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	<100	18	-	-	<0.4	40	-	-	<5	-	8.5	-	<0.1	-	11	-	-	-	8	
BH67-0.1-0.2	11/05/2021	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<20	<50	<50	<50	<20	<20	<50	<50	<100	<100	<100	8.9	-	-																

[illegible]

- 1 = US EPA (2015) Regional 4-ol Screening Value for Hazardous Waste Sites, Ecological Protection
- 2 = CCME 2013 - Canadian Soil Quality Guidelines for the protection of environmental quality
- 3 = CCME 2013 - Canadian Soil Quality Guidelines for the protection of environmental quality
- 4 = CCME 2013 - Canadian Soil Quality Guidelines for the protection of environmental quality
- 5 = NEMPM 2013 - Soil Specific Ecological Investigation Level for Cr (III) adopted, based on CCME 2013
- 6 = NEMPM 2013 - Ecological Investigation Levels, (pH 5.1, 3% CEC, 3.8% CEC, 5.7 cm_{cl}/kg)
- 7 = Upper range necessary for satisfactory plant growth (Charmann and Murphy, 2010)
- 8 = NEMPM 2013 - Ecological Screening Level
- 9 = Frieel and Nadebaum (2011) Health Screening Level, Direct soil contact
- 10 = US EPA (2021) Regional Screening Level for Residential Soil
- 11 = US EPA (2021) Regional Screening Level for Industrial Soils
- 12 = CRC CARE (2017) High reliability ecological guideline for fresh Ba/P

		OCP																				OPP																			
		4-BHC	DDD	DDT	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	γ-BHC (Lindane)	Heptachlor	Hexachlorobenzene	Methoxychlor	Toxaphene	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	DDT+DDE+DDD	Heptachlor epoxide	Mirex	Toluthion	Azinophos methyl	Bostar (Sulprofos)	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Disulfoton	Dimethoate	Ethoprop	Ethion	Fenitrothion	Fensulfotlathion	Fenthion		
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	1	0.1	0.1	0.05	0.05	0.01	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
NEPM 2013 HILs Residential A Soil									10				6	10	300	20			240	10						160															
NEPM 2013 HILs Recreational C Soil									20				10	10	400	30			400	20						250															
NEPM 2013 HILs Commercial/Industrial D Soil									100				50	80	2500	160			3600	100						2000															
NEPM 2013 EILs Commercial and industrial (Aged)				640																																					
NEPM 2013 EILs Urban residential and open public spaces (Aged)				180																																					
NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 0 to <1m, Sand																																									
Field_ID	Sampled_Date																																								
BH01_0.0	7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH01_0.2	7/02/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
BH01_0.5	7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH02_0.25	7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH03_0.2	7/02/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
BH04_0.2	7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH04_0.45	7/02/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
BH05_0.5	23/02/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
BH06_0.45	7/02/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
BH07_0.0	7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH07_0.2	7/02/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
BH08_0.25	8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH09_0.2	8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH10_0.1	8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH11_0.15	8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH12_0.35	8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH13_0.3	8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH14_0.1	8/02/2018	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	<0.05	<0.05	<0.05	<1	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH14_0.2	8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH14_0.45	8/02/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
BH15_0.1	8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH15_0.25	8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH16_0.2	8/02/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
BH17_0.15	9/02/2018	-	-																																						

- 1 = US EPA (2015) Regional 4 Sol Screening Value for Hazardous Waste Sites, Ecology
- 2 = CME 2013 – Canadian Soil Quality Guidelines for the protection of environmental quality
- 3 = CME 2013 – Canadian Soil Quality Guidelines for the protection of environmental quality
- 4 = NEMP 2013 – Health Investigation Level for Chromium (VI) adopted
- 5 = NEMP 2013 – Soil specific Ecological Investigation Level for Cr (III) adopted, base
- 6 = NEMP 2013 – Ecological Investigation Levels. (pH 5.1, 4% cation, 38% CEC, 5.7 cmol/L)
- 7 = Upper range necessary for satisfactory plant growth (Charmar and Murphy, 2010)
- 8 = NEMP 2013 – Ecological Screening Level
- 9 = Friesen and Nriagu (2003) Regional Screening Level, Direct soil contact
- 10 = US EPA (2021) Regional Screening Level for Residential Soil
- 11 = US EPA (2021) Regional Screening Level for Industrial Soils
- 12 = CRC CARE (2017) High reliability ecological guideline for fresh B(a)P

[illegible]

- 1 = US EPA (2015) Regional 4 Sol Screening Value for Hazardous Waste Sites, Ecology
- 2 = CMCe 2013 – Canadian Soil Quality Guidelines for the protection of environmental quality
- 3 = CMCe 2013 – Canadian Sediment Quality Guidelines for the protection of environmental quality
- 4 = NEMM 2013 – Health Investigation Level for Chromium (VI) adopted
- 5 = NEMM 2013 – Soil specific Ecological Investigation Level for Cr (III) adopted, base
- 6 = NEMM 2013 – Ecological Investigation Levels. (pH 5.1, 4% cation, 38% CEC, 5.7 cmol/L)
- 7 = Upper range necessary for satisfactory plant growth (Chapman and Murray, 2002)
- 8 = NEMM 2013 – Ecological Screening Level
- 9 = Friesen and Nriagu (2003) Regional Screening Level, Direct soil contact
- 10 = US EPA (2021) Regional Screening Level for Residential Soil
- 11 = US EPA (2021) Regional Screening Level for Industrial Soils
- 12 = CRC CARE (2017) High reliability ecological guideline for fresh B(a)P

TABLE 2
Current and Historical Soil Analytical Results Compared to EPA Publication 1828.2 Contaminant Concentration Thresholds
Geelong Saleyards Further ESA
754-GEXEN282929-R01

			Volatile						TPH				Organic										Heavy Metal															
			Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Naphthalene-MAH	C10 - C14	C15 - C28	C29 - C36	C10 - C36 (Sum of total)	C6 - C9	F1 (C6 - C10)	F1 (C6 - C10) less BTEX	F2 (C10 - C16)	F2 C10 - C16 (minus Naphthalene)	F3 (C16 - C34)	F4 (C34 - C40)	Arsenic	Beryllium	Boron	Cadmium	Chromium (III+VI)	Chromium (hexavalent)	Cobalt	Copper	Iron	Iron (%)	Potassium	Manganese	Lead	Mercury	Molybdenum			
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		
EQL			0.1	0.1	0.1	0.1	0.2	0.3	0.5	20	50	50	50	20	20	20	50	50	100	100	2	2	10	0.4	5	1	5	5	20	0.01	5	5	5	0.1	5			
EPA Vic IWRG1828.2 Category B upper limit			16	12800	4800			9600					40000	2600							2000	400	60000	400		2000		20000					6000	300	4000			
EPA Vic IWRG1828.2 Category C upper limit			4	3200	1200			2400					10000	650							500	100	15000	100		500		5000					1500	75	1000			
EPA Vic IWRG1828.2 Category D / Industrial Waste upper limit			4	3200	1200			2400					5000	325							500	100	15000	100		500		5000					1500	75	1000			
EPA Vic IWRG1828.2 Fill material upper limit			1										1000	100							20			3		1		100					300	1	40			
Field_ID	Sample_Depth_Range	Sampled_Date_Time																																				
BH01_0.0		7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH01_0.2		7/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	55	55	<20	<20	<20	<50	<50	<100	<100	6.1	-	-	<0.4	9.5	-	-	10	-	-	-	-	67	<0.1	-	-		
BH01_0.5		7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21,000	2.1	-	-	-	-	-	-			
BH02_0.25		7/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	24	-	-	<0.4	53	-	-	<5	-	-	-	-	17	<0.1	-	-		
BH03_0.2		7/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	26	-	-	<0.4	12	-	-	<5	-	-	-	-	12	<0.1	-	-		
BH04_0.2		7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH04_0.45		7/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	28	-	-	<0.4	44	-	-	<5	-	-	-	-	12	<0.1	-	-		
BH05_0.5		23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	8.1	-	-	<0.4	27	-	-	<5	17,000	1.7	-	-	6	<0.1	-	-		
BH06_0.45		7/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	19	-	-	<0.4	34	-	-	8.3	23,000	2.3	-	-	21	<0.1	-	-		
BH07_0.0		7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH07_0.2		7/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	10	-	-	<0.4	28	-	-	6.2	18,000	1.8	-	-	19	<0.1	-	-		
BH08_0.25		8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	66	-	-	<0.4	81	-	-	6.1	-	-	-	-	15	<0.1	-	-		
BH09_0.2		8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	130	190	320	<20	<20	<20	<50	<50	280	<100	4.9	-	-	<0.4	38	-	-	32	-	-	-	-	20	<0.1	-	-		
BH10_0.1		8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	59	59	<20	<20	<20	<50	<50	<100	<100	7.5	-	-	<0.4	34	-	-	29	-	-	-	-	79	<0.1	-	-		
BH11_0.15		8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	23	-	-	<0.4	40	-	-	7.4	24,000	2.4	-	-	22	<0.1	-	-		
BH12_0.35		8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	<2	-	-	<0.4	29	-	-	35	-	-	-	-	<5	<0.1	-	-		
BH13_0.3		8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	15	-	-	<0.4	26	-	-	16	-	-	-	-	5.4	<0.1	-	-		
BH14_0.1		8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	<2	10	<0.4	17	<1	7.5	120	-	-	-	140	540	0.6	-	-		
BH14_0.2		8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	65	66	131	<20	<20	<20	<50	<50	120	<100	8.6	-	-	<0.4	13	-	-	130	-	-	-	-	720	0.5	-	-		
BH14_0.45		8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	18	-	-	<0.4	54	-	-	7	-	-	-	-	29	<0.1	-	-		
BH15_0.1		8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	110	89	199	<20	<20	<20	<50	<50	180	<100	6.3	-	-	<0.4	8.2	-	-	9.9	-	-	-	-	110	0.2	-	-		
BH15_0.25		8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	5.6	-	-	<0.4	5	-	-	<5	4800	0.48	-	-	41	<0.1	-	-		
BH16_0.2		8/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	53	53	<20	<20	<20	<50	<50	<100	<100	11	-	-	<0.4	27	-	-	9.4	-	-	1000	-	24	<0.1	-	-		
BH17_0.15		9/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	7.6	-	-	<0.4	11	-	-	6.4	-	-	-	-	11	<0.1	-	-		
BH18_0.2		9/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	10	-	-	<0.4	16	-	-	<5	-	-	-	-	8.7	<0.1	-	-		
BH19_0.15		9/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	12	-	-	<0.4	9.9	-	-	<5	-	-	-	-	7.8	<0.1	-	-		
BH20_0.2		9/02/2018	<0.1	<0.1	<0.1																																	

TABLE 2
Current and Historical Soil Analytical Results Compared to EPA Publication 1828.2 Contaminant Concentration Thresholds
Geelong Saleyards Further ESA
754-GEXEN282929-R01

			Volatile						TPH					Organic										Heavy Metal												
			Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Naphthalene-MAH	C10 - C14	C15 - C28	C29 - C36	C10 - C36 (Sum of total)	C6 - C9	F1 (C6 - C10)	F1 (C6 - C10) less BTEX	F2 (C10 - C16)	F2 C10 - C16 (minus Naphthalene)	F3 (C16 - C34)	F4 (C34 - C40)	Arsenic	Beryllium	Boron	Cadmium	Chromium (III+VI)	Chromium (hexavalent)	Cobalt	Copper	Iron	Iron (%)	Potassium	Manganese	Lead	Mercury	Molybdenum	
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.1	0.1	0.1	0.1	0.2	0.3	0.5	20	50	50	50	20	20	20	50	50	100	100	2	2	10	0.4	5	1	5	5	20	0.01	5	5	5	0.1	5	
EPA Vic IWRG1828.2 Category B upper limit			16	12800	4800			9600					40000	2600							2000	400	60000	400		2000		20000					6000	300	4000	
EPA Vic IWRG1828.2 Category C upper limit			4	3200	1200			2400					10000	650							500	100	15000	100		500		5000				1500	75	1000		
EPA Vic IWRG1828.2 Category D / Industrial Waste upper limit			4	3200	1200			2400					5000	325							500	100	15000	100		500		5000				1500	75	1000		
EPA Vic IWRG1828.2 Fill material upper limit			1										1000	100							20			3		1		100				300	1	40		
Field_ID	Sample_Depth_Range	Sampled_Date_Time																																		
BH42_0.2		28/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.1	<2	<10	<0.4	<5	<1	<5	<5	-	-	-	6.6	<5	<0.1	-	
BH43_0.2		28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	5.3	-	-	<0.4	5.3	-	<5	-	-	-	-	5.6	<0.1	-		
BH44_0.3		23/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	<10	<0.4	23	<1	30	32	-	-	-	540	<5	<0.1	-	
BH45_0.2		23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	18	-	-	<0.4	40	-	<5	27,000	2.7	-	-	11	<0.1	-		
BH46_0.2		23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	55	-	-	<0.4	40	-	6.6	34,000	3.4	-	-	19	<0.1	-		
BH47_0.2		23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	55	-	-	<0.4	59	-	5.2	-	-	-	-	17	<0.1	-		
BH48_0.4		23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	19	-	-	<0.4	30	-	<5	-	-	-	-	7	<0.1	-		
BH49_0.3		23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	24	-	-	<0.4	32	-	12	-	-	-	-	21	<0.1	-		
BH50_0.2		23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	56	<50	56	<20	<20	<20	<50	<50	<100	<100	430	-	-	<0.4	34	-	5.7	-	-	-	-	19	0.1	-		
BH51_0.2		23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	15	-	-	<0.4	29	-	13	-	-	-	-	55	<0.1	-		
BH52_0.15		23/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.5	<2	18	<0.4	17	<1	9.6	26	-	-	-	180	60	0.5	-	
BH52_0.3		23/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	9.5	-	-	<0.4	24	-	5.3	-	-	-	-	8	<0.1	-		
BH54_0.15		28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	12	-	-	<0.4	13	-	<5	15,000	1.5	-	-	5.3	<0.1	-		
BH54_0.25		28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	39	-	-	<0.4	50	-	<5	-	-	-	-	16	<0.1	-		
BH55_0.15		28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	4.2	-	-	<0.4	5.9	-	<5	4700	0.47	-	-	12	<0.1	-		
BH55_0.5		28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	15	-	-	<0.4	30	-	<5	-	-	-	-	9.3	<0.1	-		
BH57_0.15		28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	7.6	-	-	<0.4	14	-	12	-	-	-	-	14	<0.1	-		
BH58_0.3		28/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	12	-	-	<0.4	29	-	19	29,000	2.9	-	-	14	<0.1	-		
BH59_0.3		28/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	46	<2	<10	<0.4	23	<1	9.8	14	-	-	-	150	26	<0.1	-	
BH60_0.1	0.1	6/03/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	160	87	247	<20	<20	<20	<50	<50	<210	<100	10	-	-	<0.4	16	-	5	-	-	-	-	11	<0.1	-		
MW01_0.2		22/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	71	71	<20	<20	<20	<50	<50	<100	<100	96	-	-	<0.4	32	-	10	-	-	-	-	6.8	<0.1	-		
MW01_2.0		22/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	35	-	-	<0.4	21	-	<5	-	-	-	-	6.4	<0.1	-		
MW01_3.0		22/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	340	-	-	<0.4	29	-	<5	-	-	-	-	13	<0.1	-		
MW01_3.8		22/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	210	-	-	<0.4	47	-	<5	-	-	-	-	9.1	<0.1	<5		
MW01_6.0		22/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75	-	-	<0.4	31	-	6.4	-	-	-	-	7.3	<0.1	<5		
MW02_0.5		22/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	17	-	-	<0.4	32	-	10	-	-	-	-	100	<0.1	-		
MW02_1.0		22/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	39	-	-	<0.4	38	-	<5	-	-	-	-	14	<0.1	-		
MW03_1.0		22/02/2018	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<20	<50	<50	<50	<20	<20	<20	<50	<50	<100	<100	32	-	-	<0.4	33	-	<5	-	-	-	-	8.1	<0.1	-		
MW03_2.0		22/02/2018	-	-	-	-																														



					PAH																			Inorganic																										
	Nickel	Silver	Selenium	Tin	Zinc	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Benzo(b)fluoranthene	Dibenz(a,h)anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	PAHs (Sum of total)	Benzo(a) pyrene	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ calc (Zero)	Benzo(a)pyrene TEQ calc (Half)	Fluorene	Naphthalene-PAH	Cation Exchange Capacity (CEC)	% Clay*	Conductivity (1:5 aqueous extract)	Ammonia as N	Nitrite + Nitrate as N	Nitrate (as NO3-N)	Nitrogen (Total)	Total Kjeldahl Nitrogen (TKN)	Phosphorus	Sulfate as SO4	Moisture Content (dried @ 103°C)	Cyanide (Free)	pH (lab)	4,4-DDE	a-BHC	Aldrin									
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	meq/100g	%	uS/cm	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	5	0.2	2	10	5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.05	1	10	5	5	5	10	10	5	30	1	5	0.1	0.05	0.05	0.05										
EPA Vic IWRG1828.2 Category B upper limit	12000	720	40000		140000															160																														
EPA Vic IWRG1828.2 Category C upper limit	3000	180	10000		35000															40																														
EPA Vic IWRG1828.2 Category D / Industrial Waste upper limit	3000	180	10000		35000															20																														
EPA Vic IWRG1828.2 Fill material upper limit	60	10	10	50	200															1																														
Field_ID	Sample_Depth_Range		Sampled_Date_Time																																															
BH42_0.2			28/02/2018		<5	-	<2	-	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	-	-	-	-	-	-	-	-	-	11	<5	-	<0.05	-	<0.05									
BH43_0.2			28/02/2018		<5	-	-	-	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	-	-	-	<5	<5	<5	280	280	200	39	11	-	-	-	-									
BH44_0.3			23/02/2018		150	-	<2	-	65	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	-	-	-	-	-	-	-	-	-	5	<5	-	<0.05	-	<0.05									
BH45_0.2			23/02/2018		16	-	-	-	14	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	13	30	280	<5	24	24	390	370	56	2500	16	-	6.6	-	-	-								
BH46_0.2			23/02/2018		16	-	-	-	25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	6.7	28	410	-	-	-	-	-	-	18	-	7.3	-	-	-									
BH47_0.2			23/02/2018		28	-	-	-	16	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	-	-	-	<5	40	40	380	340	770	-	21	-	-	<0.05	<0.05	<0.05									
BH48_0.4			23/02/2018		10	-	-	-	11	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	-	-	-	-	-	-	-	-	680	14	-	-	<0.05	<0.05	<0.05										
BH49_0.3			23/02/2018		35	-	-	-	58	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-									
BH50_0.2			23/02/2018		15	-	-	-	23	<0.5	<0.5	<0.5	1	0.8	1.3	1	0.7	<0.5	1.4	0.6	0.7	1.5	10.1	1.1	2	1.5	1.7	<0.5	<0.5	-	-	-	-	-	-	-	17	-	-	-	-	-								
BH51_0.2			23/02/2018		43	-	-	-	71	<0.5	<0.5	<0.5	1	0.7	0.7	1	0.9	<0.5	1.8	0.6	0.8	1.9	10.4	1	1.8	1.3	1.6	<0.5	<0.5	-	-	-	<5	43	43	460	420	270	-	13	-	-	<0.05	<0.05	<0.05					
BH52_0.15			23/02/2018		46	-	<2	-	59	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	-	-	-	-	-	-	-	-	-	16	<5	-	<0.05	-	<0.05									
BH52_0.3			23/02/2018		21	-	-	-	16	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-										
BH54_0.15			28/02/2018		16	-	-	-	12	<0.5	<0.5	<0.5	1.2	0.7	0.9	1.1	1	<0.5	2.2	0.7	2.2	12	1.3	2.2	1.7	1.9	<0.5	<0.5	12	5	150	<5	<5	<5	170	170	250	-	17	-	9.9	-	-	-						
BH54_0.25			28/02/2018		11	-	-	-	12	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	-	-	-	<5	<5	<5	470	470	67	-	22	-	-	-	-									
BH55_0.15			28/02/2018		<5	-	-	-	5.9	<0.5	<0.5	<0.5	0.6	0.5	0.7	0.6	0.5	1.2	<0.5	1.1	6.2	0.8	1.6	1	1.3	<0.5	<0.5	6.5	3.8	390	<5	19	19	380	360	280	-	10	-	7.2	<0.05	<0.05	<0.05							
BH55_0.5			28/02/2018		8.9	-	-	-	8.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	-	-	-	<5	11	10	680	670	63	-	22	-	-	-	-									
BH57_0.15			28/02/2018		26	-	-	-	26	<0.5	<0.5	<0.5	0.7	0.5	0.7	0.6	<0.5	1	<0.5	<0.5	1.2	6.3	0.9	1.7	1.1	1.4	<0.5	<0.5	-	-	<5	<5	<5	830	830	280	-	5.8	-	-	-	-								
BH58_0.3			28/02/2018		65	-	-	-	46	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.6	1.2	<0.5	1.2	<0.5	25	25	120	-	-	-	-	-	-	8.2	-	8.9	-	-	-									
BH59_0.3			28/02/2018		32	-	<2	-	37	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.3	<0.5	1.2	<0.5	0.6	<0.5	<0.5	-	-	-	-	-	-	-	-	5	<5	-	<0.05	-	<0.05										
BH60_0.1	0.1		6/03/2018		6.3	-	-	-	93	<0.5	0.8	1.3	5.4	3.6	5.1	5.2	3.4	1.3	14	4.1	2.1	12	64.6	6.3	9.5	9.5	<0.5	<0.5	-	-	-	8	9.8	9.5	2,800	2800	560	-	7.6	-	-	-	-							
MW01_0.2			22/02/2018		38	-	-	-	23	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	-	-	-	<5	83	83	630	550	310	-	16	-	-	<0.05	<0.05	<0.05								
MW01_2.0			22/02/2018		7.8	-	-	-	6.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5																																		



			OCP																																									
			Aldrin + Dieldrin	b-BHC	chlordane	p-BHC	DDD	DDT	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Hexachlorobenzene	Methoxychlor	Toxaphene	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	DDT+DDE+DDD	Heptachlor epoxide	Mirex	Tokuthion	Azinphos methyl	Boistar (Sulprofos)	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Cumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Disulfoton	Dimethoate	Ethoprop	Ethion	Fenitrothion	Fensulfathion		
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	1	0.1	0.1	0.1	0.05	0.05	0.01	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
EPA Vic IWRG1828.2 Category B upper limit			4.8		16												4.8					50	50																					
EPA Vic IWRG1828.2 Category C upper limit			1.2		4												1.2						10	50																				
EPA Vic IWRG1828.2 Category D / Industrial Waste upper limit			1.2		4												1.2					10	50																					
EPA Vic IWRG1828.2 Fill material upper limit																				1																								
Field_ID	Sample_Depth_Range	Sampled_Date_Time																																										
BH01_0.0		7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH01_0.2		7/02/2018	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH01_0.5		7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH02_0.25		7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH03_0.2		7/02/2018	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH04_0.2		7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH04_0.45		7/02/2018	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH05_0.5		23/02/2018	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH06_0.45		7/02/2018	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH07_0.0		7/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH07_0.2		7/02/2018	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH08_0.25		8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH09_0.2		8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH10_0.1		8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH11_0.15		8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH12_0.35		8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH13_0.3		8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH14_0.1		8/02/2018	-	-	<0.1	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	<0.05	<1	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH14_0.2		8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH14_0.45		8/02/2018	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH15_0.1		8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH15_0.25		8/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16_0.2		8/02/2018	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH17_0.15		9/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH18_0.2		9/02/2018	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH19_0.15		9/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH20_0.2		9/02/2018	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH21_0.2		9/02/2018	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH22_0.2		9/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH23_0.0		9/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH23_0.15		9/02/2018	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.1	<0.1	<0.05	<0.05	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH24_0.0		9/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		





TABLE 2
Current and Historical Soil Analytical Results Compared to EPA Publication 1828.2 Contaminant Concentration Thresholds
Geelong Saleyards Further ESA
754-GEXEN282929-R01

City of Greater Geelong

[illegible]

TABLE 2
Current and Historical Soil Analytical Results Compared to EPA Publication 1828.2 Contaminant Concentration Thresholds
Geelong Saleyards Further ESA
754-GEXEN282929-R01

		ppb																				PCB										SVOC									
		Fenthion	EPN	Merphos	Malathion	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Onethoate	Parathion	Phorate	Pirimiphos-methyl	Pyazophos	Ronnel	Terbufos	Trichloronate	Tetrachlorvinphos	C10 - C40 (Sum of total)	2,4,5-Trichlorophenoxy Acetic Acid	Hedonal	Atrazine	Chlorpyrifos	2-Methyl-4-chlorophenoxyacetic acid	2-Methyl-4-Chlorophenoxy Butanoic Acid	Mecoprop	Picloram	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	3-&4-methylphenol	Pentachlorophenol	Phenol	2-Methylphenol		
EQL		0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	100	0.5	0.5	0.2	0.2	0.5	0.5	0.5	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	1	0.5	0.2
EPA Vic IWRG1828.2 Category B upper limit																					480																6				
EPA Vic IWRG1828.2 Category C upper limit																					120																50				
EPA Vic IWRG1828.2 Category D / Industrial Waste upper limit																					120																2				
EPA Vic IWRG1828.2 Fill material upper limit																																					2				
Field_ID	Sample_Depth_Range	Sampled_Date_Time																																							
BH42_0.2		28/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.4	<1	<0.5	<0.2	
BH43_0.2		28/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH44_0.3		23/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.4	<1	<0.5	<0.2	
BH45_0.2		23/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH46_0.2		23/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH47_0.2		23/02/2018	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH48_0.4		23/02/2018	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH49_0.3		23/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH50_0.2		23/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH51_0.2		23/02/2018	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH52_0.15		23/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.4	<1	<0.5	<0.2
BH52_0.3		23/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH54_0.15		28/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH54_0.25		28/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH55_0.15		28/02/2018	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH55_0.5		28/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH57_0.15		28/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH58_0.3		28/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH59_0.3		28/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.4	<1	<0.5	<0.2
BH60_0.1	0.1	6/03/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW01_0.2		22/02/2018	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW01_2.0		22/02/2018	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW01_3.0		22/02/2018	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW01_3.8		22/02/2018	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW01_6.0		22/02/2018	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW02_0.5		22/02/2018	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW02_1.0		22/02/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW03_1.0		22/02/2018	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW03_2.0		22																																							

				Field_ID	BH65-0.0-0.2	BH66-0.0-0.2	BH71-0.1-0.2	BH72-0.1-0.2	BH74-0.0-0.2
				Sampled_Date	24/06/2020	24/06/2020	24/06/2020	24/06/2020	24/06/2020
				Laboratory Report	799226	799226	799226	799226	799226
				EPA Vic Publication 1828.2 Cat D Leachable Concentration	EPA Vic Publication 1828.2 Cat C Leachable Concentration	EPA Vic Publication 1828.2 Cat B Leachable Concentration			
Chemical Group	Chemical	output unit	EQL						
Heavy Metals ASLP	Arsenic	mg/L	0.01	0.5	1	4	-	-	-
	Lead	mg/L	0.01	0.5	1	4	0.09	-	-
	Nickel	mg/L	0.01	1	2	8	-	-	0.04
	Zinc	mg/L	0.01	150	300	1,200	-	1.4	-
TRH 1999 ASLP	C10-C14	mg/L	0.1	-	-	-	-	-	<0.1
	C15-C28	mg/L	0.2	-	-	-	-	-	<0.2
	C29-C36	mg/L	0.2	-	-	-	-	-	<0.2
	C10-C36 (Total)	mg/L	0.5	-	-	-	-	-	<0.2
TRH 2013 ASLP	C10-C16	mg/L	0.05	-	-	-	-	-	<0.05
	C16-C34	mg/L	0.1	-	-	-	-	-	<0.1
	C34-C40	mg/L	0.1	-	-	-	-	-	<0.1
	C10-C40 (Total)	mg/L	0.1	-	-	-	-	-	<0.1
PAH ASLP	Benzo(a)pyrene	mg/L	0.001	0.0005	0.001	0.004	-	-	<0.001

		Laboratory Report		794678	794678		EM2108933		794678	794678		EM2108933	
		Field ID	BH68-0.4-0.5	BH68-0.4-0.5	BH68-0.4-0.5 D	RPD	BH68-0.4-0.5 T	RPD	BH75-0.1-0.2	BH75 0.1-0.2-D	RPD	BH75-0.1-0.2 T	RPD
		Sampled Date	11/05/2021	11/05/2021			11/05/2021		11/05/2021	11/05/2021		11/05/2021	
Chemical Group	Chem Name	Units	EQL										
BTEXN	Benzene	mg/kg	0.1 : 0.2 (Interlab)	<0.1	<0.1	0	<0.2	0	<0.1	<0.1	0	<0.2	0
	Toluene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.5	0	<0.1	<0.1	0	<0.5	0
	Ethylbenzene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.5	0	<0.1	<0.1	0	<0.5	0
	Xylene (o)	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.5	0	<0.1	<0.1	0	<0.5	0
	Xylene (m & p)	mg/kg	0.2 : 0.5 (Interlab)	<0.2	<0.2	0	<0.5	0	<0.2	<0.2	0	<0.5	0
	Xylene Total	mg/kg	0.3 : 0.5 (Interlab)	<0.3	<0.3	0	<0.5	0	<0.3	<0.3	0	<0.5	0
TRH 1999	C6 - C9	mg/kg	20 : 10 (Interlab)	<20	<20	0	<10	0	<20	<20	0	<10	0
	C10 - C14	mg/kg	20 : 50 (Interlab)	<20	<20	0	<50	0	<20	<20	0	<50	0
	C15 - C28	mg/kg	50 : 100 (Interlab)	<50	<50	0	<100	0	<50	<50	0	<100	0
	C29 - C36	mg/kg	50 : 100 (Interlab)	<50	<50	0	<100	0	<50	<50	0	<100	0
	C10 - C36 (Sum of total)	mg/kg	50	<50	<50	0	<50	0	<50	<50	0	<50	0
TRH 2013	F1 (C6 - C10)	mg/kg	20 : 10 (Interlab)	<20	<20	0	<10	0	<20	<20	0	<10	0
	F1 (C6 - C10) less BTEX	mg/kg	20 : 10 (Interlab)	<20	<20	0	<10	0	<20	<20	0	<10	0
	F2 (C10 - C16)	mg/kg	50	<50	<50	0	<50	0	<50	<50	0	<50	0
	F2 C10 - C16 (minus Naphthalene)	mg/kg	50	<50	<50	0	<50	0	<50	<50	0	<50	0
	F3 (C16 - C34)	mg/kg	100	<100	<100	0	<100	0	<100	<100	0	<100	0
	F4 (C34 - C40)	mg/kg	100	<100	<100	0	<100	0	<100	<100	0	<100	0
	C10 - C40 (Sum of total)	mg/kg	100 : 50 (Interlab)	<100	<100	0	<50	0	<100	<100	0	<50	0
Heavy Metal	Arsenic	mg/kg	2 : 5 (Interlab)	10	16	46	22	75	8	13	48	8	0
	Cadmium	mg/kg	0.4 : 1 (Interlab)	<0.4	<0.4	0	<1	0	<0.4	<0.4	0	<1	0
	Copper	mg/kg	5	<5	<5	0	<5	0	<5	<5	0	<5	0
	Lead	mg/kg	5	6.3	10	45	10	45	<5	5.8	15	5	0
	Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	0	<0.1	<0.1	0	<0.1	0
	Nickel	mg/kg	5 : 2 (Interlab)	11	15	31	19	53	<5	<5	0	4	0
	Chromium (III+VI)	mg/kg	5 : 2 (Interlab)	27	43	46	45	50	7.1	8.7	20	7	1
	Zinc	mg/kg	5	5.5	8.6	44	7	24	6.3	6.6	5	8	24
Inorganic	Ammonia as N	mg/kg	5						12	6.3	62		
	Nitrite + Nitrate as N	mg/kg	5						<5	<5	0		
	Nitrate (as NO3-N)	mg/kg	5 : 0.1 (Interlab)						<5	<5	0	0.2	0
	Nitrogen (Total)	mg/kg	10 : 20 (Interlab)						760	220	110	600	24
	Total Kjeldahl Nitrogen (TKN)	mg/kg	10 : 20 (Interlab)						760	220	110	600	24
	Phosphorus	mg/kg	5						300	380	24		
PAH	Acenaphthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Acenaphthylene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Benzo(a)anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Benzo(g,h,i)perylene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Chrysene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Benzo(b)h)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Dibenz(a,h)anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Phenanthrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	PAHs (Sum of total)	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Benzo(a) pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	1.2	1.2	0	1.2	0	1.2	1.2	0	1.2	0
	Benzo(a)pyrene TEQ calc (Zero)	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Benzo(a)pyrene TEQ calc (Half)	mg/kg	0.5	0.6	0.6	0	0.6	0	0.6	0.6	0	0.6	0
	Fluorene	mg/kg	0.5	<0.5	<0.5	0	<0.5	0	<0.5	<0.5	0	<0.5	0
	Naphthalene-PAH	mg/kg	0.5	<0.5	<0.5	0			<0.5	<0.5	0		
Inorganic	Moisture Content (dried @ 103°C)	%	1	20	18	11			12	13	8		

*RPDs have only been considered where a concentration is greater than 0 times the EQL

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (0-10 x EQL); 30 (10-20 x EQL); 30 (> 20 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

TABLE 5
 QC blank samples
 Geelong Saleyards Further ESA
 754-GEXEN282929-R01

Laboratory Report	794678	794678	794678	794678
Field ID	RB100521	RB110521	TB100521	TB110521
Sampled Date	10/05/2021	11/05/2021	10/05/2021	11/05/2021
Sample Type	Rinsate	Rinsate	Trip Blank	Trip Blank

Chemical Group	Chemical Name	Units	EQL				
BTEXN	Benzene	µg/l	1	<1	<1	<1	<1
	Toluene	µg/l	1	<1	<1	<1	<1
	Ethylbenzene	µg/l	1	<1	<1	<1	<1
	Xylene (o)	µg/l	1	<1	<1	<1	<1
	Xylene (m & p)	µg/l	2	<2	<2	<2	<2
	Xylene Total	µg/l	3	<3	<3	<3	<3
	Naphthalene-MAH	MG/KG	0.01	<0.01	<0.01	<0.01	<0.01
TRH 1999	C6 - C9	mg/l	0.02	<0.02	<0.02	<0.02	<0.02
	C10 - C14	mg/l	0.05	<0.05	<0.05		
	C15 - C28	mg/l	0.1	0.2	<0.1		
	C29 - C36	mg/l	0.1	<0.1	<0.1		
	C10 - C36 (Sum of total)	mg/l	0.1	0.2	<0.1		
TRH 2013	F1 (C6 - C10)	mg/l	0.02	<0.02	<0.02	<0.02	<0.02
	F1 (C6 - C10) less BTEX	mg/l	0.02	<0.02	<0.02	<0.02	<0.02
	F2 (C10 - C16)	mg/l	0.05	<0.05	<0.05		
	F2 C10 - C16 (minus Naphthalene)	mg/l	0.05	<0.05	<0.05		
	F3 (C16 - C34)	mg/l	0.1	0.1	<0.1		
	F4 (C34 - C40)	mg/l	0.1	<0.1	<0.1		
	C10 - C40 (Sum of total)	mg/l	0.1	0.1	<0.1		
Heavy Metal	Arsenic	mg/l	0.001	<0.001	<0.001		
	Cadmium	mg/l	0.0002	<0.0002	<0.0002		
	Copper	mg/l	0.001	<0.001	<0.001		
	Lead	mg/l	0.001	<0.001	<0.001		
	Mercury	mg/l	0.0001	<0.0001	<0.0001		
	Nickel	mg/l	0.001	<0.001	<0.001		
	Chromium (III+VI)	mg/l	0.001	<0.001	<0.001		
	Zinc	mg/l	0.005	<0.005	<0.005		
Inorganic	Ammonia as N	mg/l	0.01	<0.01	0.03		
	Nitrite + Nitrate as N	mg/l	0.05	<0.05	<0.05		
	Nitrate (as NO3-N)	mg/l	0.02	<0.02	<0.02		
	Nitrite (as NO2-N)	mg/l	0.02	<0.02	<0.02		
	Nitrogen (Total)	mg/l	0.2	<0.2	<0.2		
	Total Kjeldahl Nitrogen (TKN)	mg/l	0.2	<0.2	<0.2		
	Phosphorus	mg/l	0.01	<0.01	<0.01		
PAH	Acenaphthene	µg/l	1	<1	<1		
	Acenaphthylene	µg/l	1	<1	<1		
	Anthracene	µg/l	1	<1	<1		
	Benz(a)anthracene	µg/l	1	<1	<1		
	Benzo(g,h,i)perylene	µg/l	1	<1	<1		
	Benzo(k)fluoranthene	µg/l	1	<1	<1		
	Chrysene	µg/l	1	<1	<1		
	Benzo(b+j)fluoranthene	mg/l	0.001	<0.001	<0.001		
	Dibenz(a,h)anthracene	µg/l	1	<1	<1		
	Fluoranthene	µg/l	1	<1	<1		
	Indeno(1,2,3-c,d)pyrene	µg/l	1	<1	<1		
	Phenanthrene	µg/l	1	<1	<1		
	Pyrene	µg/l	1	<1	<1		
	PAHs (Sum of total)	µg/l	1	<1	<1		
	Benzo(a) pyrene	µg/l	1	<1	<1		
	Fluorene	µg/l	1	<1	<1		
	Naphthalene-PAH	MG/KG	0.001	<0.001	<0.001		

APPENDIX A: SURVEY DATA

Index	Name	Longitude	Latitude	Elevation	Collection Start	Collection End	Solution Status	Lateral rms
1	BH70	144.3457343	-38.12661643	14.58869693	2021-05-11 04:55:40 UTC	2021-05-11 04:56:25 UTC	FIX	0.0109
2	BH69	144.3457142	-38.12652514	14.66774245	2021-05-11 04:57:07 UTC	2021-05-11 04:57:28 UTC	FIX	0.0042
3	BH71	144.3456431	-38.12672894	14.35323784	2021-05-11 04:58:24 UTC	2021-05-11 04:58:46 UTC	FIX	0.0037
4	BH74	144.3448602	-38.1267528	17.37255963	2021-05-11 05:00:40 UTC	2021-05-11 05:01:02 UTC	FIX	0.0026
5	BH75	144.344387	-38.12662134	18.6454402	2021-05-11 05:02:44 UTC	2021-05-11 05:03:04 UTC	FIX	0.0031
6	BH76	144.3439745	-38.12656023	19.06805941	2021-05-11 05:05:28 UTC	2021-05-11 05:05:49 UTC	FIX	0.006
7	BH66	144.3442074	-38.12612763	19.45579519	2021-05-11 05:07:05 UTC	2021-05-11 05:07:26 UTC	FIX	0.0027
8	BH65	144.3443001	-38.12599007	19.54454844	2021-05-11 05:08:08 UTC	2021-05-11 05:08:33 UTC	FIX	0.0034
9	BH67	144.3445448	-38.12616116	18.78185143	2021-05-11 05:09:40 UTC	2021-05-11 05:10:01 UTC	FIX	0.0026
10	BH68	144.3450124	-38.12622245	17.81561942	2021-05-11 05:12:09 UTC	2021-05-11 05:12:30 UTC	FIX	0.0043
11	BH64	144.3452511	-38.1261093	17.89230233	2021-05-11 05:13:22 UTC	2021-05-11 05:13:57 UTC	FIX	0.0032
12	BH63	144.3449049	-38.12588275	18.93083725	2021-05-11 05:15:40 UTC	2021-05-11 05:16:01 UTC	FIX	0.0036
13	BH62	144.3447853	-38.12549577	19.51592353	2021-05-11 05:18:19 UTC	2021-05-11 05:18:40 UTC	FIX	0.0046
14	BH61	144.3451362	-38.12548453	18.99829057	2021-05-11 05:19:37 UTC	2021-05-11 05:19:58 UTC	FIX	0.0034
15	BH73	144.3451152	-38.12680372	16.4550419	2021-05-11 05:23:17 UTC	2021-05-11 05:23:38 UTC	FIX	0.0039

Source: Survey data from CTS Environmental. Accuracy +/- 1m

APPENDIX B: BORE LOGS

Drilling Log

Soil Boring **BH01**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.6 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 7/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH01/0.0				FILL: TOPSOIL: sandy, traces of manure.
	0.0	BH01/0.2				FILL: ASPHALT:
	0.0	BH01/0.5			CH	FILL: SAND: fine grained, dark brown, loose, soft, dry, no staining, no odour. CLAY: high plasticity, orange, soft, slightly moist.
1						End of Investigation @0.55mbgs.
2						
3						
4						

Drilling Log

Soil Boring **BH02**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 7/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH02/0.25			CL	FILL: GRAVEL: coarse, grey, moderately sorted, sub-angular. CLAY: medium plasticity, orange brown, stiff, dry. End of investigation @0.3mbgs.
1						
2						
3						
4						

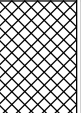
Drilling Log

Soil Boring **BH03**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 7/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						
	0.0	BH03/0.2				FILL: Sandy TOPSOIL: FILL: SAND: fine grained, dark brown, soft, loose, slightly moist.
	0.0	BH03/0.45			CH	CLAY: high plasticity, orange/brown, firm, slightly moist. End of investigation @0.5mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH04**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 7/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0		BH04/0.2			SP	Bluestone Paving SAND: fine grained, dark brown, loose, soft, slightly moist.
		BH04/0.45			CH	CLAY: high plasticity, brown, soft, slightly moist.
						End of investigation @0.5mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH05**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.6 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						
	0.0	BH05/0.5			CL	FILL: GRAVEL: coarse, grey, sub-angular, with some large pebbles (10cm), dry. CLAY: medium plasticity, brown, firm, dry.
1						End of investigation @0.6mbgs.
2						
3						
4						

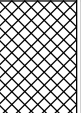
Drilling Log

Soil Boring **BH06**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 7/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0		BH06/0.2				FILL: Silty CLAY: fine grained, brown, loose, dry.
		BH06/0.45			CH	CLAY: high plasticity, brown, firm, dry. End of investigation @0.5mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH07**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 7/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH07/0.0				TOPSOIL: sandy, dark brown.
	0.0	BH07/0.2			CH	CLAY: high plasticity, brown, firm, dry. Refusal, limit of investigation @0.25mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH08**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 8/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH08/0.25			CL	FILL: TOPSOIL: sandy. FILL: ASPHALT: FILL: GRAVEL: coarse, moderately sorted, sub-angular, dry. CLAY: medium plasticity, orange/brown, firm, dry. End of investigation @0.3mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH09**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 8/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0 0.0	BH09/0.1 BH09/0.2				FILL: GRAVEL: coarse, grey, moderately sorted, sub-angular, with sandy silt, brown, fine grained, dry. FILL: GRAVEL: medium-coarse grained, grey, moderately sorted, sub-angular, increase in sandy silt content, brown, fine grained. End of investigation @0.3mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH10**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 8/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH10/0.1				FILL: GRAVEL: coarse, grey, moderately sorted, sub-angular, with minor sandy silt, brown, fine grained, dry.
	0.0	BH10/0.3			CL	CLAY: medium plasticity, dark brown, fine grained, firm, dry. As above: orange brown.
						End of investigation @0.35mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH11**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.2 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 8/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH11/0.15			CH	TOPSOIL: sandy silt, fine grained, brown, dry. CLAY: high plasticity, orange brown, fine grained, dry. End of investigation @0.2mbgs.
1						
2						
3						
4						

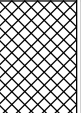
Drilling Log

Soil Boring **BH12**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 8/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH12/0.35				FILL: GRAVEL: coarse, grey, moderately sorted, sub-angular, with brown sandy silt, fine grained. Increase in sandy silt content. End of investigation @0.4mbgs.
1						
2						
3						
4						

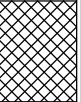
Drilling Log

Soil Boring **BH13**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 8/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH13/0.3				FILL: Sandy SILT: fine grained, light brown, with some medium-coarse sub-angular gravels, dry. As above: with pebbles, grey, sub-angular. FILL: Sandy SILT: as above. End of investigation @0.35mbgs.
1						
2						
3						
4						

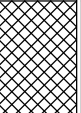
Drilling Log

Soil Boring **BH14**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 8/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0 0.0 0.0	BH14/0.1 BH14/0.2 BH14/0.45			CH	FILL: GRAVEL: coarse, grey, sub-angular, dry. FILL: Sandy SILT: fine grained, brown, dry, with debris, (glass, nails, timber and metal). As above: with pieces of ash/charcoal. CLAY: high plasticity, orange brown, fine grained, dry. End of investigation @0.5mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH15**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 8/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH15/0.1				
	0.0	BH15/0.25				
					CH	FILL: Sandy SILT: fine grained, brown, dry. As above: with pieces of ash/coal. FILL: SAND: fine grained, pale brown, loose, dry. CLAY: high plasticity, orange-brown, fine grained, dry. End of investigation @0.35mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH16**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 8/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH16/0.2			CL	FILL: GRAVEL: coarse, grey, sub-angular, with brown sandy silt, fine grained, dry. CLAY: medium plasticity, brown, fine grained, dry. End of investigation @0.25mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH17**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.6 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 9/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	1.0	BH17/0.1				FILL: Sandy SILT: fine grained, brown, loose, dry.
	0.0	BH17/0.5				FILL: Silty SAND: fine grained, light brown, loose, dry.
						As above: becoming very light brown/cream.
						End of investigation @0.6mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH18**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 9/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0		BH18/0.2				FILL: Sandy SILT: fine grained, brown, loose, dry.
		BH18/0.4			CL	CLAY: medium plasticity, orange-brown, firm, dry.
1						End of investigation @0.5mbgs.
2						
3						
4						

Drilling Log

Soil Boring **BH19**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 9/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0		BH19/0.15				FILL: Sandy SILT: fine grained, brown, loose, dry.
		BH19/0.4			CL	CLAY: medium plasticity, orange-brown, firm, dry.
						End of investigation @0.5mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH20**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 9/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0		BH20/0.2			CL	FILL: Sandy SILT: fine grained, brown, loose, dry. CLAY: medium plasticity, orange-brown, firm, dry. End of investigation @0.3mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH21**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 9/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH21/0.1				FILL: Sandy SILT: fine grained, brown, loose, dry.
	0.0	BH21/0.2			CL	CLAY: medium plasticity, orange-brown, firm, dry.
						End of investigation @0.3mbgs.
1						
2						
3						
4						

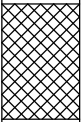
Drilling Log

Soil Boring **BH22**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 9/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH22/0.2				FILL: GRAVEL: coarse, grey, moderately sorted, sub-angular, dry. As above: with some pebbles. End of investigation @0.4mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH23**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.2 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 9/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH22/0.0				FILL: SILT: fine grained, black, loose, dry.
	0.0	BH22/0.15			CL	CLAY: medium plasticity, orange-brown, firm, dry.
						End of investigation @0.2mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH24**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.2 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 9/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH24/0.0 BH24/0.1			CL	FILL: SILT: fine grained, dark brown, loose with ash and charcoal, dry. CLAY: medium plasticity, orange-brown, firm, dry. End of investigation @0.2mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH25**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH25/0.15				CONCRETE
	0.0	BH25/0.3			CL	FILL: Bluestone pavers FILL: SAND: fine grained, brown, loose, slightly moist. CLAY: medium plasticity, brown, firm, slightly moist.
						End of investigation @0.4mbgs
1						
2						
3						
4						

Drilling Log

Soil Boring **BH26**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.6 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH26/0.15				CONCRETE FILL: Bluestone pavers FILL: SAND: fine grained, brown, loose, slightly moist.
	0.0	BH26/0.3			CL	CLAY medium plasticity, brown, firm, slightly moist.
1						End of investigation @0.6mbgs.
2						
3						
4						

Drilling Log

Soil Boring **BH27**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH27/0.2				CONCRETE
	0.0	BH27/0.35			CL	FILL: Bluestone pavers FILL: SAND: fine grained, brown, loose, slightly moist. CLAY medium plasticity, brown, firm, slightly moist.
1						End of investigation @0.4mbgs.
2						
3						
4						

Drilling Log

Soil Boring **BH28**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH28/0.1				ASPHALT
	0.0	BH28/0.4			CL	FILL: GRAVEL: coarse, grey, moderately sorted, sub-angular, dry. FILL: SAND: fine grained, brown, loose, slightly moist. CLAY: medium plasticity, brown, firm, slightly moist.
1						End of investigation @0.5mbgs.
2						
3						
4						

Drilling Log

Soil Boring **BH29**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.2 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0 0.0	BH29/0.05 BH29/0.15				CONCRETE FILL: SAND: medium-coarse grained, light brown, loose, dry. FILL: SAND: fine grained, brown, loose, slightly moist. End of investigation @0.2mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH30**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH30/0.1			CL	CONCRETE CLAY: medium plasticity, orange-brown, stiff, dry.
0	0.0	BH30/0.4				End of investigation @0.5mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH31**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.6 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.2	BH31/0.1				CONCRETE
						FILL: Clayey SAND: fine grained, light brown, loose, trace of tree roots, dry.
	0.1	BH31/0.5			CL	CLAY: medium plasticity, orange-brown, stiff, dry.
						End of investigation @0.55mbgs.
1						
2						
3						
4						

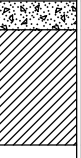
Drilling Log

Soil Boring **BH32**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH32/0.1				CONCRETE
					CL	CLAY: medium plasticity, brown-orange, firm, dry.
	0.0	BH32/0.5				End of investigation @0.5mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH33**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH33/0.1				CONCRETE
	0.0	BH33/0.4			CL	FILL: SAND: fine grained, brown, loose, slightly moist. CLAY: medium plasticity, orange-brown, firm, slightly moist.
1						End of investigation @0.5mbgs.
2						
3						
4						

Drilling Log

Soil Boring **BH34**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH34/0.1				CONCRETE
	0.0	BH34/0.4			CL	FILL: SAND: fine grained, brown, loose, slightly moist. CLAY: medium plasticity, brown, soft, slightly moist.
1						End of investigation @0.4mbgs.
2						
3						
4						

Drilling Log

Soil Boring **BH35**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						
	0.0	BH35/0.2				CONCRETE
	0.0	BH35/0.4				FILL: SAND: fine grained, dark brown, loose, slightly moist.
					CL	CLAY: medium plasticity, brown, firm, slightly moist.
						End of investigation @ 0.5mbgs
1						
2						
3						
4						

Drilling Log

Soil Boring **BH36**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.7 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						
	0.0	BH36/0.2				CONCRETE
						FILL: SAND: fine grained, brown, loose, slightly moist.
	0.0	BH36/0.6			CL	CLAY: medium plasticity, orange-brown, soft, slightly moist.
						End of investigation @0.7mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH37**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH37/0.15				CONCRETE
	0.0	BH37/0.4				FILL: SAND: fine grained, brown, loose, slightly moist.
					CL	CLAY: medium plasticity, brown, soft, slightly moist.
						End of investigation @0.5mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH38**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 23/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH38/0.1				CONCRETE
	0.1	BH38/0.3				FILL: SAND: fine grained, brown, loose, slightly moist.
					CL	CLAY: medium plasticity, brown, soft, slightly moist.
						End of investigation @0.4mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH39**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH39/0.25			CL	ASPHALT FILL: GRAVEL: coarse, grey, sub-angular, dry. CLAY: medium plasticity, orange-brown, firm, slightly moist. End of investigation @0.3mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH40**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.6 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH40/0.15				CONCRETE
						FILL: SAND: fine grained, brown, loose, slightly moist.
	0.0	BH40/0.5			CL	CLAY: medium plasticity, brown, soft, slightly moist.
1						End of investigation @0.6mbgs.
2						
3						
4						

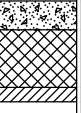
Drilling Log

Soil Boring **BH41**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH41/0.15			CL	CONCRETE FILL: SAND: fine grained, brown, loose, dry. CLAY: medium plasticity, orange-brown, soft, slightly moist. End of investigation @0.35mbgs.
1						
2						
3						
4						

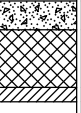
Drilling Log

Soil Boring **BH42**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH42/0.2			CL	CONCRETE FILL: SAND: fine grained, brown, loose, dry. CLAY: medium plasticity, orange-brown, firm, slightly moist. End of investigation @0.35mbgs.
1						
2						
3						
4						

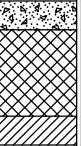
Drilling Log

Soil Boring **BH43**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH43/0.2				CONCRETE FILL: SAND: fine grained, brown, loose, dry.
					CL	CLAY: medium plasticity, orange-brown, firm, slightly moist. End of investigation @ 0.5mbgs.
1						
2						
3						
4						

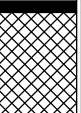
Drilling Log

Soil Boring **BH44**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH44/0.3				ASPHALT FILL: GRAVEL: coarse, grey, sub-angular, dry.
1						End of investigation @0.4mbgs.
2						
3						
4						

Drilling Log

Soil Boring **BH45**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH45/0.2			CL	ASPHALT FILL: GRAVEL: coarse, grey, sub-angular, dry. CLAY: medium plasticity, brown, firm, dry. End of investigation @0.3mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH46**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH46/0.2			CL	ASPHALT FILL: GRAVEL: coarse, grey, sub-angular, dry. CLAY: medium plasticity, brown, firm, dry. End of investigation @0.3mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH47**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH47/0.2			CL	CONCRETE CLAY: medium plasticity, brown, firm, dry. End of investigation @0.3mbgs.
1						
2						
3						
4						

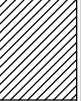
Drilling Log

Soil Boring **BH48**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.5 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						
	0.0	BH48/0.4				FILL: GRAVEL: coarse, grey, sub-angular, dry.
					CL	CLAY: medium plasticity, brown, firm, dry.
						End of investigation @0.5mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH49**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						
	0.0	BH49/0.4				FILL: GRAVEL: coarse, grey, sub-angular, dry.
					CL	CLAY: medium plasticity, brown, firm, dry.
						End of investigation @0.4mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH50**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH50/0.3			CL	FILL: GRAVEL: coarse, grey, sub-angular, dry. CLAY: medium plasticity, brown, firm, dry. End of investigation @0.3mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH51**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH51/0.2				FILL: GRAVEL: coarse, grey, sub-angular, dry.
					CL	CLAY: medium plasticity, brown, firm, dry.
						End of investigation @0.3mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH52**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH52/0.15				ASPHALT
	0.0	BH52/0.3				FILL: SILT: fine grained, black, loose, dry.
					CL	Sandy CLAY: fine grained, orange-brown, soft, dry.
						End of investigation @0.4mbgs.
1						
2						
3						
4						

Drilling Log

Soil Boring **BH54**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH54/0.15				CONCRETE
	0.0	BH54/0.25			CL	FILL: SAND: fine grained, brown, loose, dry. CLAY: medium plasticity, brown, firm, slightly moist.
						End of investigation @0.3mbgs
1						
2						
3						
4						

Drilling Log

Soil Boring **BH55**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.6 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH55/0.15				CONCRETE
						FILL: SAND: fine grained, brown, loose, dry.
	0.0	BH55/0.5			CL	CLAY: medium plasticity, brown-orange, firm, slightly moist.
						End of investigation @0.55mbgs
1						
2						
3						
4						

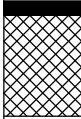
Drilling Log

Soil Boring **BH56**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS
No Samples taken due to depth of gravel layer.

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						ASPHALT FILL: GRAVEL: coarse, grey, sub-angular, dry.
1						End of investigation @0.4mbgs
2						
3						
4						

Drilling Log

Soil Boring **BH57**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.2 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH57/0.15			CL	FILL: GRAVEL: coarse, grey, sub-angular, dry. CLAY: low plasticity, orange-brown, very stiff, dry. End of investigation @0.2mbgs
1						
2						
3						
4						

Drilling Log

Soil Boring **BH58**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH58/0.3			CL	FILL: GRAVEL: coarse, grey, sub-angular, loose, dry. CLAY: low plasticity, brown-orange, very stiff, dry. End of investigation @0.3mbgs.
1						
2						
3						
4						

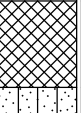
Drilling Log

Soil Boring **BH59**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.4 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0	0.0	BH59/0.3			ML	FILL: GRAVEL: coarse, grey, sub-angular, dry. Sandy SILT: fine grained, light grey, medium density. End of investigation @0.4mbgs
1						
2						
3						
4						

Drilling Log

Soil Boring **BH60**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 0.3 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 100 mm.
Screen: Dia NA Length NA Type/Size NA
Casing: Dia NA Length NA Type NA
Fill Material _____ Rig/Core _____
Drill Co. South Western Drilling Method Hand Auger
Driller B. Steenvoorden Log By E. Grinter Date 28/2/18 Permit # 714
Checked By A. Wightwick License No. NA

COMMENTS

Depth (m.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0		BH60/0.1 BH60/0.2		 	CL	FILL: SAND: fine grained, light brown, loose, dry. CLAY: medium plasticity, brown, firm, dry. End of investigation @0.3mbgs.
1						
2						
3						
4						

Drilling Log

Monitoring Well **MW01**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 9.0 m. North NA East NA
Top of Casing NA Water Level Initial NA Static ▼ 4.8 m. Diameter 150 mm.
Screen: Dia 50 mm. Length 3 m. Type/Size Class 18 uPVC/0.5 mm.
Casing: Dia 50 mm. Length 4 m. Type Class 18 uPVC
Fill Material Bentonite/Sand/Bentonite/Grout Rig/Core Geoprobe
Drill Co. South Western Drilling Method Hand Auger/Push Tube/
Driller B. Steenvoorden Log By E. Grinter Date 22/2/18 Permit # 714
Checked By A. Wightwick License No. WLE070336

COMMENTS
Backfilled to 7.0mbgs.

Depth (m.)	Well Completion	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0		0.0	MW01/0.2			GP	GRAVEL: coarse grained, sub-angular, grey, dry.
		0.0	MW01/1.0			CH	CLAY: high plasticity, brown, soft, slightly moist.
2		0.0	MW01/2.0			CL ML	Silty CLAY: low plasticity, orange brown, fine grained, soft, dry.
		0.0	MW01/3.0				
4		0.0	MW01/3.8				CLAY: medium plasticity, orange, soft, slightly moist.
6		0.0	MW01/6.0			CH	As above: light grey (6.5-7.0mbgs).
8							
10							End of investigation @9.0mbgs.

Drilling Log

Monitoring Well **MW02**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 9.0 m. North NA East NA
Top of Casing NA Water Level Initial ▽ 6.1 m. Static ▼ 5.3 m. Diameter 150 mm.
Screen: Dia 50 mm. Length 3 m. Type/Size Class 18 uPVC/0.5 mm.
Casing: Dia 50 mm. Length 4 m. Type Class 18 uPVC
Fill Material Sand/Bentonite/Grout Rig/Core Geoprobe
Drill Co. South Western Drilling Method Hand Auger/Push Tube/
Driller B. Steenvoorden Log By E. Grinter Date 22/2/18 Permit # 714
Checked By A. Wightwick License No. WLE070336

COMMENTS

Depth (m.)	Well Completion	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0		0.2	MW02/0.2				TOPSOIL: Sandy Silt, fine grained, brown, loose.
		0.0	MW02/1.0				CLAY: medium plasticity, brown, soft, dry.
2		0.0	MW02/2.0				
		0.0	MW02/3.0				
4						CL	Slightly moist.
		0.0	MW02/5.0				
6							
							End of investigation @7.0mbgs.
8							
10							

Drilling Log

Monitoring Well **MW03**

Page: 1 of 1

Project Geelong Saleyards ESA Owner City of Greater Geelong
Location 125-135 Weddell Road, North Geelong Vic Proj. No. 754-GEXEN213035
Surface Elev. NA Total Hole Depth 10.0 m. North NA East NA
Top of Casing NA Water Level Initial NA Static NA Diameter 150 mm.
Screen: Dia 50 mm. Length 3 m. Type/Size Class 18 uPVC/0.5 mm.
Casing: Dia 50 mm. Length NA Type Class 18 uPVC
Fill Material Sand/Bentonite/Grout Rig/Core Geoprobe
Drill Co. South Western Drilling Method Hand Auger/Push Tube/
Driller B. Steenvoorden Log By E. Grinter Date 22/2/18 Permit # 714
Checked By A. Wightwick License No. WLE070336

COMMENTS

Depth (m.)	Well Completion	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0		0.0	MW03/0.3			SP	ASPHALT
		0.0	MW03/0.6			CL	SAND: brown. CLAY: brown.
		0.0	MW03/1.0				
2		0.0	MW03/2.0			CL	Sandy CLAY: low plasticity, orange-brown, fine grained, soft, medium density.
		0.0	MW03/3.0				
4		0.0	MW03/4.0			SW	SAND: medium-coarse grained, pale brown, sub-rounded, well sorted, medium density, dry. As above: turning orange-brown.
6							
8						CL	CLAY: medium plasticity, orange brown, fine grained, soft, dry.
10							End of investigation @10.0mbgs.

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID: **BH61**

sheet: 1 of 1

project no. **754-GEXEN282929**

date started: **11 May 2021**

date completed: **11 May 2021**

logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components		moisture condition	consistency / relative density	structure and additional observations
HA N		E: BH61/0.1	0.1				SM	FILL: SILTY SAND: fine - coarse grained, brown, with trace gravels.		W	L	FILL No odour
							CI	Sandy CLAY: medium plasticity, brown mottled orange and red, fine grained.		M - W	F	No odour
		E: BH61/0.4	0		0.5							
		E: BH61/0.9	0.1		1.0		CH	Sandy CLAY: high plasticity, pale brown-grey, fine grained. Borehole BH61 terminated at 1.00 m		M	VSt	
					1.5							
					2.0							
					2.5							

method AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud C casing N nil water 	samples & field tests ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL loose L very loose MD medium dense D dense VD very dense

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID. **BH62**

sheet: 1 of 1

project no. **754-GEXEN282929**

date started: **11 May 2021**

date completed: **11 May 2021**

logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components		moisture condition	consistency / relative density	structure and additional observations
HA N		E: BH62/0.1	0.1				SM	CONCRETE.		W	L	No odour
								Silty SAND: fine grained, grey.				
		E: BH62/0.4	0.1		0.5		CI	Sandy CLAY: medium plasticity, brown mottled orange, fine grained.			F	No odour
		E: BH62/0.9	0.1		1.0		CI	fine becoming medium grained, becoming pale brown.		M	St	
								Borehole BH62 terminated at 1.00 m				

method AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud C casing N nil water  10-Oct-12 water level on date shown  water inflow  water outflow	samples & field tests ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID: **BH63**

sheet: 1 of 1

project no. **754-GEXEN282929**

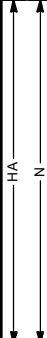
date started: **11 May 2021**

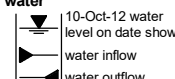
date completed: **11 May 2021**

logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance				
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density
		E: BH63/0.15	0.1				CI	BLUESTONE PAVERS.		
								FILL: Sandy CLAY: medium plasticity, brown mottled orange, fine grained sands.	W	S
		E: BH63/0.4	0.1					FILL: becoming pale brown mottled dark grey.		
							SC	Clayey SAND: fine grained, pale brown.		MD
		E: BH63/0.9	0.1							
					1.0			Borehole BH63 terminated at 1.00 m		
					1.5					
					2.0					
					2.5					

method AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud C casing N nil water  10-Oct-12 water level on date shown water inflow water outflow	samples & field tests ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID: **BH64**

sheet: 1 of 1

project no: **754-GEXEN282929**

date started: **11 May 2021**

date completed: **11 May 2021**

logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	structure and additional observations	
HA N		E: BH64/0.1	0				SM	FILL: Silty SAND: fine - coarse grained, dark brown, with trace angular gravels. grey to pale grey.	M	L	FILL vegetation surface with roots, no odour	
		E: BH64/0.4	0		0.5		CI	Sandy CLAY: medium plasticity, brown mottled orange, fine grained sands.	D	F	no odour	
		E: BH64/0.9	0		1.0		SC	Clayey SAND: fine - medium grained, brown-orange.	D	MD	no odour	
					1.0			Borehole BH64 terminated at 1.00 m				

method AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud C casing N nil water  10-Oct-12 water level on date shown  water inflow  water outflow	samples & field tests ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID: **BH65**

sheet: 1 of 1

project no: **754-GEXEN282929**

date started: **10 May 2021**

date completed: **10 May 2021**

logged by: **C. Chapman**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance				
method & support	water	samples & field tests	photoionization detector (ppmv)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HA N		E: BH65/0.0	0.1			GM	FILL: Silty GRAVEL: fine - coarse grained, sub-angular to angular, brown-grey.	W	L	FILL no odour
		E: BH65/0.3	0.2			CL-ML	Silty CLAY: high plasticity, brown mottled orange. with trace fine sands.	M	S	no odour
		E: BH65/0.5	0.1			CH	CLAY: high plasticity, pale brown.	M	VSt	no odour
				1.0			Borehole BH65 terminated at 1.00 m			

method	support	samples & field tests	soil group symbol & soil description based on AS 1726:2017	consistency / relative density
AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore	M mud C casing N nil	ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	moisture condition D dry M moist W wet Wp plastic limit WI liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

water
10-Oct-12 water level on date shown
water inflow
water outflow

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID: **BH66**

sheet: 1 of 1

project no. **754-GEXEN282929**

date started: **10 May 2021**

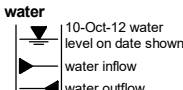
date completed: **10 May 2021**

logged by: **C. Chapman**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details	material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	structure and additional observations
HA N		E: BH66/0.0	0.1				GM	FILL: Silty GRAVEL: fine - coarse grained, brown-grey, angular-subangular.	W	L	FILL No odour
							CL-ML	Silty CLAY: high plasticity, brown mottled orange. with trace fine sands.	M	S	No odour
		E: BH66/0.0	0								
		E: BH66/0.8	0				SC	Clayey SAND: pale brown.	M	MD	No odour
					1.0	Borehole BH66 terminated at 1.00 m					
					1.5						
					2.0						
					2.5						

method AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud C casing N nil water 	samples & field tests ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID: **BH67**

sheet: 1 of 1

project no: **754-GEXEN282929**

date started: **11 May 2021**

date completed: **11 May 2021**

logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details	material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HA N		E: BH67/0.1	0.1					CONCRETE.			no odour
							GM	FILL: Silty GRAVEL: medium - coarse grained, grey, angular to sub-angular.	M	L	FILL
		E: BH67/0.4	0		0.5		CI	Sandy CLAY: medium plasticity, brown mottled grey and orange, fine grained sands.		F	no odour
							SC	Clayey SAND: fine grained, low - medium plasticity, yellow mottled orange, brown.		MD - VD	no odour
		E: BH67/0.9	0.1		1.0			Borehole BH67 terminated at 1.00 m			
					1.5						
					2.0						
					2.5						

method	support	samples & field tests	soil group symbol & soil description based on AS 1726:2017	consistency / relative density
AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore	M mud C casing N nil	ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
* bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	water 10-Oct-12 water level on date shown water inflow water outflow			

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID. **BH68**

sheet: 1 of 1

project no. **754-GEXEN282929**

date started: **11 May 2021**

date completed: **11 May 2021**

logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance				
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density
		E: BH68/0.15	0.1				GM	CONCRETE.		
							CH	FILL: Silty GRAVEL: grey, angular-sub-angular. Sandy CLAY: high plasticity, brown becoming orange, fine grained sands.	W M	L VSt
		E: BH68/0.4 BH68/0.4D BH68/0.4T	0.1		0.5		SC	Clayey SAND: fine grained, yellow, mottled orange-brown.		VD
		E: BH68/0.9	0.1		1.0			Borehole BH68 terminated at 1.00 m		
					1.5					
					2.0					
					2.5					

method	support	samples & field tests	soil group symbol & soil description based on AS 1726:2017	consistency / relative density
AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore	M mud C casing N nil	ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	moisture condition D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

water
10-Oct-12 water level on date shown
water inflow
water outflow

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID. **BH69**

sheet: 1 of 1

project no. **754-GEXEN282929**

date started: **11 May 2021**

date completed: **11 May 2021**

logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance				
method & support	water	samples & field tests	photoionization detector (ppmv)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HA N		E: BH69/0.1	0.3			GP	FILL: Sandy GRAVEL: medium - coarse grained, grey, angular-sub-angular.	W		FILL no odour
						SC	FILL: Clayey SAND: fine grained, brown-orange.	D - M		
		E: BH69/0.4	0	0.5		CI	Sandy CLAY: medium plasticity, brown mottled red/grey, fine grained sands.	D		no odour
						SC	Clayey SAND: fine grained, pale brown-yellow, with trace coarse quartz sands.	D		no odour
		E: BH69/0.9	0.2	1.0			Borehole BH69 terminated at 1.00 m			
				1.5						
				2.0						
				2.5						

method	support	samples & field tests	soil group symbol & soil description based on AS 1726:2017	consistency / relative density
AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore	M mud C casing N nil	ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	moisture condition D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

water
10-Oct-12 water level on date shown
water inflow
water outflow

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID: **BH70**

sheet: 1 of 1

project no. **754-GEXEN282929**

date started: **11 May 2021**

date completed: **11 May 2021**

logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations	
							GP	Sandy GRAVEL: medium - coarse grained, brown-grey, angular-sub-angular, with some bluestone cobbles.	M	VL	no odour	
		E: BH70/0.1	0.1				SC	Clayey SAND: fine grained, brown mottled orange. becoming pale brown.		L		
		E: BH70/0.4	0.1		0.5		CL	Sandy CLAY: brown mottled orange-grey.				
		E: BH70/0.9	0.1		1.0							
		E: BH70/1.7	0.1		1.5			orange, with trace quartz pebbles.				
					2.0			Borehole BH70 terminated at 1.80 m				
					2.5							

method AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud C casing N nill water 10-Oct-12 water level on date shown water inflow water outflow	samples & field tests ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID. **BH71**

sheet: 1 of 1

project no. **754-GEXEN282929**

date started: **11 May 2021**

date completed: **11 May 2021**

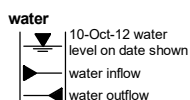
logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components		moisture condition	consistency / relative density	structure and additional observations
HA N		E: BH71/0.1	0.2				GM	Silty GRAVEL: angular, brown-grey.		M	L	no odour
							CL	CLAY: brown-red mottled orange, with trace sands, fine grained.			St	
							CL	Sandy CLAY: brown, fine grained sand.			L	
		E: BH71/0.1 D/T	0.2				SM	Silty SAND: fine - medium grained, brown.			S	
							CL	Sandy CLAY: brown-yellow, fine grained sand.			F	
		E: BH71/0.9	0.2		1.0			Borehole BH71 terminated at 1.00 m				
					1.5							
					2.0							
					2.5							

method	support	samples & field tests	soil group symbol & soil description based on AS 1726:2017	consistency / relative density
AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore	M mud C casing N nil	ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal		VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
* bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit		moisture condition D dry M moist W wet Wp plastic limit WI liquid limit		



Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID: **BH72**

sheet: 1 of 1

project no: **754-GEXEN282929**

date started: **11 May 2021**

date completed: **11 May 2021**

logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	structure and additional observations	
HA N		E: BH72/0.1	0.1				GM	FILL: Silty GRAVEL: medium - coarse grained, grey.	M	L	FILL vegetation surface no odour	
		E: BH72/0.4	0.1		0.5		CI	Sandy CLAY: medium plasticity, brown mottled orange, fine-medium grained sand.		F	no odour	
							SM	Silty SAND: fine grained, pale brown and orange.		MD		
		E: BH72/0.9	0.2		1.0			Borehole BH72 terminated at 1.00 m				
					1.5							
					2.0							
					2.5							

method AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud C casing N nil water 10-Oct-12 water level on date shown water inflow water outflow	samples & field tests ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID: **BH73**

sheet: 1 of 1

project no. **754-GEXEN282929**

date started: **11 May 2021**

date completed: **11 May 2021**

logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance				
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density
		E: BH73/0.1	0.1				SM	CONCRETE. Silty SAND: fine grained, well graded, brown-orange.	M	MD
							CH	CLAY: high plasticity, dark brown-brown, mottled orange.		St
		E: BH73/0.4	0.1		0.5					
							SC	Clayey SAND: fine grained, well graded, low plasticity, pale brown mottled orange.		
		E: BH73/0.9	0.2		1.0			Borehole BH73 terminated at 1.00 m		
					1.5					
					2.0					
					2.5					

method AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud C casing N nill water 	samples & field tests ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID. **BH74**

sheet: 1 of 1

project no. **754-GEXEN282929**

date started: **11 May 2021**

date completed: **11 May 2021**

logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations	
HA N		E: BH74/0.0	0.1				SM	Silty SAND: fine - coarse grained, dark brown, with organic matter, roots.	M	L	FILL vegetation surface no odour	
		E: BH74/0.3	0.1				SM	Silty SAND: fine - medium grained, brown.		MD	potential fill 0.4-0.9mbgs no odour	
		E: BH74/0.8	0.1				SC	Clayey SAND: fine - medium grained, brown.		VD	no odour	
					1.0			Borehole BH74 terminated at 1.00 m				
					1.5							
					2.0							
					2.5							

method	support	samples & field tests	soil group symbol & soil description based on AS 1726:2017	consistency / relative density
AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore	M mud C casing N nil	ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	moisture condition D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

water
10-Oct-12 water level on date shown
water inflow
water outflow

Environmental Log - Borehole

client: **City of Greater Geelong**

principal: **N/A**

project: **Geelong Saleyards, Further ESA & Remediation estimates**

location: **125-135 Weddell Rd, North Geelong**

Hole ID: **BH75**

sheet: 1 of 1

project no. **754-GEXEN282929**

date started: **11 May 2021**

date completed: **11 May 2021**

logged by: **J. Rodden**

checked by: **A. Wightwick**

position: Not Specified surface elevation: Not Specified angle from horizontal: 90°
equipment type: Hand Auger drilling fluid: Hand Auger hole diameter : 85 mm

drilling information				well details		material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
<											

method AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud C casing N nil water 10-Oct-12 water level on date shown water inflow water outflow	samples & field tests ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Environmental Log - Borehole

location: **125-135 Weddell Rd, North Geelong**

checked by: **A. Wightwick**

hole diameter : 85 mm

drilling information				well details	material substance										
method & support		water	samples & field tests	photoionization detector (ppmv)		depth (m)	graphic log	soil group symbol	material description		moisture condition	consistency / relative density	structure and additional observations		
HA N			E: BH76/0.0	0.2				SM	CONCRETE. FILL: Silty SAND: fine - medium grained, grey.		M	L	FILL no odour		
			E: BH76/0.4	0.2		0.5		CI	Sandy CLAY: medium plasticity, brown mottled orange, fine grained sands.			St	no odour		
			E: BH76/1.0	0.3		1.0		SC	Clayey SAND: fine grained, pale brown.			VD			
						1.0	Borehole BH76 terminated at 1.00 m								
						1.5									
						2.0									
						2.5									
method AD auger drilling* AS auger screwing* HA hand auger MR mud rotary W washbore * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit				support M mud C casing N nil water  10-Oct-12 water level on date shown  water inflow  water outflow		samples & field tests ALT air lift test B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter WS water sample HB hammer bouncing N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone PID photoionization detector R refusal				soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit			consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense		

APPENDIX C: CALIBRATION CERTIFICATES

FIELD REPORTING COVER SHEET

Project Name: <u>Geelong Sileyards</u>	Date: <u>10-11 May 2021</u>
Project Number: <u>GFEN282929</u>	Arrival Time: <u>12:30 10th</u>
Field Personnel (initials): <u>CC/SR/KU</u>	Departure Time: <u>17:00 11th</u>
Project Manager (initials): <u>AW</u>	

Purpose of Visit (Tick Appropriate Box)

Drilling ☐	GW Sampling ☐	Soil Sampling ☒
Gauging ☐	Cable locating ☐	Other ☐
Site inspection ☐	Tank removal and validation ☐	Specify: _____

Tick Equipment Used

FID ☐ Serial # _____	LEL/O2/Toxic Gas meter ☐ Serial # _____
PID ☒ Serial # <u>T-105870</u>	Water Quality meter ☐ Serial # _____
IP ☐ Serial # _____	Other meter(s) ☐ Serial # _____

Field Equipment Calibration Details attached: ☒

Other Calibration Performed (if any): _____

Sampling

Sampling Conducted: Y ☒ N ☐ Matrix: Soil ☒ Water ☒ Other ☐

COC Completed and Samples Sent: Y ☒ N ☐ COC No(s): _____

Primary Lab: Surfing Secondary Lab: ALS

Description of Activities (e.g., What did you do – drilled 3 soil borings (i.e. SB1 – SB7), installed 3 MWs, etc.)

Hand Auger & soil sampling at 16 locations across site

Attached Forms

Daily Field Summary: Y ☒ N ☐	Relevant Field Forms (list): <u>Borehole</u>
Site Map / Sketch: Y ☒ N ☐	Others (Specify): _____
Field Quality Control Log Y ☒ N ☐	

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: <u>GEXEN 282929 Safety</u>	Project Number: <u>GEXEN 282929</u>
Today's Date: <u>10/5/21</u>	Work Completed By: <u>CC & JR</u>
Type of Work (eg. ESA, GME, etc): <u>ESA</u>	
Equipment Supplier Calibration Certificates Included? ☒ Y / N (circle result)	

Photoionisation Detector (PID)		
Equipment Description: <u>Tiger PID</u>	Equipment ID (serial number): <u>T-105870</u>	
Calibration Frequency Required by Manufacturer: <u>6 months</u>	Last Service Date: <u>5/5/21</u>	Calibrated by: <u>CC</u>
Challenge Gas Standard: <u>Isobutylene 100ppm</u>	Gas Batch #: <u>1071726 C36</u>	Gas Expiry date: <u>Jan/24</u>
Field Fresh Air Calibration Performed? ☒ Y / N (circle result)	Bump Test Result (ppm): <u>99.4</u>	Bump Test Result (ppm) (end of day): <u>101.2</u>
Field Gas Calibration Required? ☒ Y / N (circle result)	Performed? ☒ Y / N (circle result)	<u>99.4</u>

Water Quality Meter (WQM)					
Equipment Description:		Equipment ID (serial number):			
Calibration Frequency Required by Manufacturer:		Last Service Date:		Calibrated by:	
Field Calibration Required? Y / N (circle result)		Field Bump Test Performed? Y / N (circle result)			
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	/	/	/	/	
Bump Test Result (start of day):					
Bump Test Result (end of day):					
Calibrated? (circle result)	Y / N	Y / N	Y / N	Y / N	Y / N

Interface Probe (IP)		
Equipment Description:		Equipment ID (serial number):
Calibration Frequency Required by Manufacturer:		Last Service Date:
Field Bump Test Results:		Calibrated by:
Water: IP Worked? Y / N (circle result)		Oil: IP Worked? Y / N (circle result) (if possible)

Lower Explosive Level (LEL) Meter		
Equipment Description:		Equipment ID (serial number):
Calibration Frequency Required by Manufacturer:		Last Service Date:
Challenge Mixture LEL% (refer side of cylinder):		Gas Batch #:
Gas Expiry date:		
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? Y / N (circle result) Performed? Y / N (circle result)		

☐ Tick if recorded elsewhere on Hot Work Permit (No. _____)

Multi-gas Meter				
Equipment Description:		Equipment ID (serial number):		
Calibration Frequency Required by Manufacturer:		Last Service Date:		Calibrated by:
Challenge Mixture: %O ₂ : _____ %LEL: _____ H ₂ S (ppm): _____ CO (ppm): _____		Gas Batch #:		Gas Expiry date:
Field Calibration Required? Y / N (circle result)		Field Bump Test Performed? Y / N (circle result)		
	%O₂	%LEL	H₂S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	Y / N	Y / N	Y / N	Y / N

☐ Tick if recorded elsewhere on Hot Work Permit (No. _____)

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: <u>GEXEN 282929</u> <u>Solegardy</u>	Project Number: <u>GEXEN 282929</u>
Todays Date: <u>11/5/21</u>	Work Completed By: <u>CC</u>
Type of Work (eg. ESA, GME, etc): <u>SAFETY</u> <u>ESA</u>	
Equipment Supplier Calibration Certificates Included? <u>Y</u> / N (circle result)	

Photoionisation Detector (PID)	
Equipment Description: <u>TIGER PID</u>	Equipment ID (serial number): <u>T-105870</u>
Calibration Frequency Required by Manufacturer: <u>6 months</u>	Last Service Date: _____ Calibrated by: <u>CC</u>
Challenge Gas Standard: <u>Isobutylene 100ppm</u>	Gas Batch #: <u>1071726E36</u> Gas Expiry date: <u>Jan 24</u>
Field Fresh Air Calibration Performed? <u>Y</u> / N (circle result)	Bump Test Result (ppm): <u>100</u> Bump Test Result (ppm) (end of day): <u>105.1</u>
Field Gas Calibration Required? <u>Y</u> / N (circle result)	Performed? <u>Y</u> / N (circle result) <u>107-100ppm</u>

Water Quality Meter (WQM)					
Equipment Description:		Equipment ID (serial number):			
Calibration Frequency Required by Manufacturer:		Last Service Date:		Calibrated by:	
Field Calibration Required? Y / N (circle result)		Field Bump Test Performed? Y / N (circle result)			
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	/	/	/	/	
Bump Test Result (start of day):					
Bump Test Result (end of day):					
Calibrated? (circle result)	Y / N	Y / N	Y / N	Y / N	Y / N

Interface Probe (IP)	
Equipment Description:	Equipment ID (serial number):
Calibration Frequency Required by Manufacturer:	Last Service Date: _____ Calibrated by:
Field Bump Test Results: Water: IP Worked? Y / N (circle result) Oil: IP Worked? Y / N (circle result) (if possible)	

Lower Explosive Level (LEL) Meter		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Mixture LEL% (refer side of cylinder):	Gas Batch #:	Gas Expiry date:
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? Y / N (circle result) Performed? Y / N (circle result)		

☐ Tick if recorded elsewhere on Hot Work Permit (No. _____)

Multi-gas Meter				
Equipment Description:		Equipment ID (serial number):		
Calibration Frequency Required by Manufacturer:		Last Service Date:		Calibrated by:
Challenge Mixture: %O ₂ : _____ %LEL: _____ H ₂ S (ppm): _____ CO (ppm): _____		Gas Batch #:		Gas Expiry date:
Field Calibration Required? Y / N (circle result)		Field Bump Test Performed? Y / N (circle result)		
	%O ₂	%LEL	H ₂ S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	Y / N	Y / N	Y / N	Y / N

☐ Tick if recorded elsewhere on Hot Work Permit (No. _____)

PID Calibration Certificate

Instrument PhoCheck Tiger
Serial No. T-105870



Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments			
Battery	Charge Condition	✓				
	Fuses	✓				
	Capacity	✓				
	Recharge OK?	✓				
Switch/keypad	Operation	✓				
Display	Intensity	✓				
	Operation (segments)	✓				
Grill Filter	Condition	✓				
	Seal	✓				
Pump	Operation	✓				
	Filter	✓				
	Flow	✓				
	Valves, Diaphragm	✓				
PCB	Condition	✓				
Connectors	Condition	✓				
Sensor	PID	✓	10.6 ev			
Alarms	Beeper	✓	Low	High	TWA	STEL
	Settings	✓	50ppm	100ppm		
Software	Version	✓				
Data logger	Operation	✓				
Download	Operation	✓				
Other tests:						

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No		Instrument Reading
PID Lamp		95ppm Isobutylene	NIST	ME758		95ppm Isobutylene

Calibrated by: _____ Yu Chee

Calibration date: 5/05/2021

Next calibration due: 1/11/2021

APPENDIX D: LABORATORY REPORTS AND CHAIN OF CUSTODY DOCUMENTATION

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST



Consigning Office: Geelong

Report Results to: Adam.Wightwick@coffey.com & chris.chapman@coffey.com

Invoices to: lisa.marnell@coffey.com

Phone:

Email:

Project No: 754-GEXEN282929

Task No:

Project Name: Geelong Saleyards

Laboratory: Eurofins

Sampler's Name: CC / JR / KV

Project Manager: AW

Special Instructions: Please forward BH68-0.4-0.5_T and BH75-0.1-0.2_T to ALS for analysis

Analysis Request Section

Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	B7 Suite	B19D suite	hold											NOTES
	BH61-0.1-0.2	11/05/2021		soil	1 jar	standard	X	X												
	BH61-0.4-0.5	11/05/2021		soil	1 jar	standard			X											
	BH61-0.9-1.0	11/05/2021		soil	1 jar	standard			X											
	BH62-0.1-0.2	11/05/2021		soil	1 jar	standard	X													
	BH62-0.4-0.5	11/05/2021		soil	1 jar	standard	X	X												
	BH62-0.9-1.0	11/05/2021		soil	1 jar	standard			X											
	BH63-0.15-0.2	11/05/2021		soil	1 jar	standard	X													
	BH63-0.4-0.5	11/05/2021		soil	1 jar	standard			X											
	BH63-0.9-1.0	11/05/2021		soil	1 jar	standard			X											
	BH64-0.1-0.2	11/05/2021		soil	1 jar	standard	X	X												
	BH64-0.4-0.5	11/05/2021		soil	1 jar	standard			X											
	BH64-0.9-1.0	11/05/2021		soil	1 jar	standard	X													
	BH65-0.0-0.2	10/05/2021		soil	1 jar	standard	X													
	BH65-0.3-0.5	10/05/2021		soil	1 jar	standard			X											
	BH65-0.8-1.0	10/05/2021		soil	1 jar	standard			X											
	BH66-0.0-0.2	10/05/2021		soil	1 jar	standard	X	X												
	BH66-0.3-0.5	10/05/2021		soil	1 jar	standard	X													
	BH66-0.8-1.0	10/05/2021		soil	1 jar	standard			X											

C9.6
 9.3
 9.3
 Counter

RELINQUISHED BY			RECEIVED BY			Sample Receipt Advice: (Lab Use Only)	
Name: <u>Chris Chapman</u>	Date: <u>12/5/21</u>	→	Name: <u>Josie TTH</u>	Date: <u>12/5/21</u>	All Samples Received in Good Condition ☐ All Documentation is in Proper Order ☐ Samples Received Properly Chilled ☐ Lab. Ref/Batch No. 794677		
Coffey Environments	Time: <u>12:30</u>		Company: <u>Josie TTH</u>	Time: <u>2:00</u>			
Name:	Date:	→	Name: <u>AWH to Eurofins</u>	Date: <u>12/5/21</u>			
Company:	Time:		Company:	Time: <u>4:59pm</u>			

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Issue Date: 16/02/2016

Australia
Melbourne

6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney

Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane

1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth

46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle

4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

New Zealand
Auckland

35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch

43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name: Coffey Environments Pty Ltd GEEL
Contact name: Adam Wightwick
Project name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929
Turnaround time: 5 Day
Date/Time received: May 12, 2021 4:59 PM
Eurofins reference: 794678

Sample Information

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

Notes

Contact

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

Harry Bacalis on phone : or by email: HarryBacalis@eurofins.com

Results will be delivered electronically via email to Adam Wightwick - adam.wightwick@coffey.com.

Note: A copy of these results will also be delivered to the general Coffey Environments Pty Ltd GEEL email address.

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
Newtown
VIC 3220

Order No.:
Report #: 794678
Phone: 5215 4600
Fax: 5224 1368

Received: May 12, 2021 4:59 PM
Due: May 19, 2021
Priority: 5 Day
Contact Name: Adam Wightwick

Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	BH61-0.1-0.2	May 11, 2021		Soil	M21-My23624		X	X			X
2	BH62-0.1-0.2	May 11, 2021		Soil	M21-My23625		X	X			
3	BH62-0.4-0.5	May 11, 2021		Soil	M21-My23626		X	X			X
4	BH63-0.15-0.2	May 11, 2021		Soil	M21-My23627		X	X			
5	BH64-0.1-0.2	May 11, 2021		Soil	M21-My23628		X	X			X
6	BH64-0.9-1.0	May 11, 2021		Soil	M21-My23629		X	X			
7	BH65-0.0-0.2	May 10, 2021		Soil	M21-My23630		X	X			
8	BH66-0.0-0.2	May 10, 2021		Soil	M21-My23631		X	X			X
9	BH66-0.3-0.5	May 10, 2021		Soil	M21-My23632		X	X			

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Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
Newtown
VIC 3220

Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Order No.:
Report #: 794678
Phone: 5215 4600
Fax: 5224 1368

Received: May 12, 2021 4:59 PM
Due: May 19, 2021
Priority: 5 Day
Contact Name: Adam Wightwick

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
10	BH67-0.1-0.2	May 11, 2021		Soil	M21-My23633		X	X			
11	BH68-0.15-0.2	May 11, 2021		Soil	M21-My23634		X	X			X
12	BH68-0.4-0.5	May 11, 2021		Soil	M21-My23635		X	X			
13	BH69-0.1-0.2	May 11, 2021		Soil	M21-My23636		X	X			
14	BH70-0.1-0.2	May 11, 2021		Soil	M21-My23637		X	X			
15	BH70-1.7-1.8	May 11, 2021		Soil	M21-My23638		X	X			X
16	BH71-0.1-0.2	May 11, 2021		Soil	M21-My23639		X	X			X
17	BH72-0.1-0.2	May 11, 2021		Soil	M21-My23640		X	X			X
18	BH72-0.9-1.0	May 11, 2021		Soil	M21-My23641		X	X			
19	BH73-0.1-0.2	May 11, 2021		Soil	M21-My23642		X	X			X
20	BH74-0.0-0.2	May 11, 2021		Soil	M21-My23643		X	X			X

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Order No.:
Report #: 794678
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Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
21	BH74-0.3-0.5	May 11, 2021		Soil	M21-My23644		X	X			
22	BH75-0.1-0.2	May 11, 2021		Soil	M21-My23645		X	X			X
23	BH76-0.0-0.2	May 11, 2021		Soil	M21-My23646		X	X			X
24	BH76-0.9-1.0	May 11, 2021		Soil	M21-My23647		X	X			
25	BH68-0.4-0.5 D	May 11, 2021		Soil	M21-My23648		X	X			
26	BH75_0.1-0.2-D	May 11, 2021		Soil	M21-My23649		X	X			X
27	RB100521	May 10, 2021		Water	M21-My23650			X		X	
28	RB110521	May 11, 2021		Water	M21-My23651			X		X	
29	TB100521	May 10, 2021		Water	M21-My23652				X		

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Address: Level 1, 23 West Fyans Street
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Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

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Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
30	TB110521	May 11, 2021		Water	M21-My23653				X		
31	BH61-0.4-0.5	May 11, 2021		Soil	M21-My23654	X					
32	BH61-0.9-1.0	May 11, 2021		Soil	M21-My23655	X					
33	BH62-0.9-1.0	May 11, 2021		Soil	M21-My23656	X					
34	BH63-0.4-0.5	May 11, 2021		Soil	M21-My23657	X					
35	BH63-0.9-1.0	May 11, 2021		Soil	M21-My23658	X					
36	BH64-0.4-0.5	May 11, 2021		Soil	M21-My23659	X					
37	BH65-0.3-0.5	May 10, 2021		Soil	M21-My23660	X					
38	BH65-0.8-1.0	May 10, 2021		Soil	M21-My23661	X					
39	BH66-0.8-1.0	May 10, 2021		Soil	M21-My23662	X					
40	BH67-0.4-0.5	May 11, 2021		Soil	M21-My23663	X					

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Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
41	BH67-0.9-1.0	May 11, 2021		Soil	M21-My23664	X					
42	BH68-0.9-1.0	May 11, 2021		Soil	M21-My23665	X					
43	BH69-0.4-0.5	May 11, 2021		Soil	M21-My23666	X					
44	BH69-0.9-1.0	May 11, 2021		Soil	M21-My23667	X					
45	BH70-0.4-0.5	May 11, 2021		Soil	M21-My23668	X					
46	BH70-0.9-1.0	May 11, 2021		Soil	M21-My23669	X					
47	BH71-0.4-0.5	May 11, 2021		Soil	M21-My23670	X					
48	BH71-0.9-1.0	May 11, 2021		Soil	M21-My23671	X					
49	BH72-0.4-0.5	May 11, 2021		Soil	M21-My23672	X					
50	BH73-0.4-0.5	May 11, 2021		Soil	M21-My23673	X					
51	BH73-0.9-1.0	May 11, 2021		Soil	M21-My23674	X					

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Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
52	BH74-0.8-1.0	May 11, 2021		Soil	M21-My23675	X					
53	BH75-0.4-0.5	May 11, 2021		Soil	M21-My23676	X					
54	BH75-0.9-1.0	May 11, 2021		Soil	M21-My23677	X					
55	BH76-0.4-0.5	May 11, 2021		Soil	M21-My23678	X					
56	BH71-0.9-1.0 D	May 11, 2021		Soil	M21-My23679	X					
57	BH71_0.9-1.0 T	May 11, 2021		Soil	M21-My23680	X					
Test Counts						27	26	28	2	2	13

Coffey Environments Pty Ltd GEEL
Level 1, 23 West Fyans Street
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VIC 3220



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
 NATA is a signatory to the ILAC Mutual Recognition
 Arrangement for the mutual recognition of the
 equivalence of testing, medical testing, calibration,
 inspection and proficiency testing scheme providers
 reports.

Attention: Adam Wightwick

Report 794678-S
Project name GEELONG SALEYARDS
Project ID 754-GEXEN282929
Received Date May 12, 2021

Client Sample ID			BH61-0.1-0.2	BH62-0.1-0.2	BH62-0.4-0.5	BH63-0.15-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-My23624	M21-My23625	M21-My23626	M21-My23627
Date Sampled			May 11, 2021	May 11, 2021	May 11, 2021	May 11, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	74	72	69	67
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	0.8	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	1.1	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.4	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	0.6	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	0.7	< 0.5	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	0.8	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	0.6	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	0.9	< 0.5	< 0.5	< 0.5

Client Sample ID			BH61-0.1-0.2	BH62-0.1-0.2	BH62-0.4-0.5	BH63-0.15-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-My23624	M21-My23625	M21-My23626	M21-My23627
Date Sampled			May 11, 2021	May 11, 2021	May 11, 2021	May 11, 2021
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	1.6	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	0.7	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	0.7	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	1.7	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	8.3	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	81	114	118	112
p-Terphenyl-d14 (surr.)	1	%	100	124	123	122
Ammonia (as N)	5	mg/kg	6.4	-	12	-
Nitrate & Nitrite (as N)	5	mg/kg	5.3	-	< 5	-
Nitrate (as N)	5	mg/kg	< 5	-	< 5	-
Nitrite (as N)	5	mg/kg	< 5	-	< 5	-
Total Kjeldahl Nitrogen (as N)	10	mg/kg	140	-	270	-
Total Nitrogen (as N)*	10	mg/kg	145.3	-	270	-
Phosphorus	5	mg/kg	780	-	51	-
% Moisture	1	%	18	14	21	20
Heavy Metals						
Arsenic	2	mg/kg	15	2.5	24	6.4
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	16	5.6	47	32
Copper	5	mg/kg	22	< 5	< 5	< 5
Lead	5	mg/kg	70	< 5	14	7.9
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	38	< 5	22	7.3
Zinc	5	mg/kg	69	8.4	11	7.3

Client Sample ID			BH64-0.1-0.2	BH64-0.9-1.0	BH65-0.0-0.2	BH66-0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-My23628	M21-My23629	M21-My23630	M21-My23631
Date Sampled			May 11, 2021	May 11, 2021	May 10, 2021	May 10, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	22
TRH C15-C28	50	mg/kg	< 50	78	210	480
TRH C29-C36	50	mg/kg	< 50	72	98	470
TRH C10-C36 (Total)	50	mg/kg	< 50	150	308	972
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	85	58	68	63

Client Sample ID			BH64-0.1-0.2	BH64-0.9-1.0	BH65-0.0-0.2	BH66-0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-My23628	M21-My23629	M21-My23630	M21-My23631
Date Sampled			May 11, 2021	May 11, 2021	May 10, 2021	May 10, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	130	290	790
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	160
TRH >C10-C40 (total)*	100	mg/kg	< 100	130	290	950
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	0.7	4.5	9.3	12
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	1.0	4.7	9.6	12
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.3	5.0	9.8	12
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	0.5	3.2	5.7	2.7
Benzo(a)pyrene	0.5	mg/kg	0.6	3.5	7.1	9.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	2.5	5.3	6.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	1.8	4.0	5.7
Benzo(k)fluoranthene	0.5	mg/kg	0.5	1.7	6.3	7.8
Chrysene	0.5	mg/kg	< 0.5	2.6	4.3	4.3
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	0.8	4.8	10	4.7
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	< 0.5	2.0	4.2	6.4
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	0.8	4.7	0.9
Pyrene	0.5	mg/kg	0.8	4.6	11	6.8
Total PAH*	0.5	mg/kg	3.2	27.5	63.1	55.3
2-Fluorobiphenyl (surr.)	1	%	108	122	105	78
p-Terphenyl-d14 (surr.)	1	%	122	131	106	150
Ammonia (as N)	5	mg/kg	5.7	-	-	6.3
Nitrate & Nitrite (as N)	5	mg/kg	20	-	-	14
Nitrate (as N)	5	mg/kg	20	-	-	14
Nitrite (as N)	5	mg/kg	< 5	-	-	< 5
Total Kjeldahl Nitrogen (as N)	10	mg/kg	150	-	-	920
Total Nitrogen (as N)*	10	mg/kg	170	-	-	934
Phosphorus	5	mg/kg	74	-	-	1000
% Moisture	1	%	9.7	4.8	15	16
Heavy Metals						
Arsenic	2	mg/kg	7.2	4.2	5.7	5.5
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	0.9
Chromium	5	mg/kg	34	7.4	14	22
Copper	5	mg/kg	< 5	< 5	15	29
Lead	5	mg/kg	8.2	5.7	160	51
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	15	6.7	32	56
Zinc	5	mg/kg	8.4	14	190	380

Client Sample ID			BH66-0.3-0.5	BH67-0.1-0.2	BH68-0.15-0.2	BH68-0.4-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-My23632	M21-My23633	M21-My23634	M21-My23635
Date Sampled			May 10, 2021	May 11, 2021	May 11, 2021	May 11, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	58	67	71	70
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	78	76	65	56
p-Terphenyl-d14 (surr.)	1	%	100	93	80	81

Client Sample ID			BH66-0.3-0.5	BH67-0.1-0.2	BH68-0.15-0.2	BH68-0.4-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-My23632	M21-My23633	M21-My23634	M21-My23635
Date Sampled			May 10, 2021	May 11, 2021	May 11, 2021	May 11, 2021
Test/Reference	LOR	Unit				
Ammonia (as N)	5	mg/kg	-	-	9.7	-
Nitrate & Nitrite (as N)	5	mg/kg	-	-	< 5	-
Nitrate (as N)	5	mg/kg	-	-	< 5	-
Nitrite (as N)	5	mg/kg	-	-	< 5	-
Total Kjeldahl Nitrogen (as N)	10	mg/kg	-	-	760	-
Total Nitrogen (as N)*	10	mg/kg	-	-	760	-
Phosphorus	5	mg/kg	-	-	98	-
% Moisture	1	%	21	24	20	20
Heavy Metals						
Arsenic	2	mg/kg	18	8.9	15	10
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	40	24	40	27
Copper	5	mg/kg	< 5	17	< 5	< 5
Lead	5	mg/kg	8.5	6.3	11	6.3
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	11	36	13	11
Zinc	5	mg/kg	8.0	18	8.8	5.5

Client Sample ID			BH69-0.1-0.2	BH70-0.1-0.2	BH70-1.7-1.8	BH71-0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-My23636	M21-My23637	M21-My23638	M21-My23639
Date Sampled			May 11, 2021	May 11, 2021	May 11, 2021	May 11, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	57	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	57	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	78	62	60	63
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100

Client Sample ID			BH69-0.1-0.2	BH70-0.1-0.2	BH70-1.7-1.8	BH71-0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-My23636	M21-My23637	M21-My23638	M21-My23639
Date Sampled			May 11, 2021	May 11, 2021	May 11, 2021	May 11, 2021
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	1.6	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	1.9	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	2.1	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	1.2	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	1.2	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	1.2	< 0.5	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	0.6	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	1.2	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	1.3	< 0.5	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	4.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	0.6	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	0.8	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	4.1	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	16.7	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	65	64	119	101
p-Terphenyl-d14 (surr.)	1	%	86	87	76	80
Ammonia (as N)	5	mg/kg	-	-	6.4	5.8
Nitrate & Nitrite (as N)	5	mg/kg	-	-	24	110
Nitrate (as N)	5	mg/kg	-	-	24	110
Nitrite (as N)	5	mg/kg	-	-	< 5	< 5
Total Kjeldahl Nitrogen (as N)	10	mg/kg	-	-	1100	380
Total Nitrogen (as N)*	10	mg/kg	-	-	1124	490
Phosphorus	5	mg/kg	-	-	81	79
% Moisture	1	%	8.2	6.4	15	14
Heavy Metals						
Arsenic	2	mg/kg	77	16	17	440
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	17	27	40	43
Copper	5	mg/kg	< 5	30	< 5	< 5
Lead	5	mg/kg	9.6	< 5	8.0	12
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.1
Nickel	5	mg/kg	7.0	110	13	9.1
Zinc	5	mg/kg	6.6	70	16	9.1

Client Sample ID			BH72-0.1-0.2	BH72-0.9-1.0	BH73-0.1-0.2	BH74-0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-My23640	M21-My23641	M21-My23642	M21-My23643
Date Sampled			May 11, 2021	May 11, 2021	May 11, 2021	May 11, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	22
TRH C15-C28	50	mg/kg	62	< 50	< 50	990
TRH C29-C36	50	mg/kg	51	< 50	< 50	550
TRH C10-C36 (Total)	50	mg/kg	113	< 50	< 50	1562
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	66	66	63	58
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	1400
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	200
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	1600
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	67
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	67
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	67
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	6.3
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	32
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	42
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	39
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	11
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	40
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	35
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	10
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	69
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	34
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.8
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	19
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	71
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	410.6
2-Fluorobiphenyl (surr.)	1	%	65	66	95	74
p-Terphenyl-d14 (surr.)	1	%	66	62	71	79

Client Sample ID			BH72-0.1-0.2	BH72-0.9-1.0	BH73-0.1-0.2	BH74-0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-My23640	M21-My23641	M21-My23642	M21-My23643
Date Sampled			May 11, 2021	May 11, 2021	May 11, 2021	May 11, 2021
Test/Reference	LOR	Unit				
Ammonia (as N)	5	mg/kg	5.7	-	7.1	11
Nitrate & Nitrite (as N)	5	mg/kg	< 5	-	< 5	33
Nitrate (as N)	5	mg/kg	< 5	-	< 5	33
Nitrite (as N)	5	mg/kg	< 5	-	< 5	< 5
Total Kjeldahl Nitrogen (as N)	10	mg/kg	240	-	190	11000
Total Nitrogen (as N)*	10	mg/kg	240	-	190	11033
Phosphorus	5	mg/kg	1200	-	470	1000
% Moisture	1	%	7.5	7.7	28	52
Heavy Metals						
Arsenic	2	mg/kg	21	16	23	7.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	29	9.2	52	13
Copper	5	mg/kg	36	< 5	< 5	16
Lead	5	mg/kg	28	< 5	12	29
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	130	< 5	12	14
Zinc	5	mg/kg	110	< 5	16	160

Client Sample ID			BH74-0.3-0.5	BH75-0.1-0.2	BH76-0.0-0.2	BH76-0.9-1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-My23644	M21-My23645	M21-My23646	M21-My23647
Date Sampled			May 11, 2021	May 11, 2021	May 11, 2021	May 11, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	86	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	55	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	141	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	58	72	83	76
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	130	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	130	< 100

Client Sample ID			BH74-0.3-0.5	BH75-0.1-0.2	BH76-0.0-0.2	BH76-0.9-1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-My23644	M21-My23645	M21-My23646	M21-My23647
Date Sampled			May 11, 2021	May 11, 2021	May 11, 2021	May 11, 2021
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	2.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	2.8	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	3.0	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	1.4	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	1.7	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	2.6	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	2.8	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	1.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	2.1	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	1.2	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	0.8	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	2.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	16.6	< 0.5
2-Fluorobiphenyl (surr.)	1	%	111	93	80	108
p-Terphenyl-d14 (surr.)	1	%	79	73	59	98
Ammonia (as N)	5	mg/kg	-	12	5.8	-
Nitrate & Nitrite (as N)	5	mg/kg	-	< 5	< 5	-
Nitrate (as N)	5	mg/kg	-	< 5	< 5	-
Nitrite (as N)	5	mg/kg	-	< 5	< 5	-
Total Kjeldahl Nitrogen (as N)	10	mg/kg	-	760	230	-
Total Nitrogen (as N)*	10	mg/kg	-	760	230	-
Phosphorus	5	mg/kg	-	300	230	-
% Moisture	1	%	20	12	8.1	12
Heavy Metals						
Arsenic	2	mg/kg	15	8.0	7.2	38
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	48	7.1	6.7	41
Copper	5	mg/kg	< 5	< 5	< 5	< 5
Lead	5	mg/kg	11	< 5	6.3	8.7
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	16	< 5	< 5	18
Zinc	5	mg/kg	15	6.3	12	16

Client Sample ID			BH68-0.4-0.5_D	BH75_0.1-0.2-D
Sample Matrix			Soil	Soil
Eurofins Sample No.			M21-My23648	M21-My23649
Date Sampled			May 11, 2021	May 11, 2021
Test/Reference	LOR	Unit		
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				
TRH C6-C9	20	mg/kg	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50
BTEX				
Benzene	0.1	mg/kg	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	68	67
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100
Polycyclic Aromatic Hydrocarbons				
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	110	78
p-Terphenyl-d14 (surr.)	1	%	97	84

Client Sample ID			BH68-0.4-0.5_D	BH75_0.1-0.2-D
Sample Matrix			Soil	Soil
Eurofins Sample No.			M21-My23648	M21-My23649
Date Sampled			May 11, 2021	May 11, 2021
Test/Reference	LOR	Unit		
Ammonia (as N)	5	mg/kg	-	6.3
Nitrate & Nitrite (as N)	5	mg/kg	-	< 5
Nitrate (as N)	5	mg/kg	-	< 5
Nitrite (as N)	5	mg/kg	-	< 5
Total Kjeldahl Nitrogen (as N)	10	mg/kg	-	220
Total Nitrogen (as N)*	10	mg/kg	-	220
Phosphorus	5	mg/kg	-	380
% Moisture	1	%	18	13
Heavy Metals				
Arsenic	2	mg/kg	16	13
Cadmium	0.4	mg/kg	< 0.4	< 0.4
Chromium	5	mg/kg	43	8.7
Copper	5	mg/kg	< 5	< 5
Lead	5	mg/kg	10	5.8
Mercury	0.1	mg/kg	< 0.1	< 0.1
Nickel	5	mg/kg	15	< 5
Zinc	5	mg/kg	8.6	6.6

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	May 15, 2021	14 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	May 15, 2021	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	May 15, 2021	14 Days
Eurofins Suite B7			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	May 15, 2021	14 Days
Polycyclic Aromatic Hydrocarbons - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water	Melbourne	May 15, 2021	14 Days
Metals M8 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	May 15, 2021	180 Days
Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P			
Ammonia (as N) - Method: APHA 4500-NH3 Ammonia Nitrogen by FIA	Melbourne	May 15, 2021	28 Days
Nitrate & Nitrite (as N) - Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA	Melbourne	May 15, 2021	28 Days
Nitrate (as N) - Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA	Melbourne	May 15, 2021	28 Days
Nitrite (as N) - Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA	Melbourne	May 15, 2021	28 Days
Total Kjeldahl Nitrogen (as N) - Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA	Melbourne	May 15, 2021	28 Days
Phosphorus - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon and Phosphorus by ICP-AES	Melbourne	May 15, 2021	180 Days
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	May 13, 2021	14 Days

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Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
Newtown
VIC 3220

Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Order No.:
Report #: 794678
Phone: 5215 4600
Fax: 5224 1368

Received: May 12, 2021 4:59 PM
Due: May 19, 2021
Priority: 5 Day
Contact Name: Adam Wightwick

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	BH61-0.1-0.2	May 11, 2021		Soil	M21-My23624		X	X			X
2	BH62-0.1-0.2	May 11, 2021		Soil	M21-My23625		X	X			
3	BH62-0.4-0.5	May 11, 2021		Soil	M21-My23626		X	X			X
4	BH63-0.15-0.2	May 11, 2021		Soil	M21-My23627		X	X			
5	BH64-0.1-0.2	May 11, 2021		Soil	M21-My23628		X	X			X
6	BH64-0.9-1.0	May 11, 2021		Soil	M21-My23629		X	X			
7	BH65-0.0-0.2	May 10, 2021		Soil	M21-My23630		X	X			
8	BH66-0.0-0.2	May 10, 2021		Soil	M21-My23631		X	X			X
9	BH66-0.3-0.5	May 10, 2021		Soil	M21-My23632		X	X			

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Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
Newtown
VIC 3220

Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Order No.:
Report #: 794678
Phone: 5215 4600
Fax: 5224 1368

Received: May 12, 2021 4:59 PM
Due: May 19, 2021
Priority: 5 Day
Contact Name: Adam Wightwick

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
10	BH67-0.1-0.2	May 11, 2021		Soil	M21-My23633		X	X			
11	BH68-0.15-0.2	May 11, 2021		Soil	M21-My23634		X	X			X
12	BH68-0.4-0.5	May 11, 2021		Soil	M21-My23635		X	X			
13	BH69-0.1-0.2	May 11, 2021		Soil	M21-My23636		X	X			
14	BH70-0.1-0.2	May 11, 2021		Soil	M21-My23637		X	X			
15	BH70-1.7-1.8	May 11, 2021		Soil	M21-My23638		X	X			X
16	BH71-0.1-0.2	May 11, 2021		Soil	M21-My23639		X	X			X
17	BH72-0.1-0.2	May 11, 2021		Soil	M21-My23640		X	X			X
18	BH72-0.9-1.0	May 11, 2021		Soil	M21-My23641		X	X			
19	BH73-0.1-0.2	May 11, 2021		Soil	M21-My23642		X	X			X
20	BH74-0.0-0.2	May 11, 2021		Soil	M21-My23643		X	X			X

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Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
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VIC 3220
Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Order No.:
Report #: 794678
Phone: 5215 4600
Fax: 5224 1368

Received: May 12, 2021 4:59 PM
Due: May 19, 2021
Priority: 5 Day
Contact Name: Adam Wightwick

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
21	BH74-0.3-0.5	May 11, 2021		Soil	M21-My23644		X	X			
22	BH75-0.1-0.2	May 11, 2021		Soil	M21-My23645		X	X			X
23	BH76-0.0-0.2	May 11, 2021		Soil	M21-My23646		X	X			X
24	BH76-0.9-1.0	May 11, 2021		Soil	M21-My23647		X	X			
25	BH68-0.4-0.5 D	May 11, 2021		Soil	M21-My23648		X	X			
26	BH75_0.1-0.2-D	May 11, 2021		Soil	M21-My23649		X	X			X
27	RB100521	May 10, 2021		Water	M21-My23650			X		X	
28	RB110521	May 11, 2021		Water	M21-My23651			X		X	
29	TB100521	May 10, 2021		Water	M21-My23652				X		

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Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
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Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Order No.:
Report #: 794678
Phone: 5215 4600
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Received: May 12, 2021 4:59 PM
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Contact Name: Adam Wightwick

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
30	TB110521	May 11, 2021		Water	M21-My23653				X		
31	BH61-0.4-0.5	May 11, 2021		Soil	M21-My23654	X					
32	BH61-0.9-1.0	May 11, 2021		Soil	M21-My23655	X					
33	BH62-0.9-1.0	May 11, 2021		Soil	M21-My23656	X					
34	BH63-0.4-0.5	May 11, 2021		Soil	M21-My23657	X					
35	BH63-0.9-1.0	May 11, 2021		Soil	M21-My23658	X					
36	BH64-0.4-0.5	May 11, 2021		Soil	M21-My23659	X					
37	BH65-0.3-0.5	May 10, 2021		Soil	M21-My23660	X					
38	BH65-0.8-1.0	May 10, 2021		Soil	M21-My23661	X					
39	BH66-0.8-1.0	May 10, 2021		Soil	M21-My23662	X					
40	BH67-0.4-0.5	May 11, 2021		Soil	M21-My23663	X					

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Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
Newtown
VIC 3220

Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Order No.:
Report #: 794678
Phone: 5215 4600
Fax: 5224 1368

Received: May 12, 2021 4:59 PM
Due: May 19, 2021
Priority: 5 Day
Contact Name: Adam Wightwick

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
41	BH67-0.9-1.0	May 11, 2021		Soil	M21-My23664	X					
42	BH68-0.9-1.0	May 11, 2021		Soil	M21-My23665	X					
43	BH69-0.4-0.5	May 11, 2021		Soil	M21-My23666	X					
44	BH69-0.9-1.0	May 11, 2021		Soil	M21-My23667	X					
45	BH70-0.4-0.5	May 11, 2021		Soil	M21-My23668	X					
46	BH70-0.9-1.0	May 11, 2021		Soil	M21-My23669	X					
47	BH71-0.4-0.5	May 11, 2021		Soil	M21-My23670	X					
48	BH71-0.9-1.0	May 11, 2021		Soil	M21-My23671	X					
49	BH72-0.4-0.5	May 11, 2021		Soil	M21-My23672	X					
50	BH73-0.4-0.5	May 11, 2021		Soil	M21-My23673	X					
51	BH73-0.9-1.0	May 11, 2021		Soil	M21-My23674	X					

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Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
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VIC 3220
Project Name: GEELONG SALEYARDS
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Report #: 794678
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Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
52	BH74-0.8-1.0	May 11, 2021		Soil	M21-My23675	X					
53	BH75-0.4-0.5	May 11, 2021		Soil	M21-My23676	X					
54	BH75-0.9-1.0	May 11, 2021		Soil	M21-My23677	X					
55	BH76-0.4-0.5	May 11, 2021		Soil	M21-My23678	X					
56	BH71-0.9-1.0 D	May 11, 2021		Soil	M21-My23679	X					
57	BH71_0.9-1.0 T	May 11, 2021		Soil	M21-My23680	X					
Test Counts						27	26	28	2	2	13

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g,h,i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a,h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Ammonia (as N)	mg/kg	< 5			5	Pass	
Nitrate & Nitrite (as N)	mg/kg	< 5			5	Pass	
Nitrate (as N)	mg/kg	< 5			5	Pass	
Nitrite (as N)	mg/kg	< 5			5	Pass	
Phosphorus	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Mercury			mg/kg	< 0.1			0.1	Pass	
Nickel			mg/kg	< 5			5	Pass	
Zinc			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions									
TRH C6-C9		%	105				70-130	Pass	
TRH C10-C14		%	106				70-130	Pass	
LCS - % Recovery									
BTEX									
Benzene		%	99				70-130	Pass	
Toluene		%	94				70-130	Pass	
Ethylbenzene		%	104				70-130	Pass	
m&p-Xylenes		%	108				70-130	Pass	
Xylenes - Total*		%	107				70-130	Pass	
LCS - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
Naphthalene		%	85				70-130	Pass	
TRH C6-C10		%	97				70-130	Pass	
TRH >C10-C16		%	108				70-130	Pass	
LCS - % Recovery									
Polycyclic Aromatic Hydrocarbons									
Acenaphthene		%	116				70-130	Pass	
Acenaphthylene		%	91				70-130	Pass	
Anthracene		%	104				70-130	Pass	
Benz(a)anthracene		%	95				70-130	Pass	
Benzo(a)pyrene		%	104				70-130	Pass	
Benzo(b&j)fluoranthene		%	99				70-130	Pass	
Benzo(g,h,i)perylene		%	119				70-130	Pass	
Benzo(k)fluoranthene		%	117				70-130	Pass	
Chrysene		%	110				70-130	Pass	
Dibenz(a,h)anthracene		%	109				70-130	Pass	
Fluoranthene		%	119				70-130	Pass	
Fluorene		%	91				70-130	Pass	
Indeno(1.2.3-cd)pyrene		%	112				70-130	Pass	
Naphthalene		%	84				70-130	Pass	
Phenanthrene		%	113				70-130	Pass	
Pyrene		%	121				70-130	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic		%	112				80-120	Pass	
Cadmium		%	103				80-120	Pass	
Chromium		%	115				80-120	Pass	
Copper		%	111				80-120	Pass	
Lead		%	119				80-120	Pass	
Mercury		%	117				80-120	Pass	
Nickel		%	106				80-120	Pass	
Zinc		%	109				80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14		M21-My28540	NCP	%	117		70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16		M21-Mv28540	NCP	%	119		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M21-My20661	NCP	%	95			70-130	Pass	
Acenaphthylene	M21-My20661	NCP	%	115			70-130	Pass	
Anthracene	M21-My20661	NCP	%	98			70-130	Pass	
Benz(a)anthracene	M21-My20661	NCP	%	105			70-130	Pass	
Benzo(a)pyrene	M21-My20661	NCP	%	94			70-130	Pass	
Benzo(b&j)fluoranthene	M21-My20661	NCP	%	78			70-130	Pass	
Benzo(g,h,i)perylene	M21-My20661	NCP	%	94			70-130	Pass	
Benzo(k)fluoranthene	M21-My20661	NCP	%	82			70-130	Pass	
Chrysene	M21-My20661	NCP	%	101			70-130	Pass	
Dibenz(a,h)anthracene	M21-My20661	NCP	%	112			70-130	Pass	
Fluoranthene	M21-My20661	NCP	%	95			70-130	Pass	
Fluorene	M21-My20661	NCP	%	120			70-130	Pass	
Indeno(1,2,3-cd)pyrene	M21-My20661	NCP	%	111			70-130	Pass	
Naphthalene	M21-My20661	NCP	%	106			70-130	Pass	
Phenanthrene	M21-My20661	NCP	%	105			70-130	Pass	
Pyrene	M21-My20661	NCP	%	95			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M21-My26530	NCP	%	124			75-125	Pass	
Cadmium	M21-My26530	NCP	%	100			75-125	Pass	
Chromium	M21-My26530	NCP	%	105			75-125	Pass	
Copper	M21-My26530	NCP	%	99			75-125	Pass	
Lead	M21-My26530	NCP	%	106			75-125	Pass	
Mercury	M21-My24981	NCP	%	101			75-125	Pass	
Nickel	M21-My26530	NCP	%	96			75-125	Pass	
Zinc	M21-My26530	NCP	%	99			75-125	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M21-My24976	NCP	%	121			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M21-My24976	NCP	%	112			70-130	Pass	
Toluene	M21-My24976	NCP	%	121			70-130	Pass	
Ethylbenzene	M21-My24976	NCP	%	124			70-130	Pass	
m&p-Xylenes	M21-My24976	NCP	%	110			70-130	Pass	
o-Xylene	M21-My24976	NCP	%	125			70-130	Pass	
Xylenes - Total*	M21-My24976	NCP	%	115			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M21-My24976	NCP	%	117			70-130	Pass	
TRH C6-C10	M21-My24976	NCP	%	127			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M21-My23624	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M21-My28597	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M21-My28597	NCP	mg/kg	< 50	< 50	<1	30%	Pass	

Duplicate								
BTEX				Result 1	Result 2	RPD		
Benzene	M21-My23624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	M21-My23624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	M21-My23624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	M21-My23624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	M21-My23624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total*	M21-My23624	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	M21-My23624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	M21-My23624	CP	mg/kg	< 20	< 20	<1	30%	Pass
TRH >C16-C34	M21-My28597	NCP	mg/kg	< 100	< 100	<1	30%	Pass
TRH >C34-C40	M21-My28597	NCP	mg/kg	< 100	< 100	<1	30%	Pass
Duplicate								
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD		
Acenaphthene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Acenaphthylene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Anthracene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benz(a)anthracene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(a)pyrene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(b&j)fluoranthene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(g,h,i)perylene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(k)fluoranthene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Chrysene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Dibenz(a,h)anthracene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluoranthene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluorene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Indeno(1,2,3-cd)pyrene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Naphthalene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Phenanthrene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Pyrene	M21-My28600	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Phosphorus	M21-My20218	NCP	mg/kg	170	190	14	30%	Pass
% Moisture	M21-My23624	CP	%	18	20	6.0	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C6-C9	M21-My23634	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
BTEX				Result 1	Result 2	RPD		
Benzene	M21-My23634	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	M21-My23634	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	M21-My23634	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	M21-My23634	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	M21-My23634	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total*	M21-My23634	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	M21-My23634	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	M21-My23634	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	M21-My23634	CP	%	20	21	7.0	30%	Pass

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M21-My23637	CP	mg/kg	16	23	35	30%	Fail	Q15
Cadmium	M21-My23637	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M21-My23637	CP	mg/kg	27	28	3.0	30%	Pass	
Copper	M21-My23637	CP	mg/kg	30	30	1.0	30%	Pass	
Lead	M21-My23637	CP	mg/kg	< 5	6.0	32	30%	Fail	Q15
Mercury	M21-My23637	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	M21-My23637	CP	mg/kg	110	110	4.0	30%	Pass	
Zinc	M21-My23637	CP	mg/kg	70	77	9.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M21-My23644	CP	%	20	19	7.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M21-My23645	CP	mg/kg	12	8.7	35	30%	Fail	Q15
Nitrate & Nitrite (as N)	M21-My23645	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Nitrate (as N)	M21-My23645	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Nitrite (as N)	M21-My23645	CP	mg/kg	< 5	< 5	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Harry Bacalis	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Scott Beddoes	Senior Analyst-Inorganic (VIC)
Vivian Wang	Senior Analyst-Volatile (VIC)



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please [click here](#).

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Coffey Environments Pty Ltd GEEL
Level 1, 23 West Fyans Street
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NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
 NATA is a signatory to the ILAC Mutual Recognition
 Arrangement for the mutual recognition of the
 equivalence of testing, medical testing, calibration,
 inspection and proficiency testing scheme providers
 reports.

Attention: Adam Wightwick

Report 794678-W
Project name GEELONG SALEYARDS
Project ID 754-GEXEN282929
Received Date May 12, 2021

Client Sample ID			RB100521	RB110521	TB100521	TB110521
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-My23650	M21-My23651	M21-My23652	M21-My23653
Date Sampled			May 10, 2021	May 11, 2021	May 10, 2021	May 11, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-	-
TRH C15-C28	0.1	mg/L	0.2	< 0.1	-	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-	-
TRH C10-C36 (Total)	0.1	mg/L	0.2	< 0.1	-	-
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	88	89	79	75
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05	-	-
TRH >C16-C34	0.1	mg/L	0.1	< 0.1	-	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-	-
TRH >C10-C40 (total)*	0.1	mg/L	0.1	< 0.1	-	-
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.001	mg/L	< 0.001	< 0.001	-	-
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001	-	-
Anthracene	0.001	mg/L	< 0.001	< 0.001	-	-
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001	-	-
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	-	-
Benzo(b&j)fluoranthene ^{N07}	0.001	mg/L	< 0.001	< 0.001	-	-
Benzo(g,h,i)perylene	0.001	mg/L	< 0.001	< 0.001	-	-
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001	-	-
Chrysene	0.001	mg/L	< 0.001	< 0.001	-	-
Dibenz(a,h)anthracene	0.001	mg/L	< 0.001	< 0.001	-	-
Fluoranthene	0.001	mg/L	< 0.001	< 0.001	-	-
Fluorene	0.001	mg/L	< 0.001	< 0.001	-	-

Client Sample ID			RB100521	RB110521	TB100521	TB110521
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-My23650	M21-My23651	M21-My23652	M21-My23653
Date Sampled			May 10, 2021	May 11, 2021	May 10, 2021	May 11, 2021
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001	-	-
Naphthalene	0.001	mg/L	< 0.001	< 0.001	-	-
Phenanthrene	0.001	mg/L	< 0.001	< 0.001	-	-
Pyrene	0.001	mg/L	< 0.001	< 0.001	-	-
Total PAH*	0.001	mg/L	< 0.001	< 0.001	-	-
2-Fluorobiphenyl (surr.)	1	%	66	67	-	-
p-Terphenyl-d14 (surr.)	1	%	60	67	-	-
Ammonia (as N)	0.01	mg/L	< 0.01	0.03	-	-
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	-	-
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	-	-
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	-	-
Phosphate total (as P)	0.01	mg/L	< 0.01	< 0.01	-	-
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	-	-
Total Nitrogen (as N)*	0.2	mg/L	< 0.2	< 0.2	-	-
Heavy Metals						
Arsenic	0.001	mg/L	< 0.001	< 0.001	-	-
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	-	-
Chromium	0.001	mg/L	< 0.001	< 0.001	-	-
Copper	0.001	mg/L	< 0.001	< 0.001	-	-
Lead	0.001	mg/L	< 0.001	< 0.001	-	-
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	-	-
Nickel	0.001	mg/L	< 0.001	< 0.001	-	-
Zinc	0.005	mg/L	< 0.005	< 0.005	-	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	May 14, 2021	7 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	May 14, 2021	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	May 14, 2021	7 Days
Total Recoverable Hydrocarbons - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	May 14, 2021	7 Days
Eurofins Suite B7			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	May 14, 2021	7 Days
Polycyclic Aromatic Hydrocarbons - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water	Melbourne	May 14, 2021	7 Days
Metals M8 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	May 14, 2021	180 Days
Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P			
Ammonia (as N) - Method: APHA 4500-NH3 Ammonia Nitrogen by FIA	Melbourne	May 14, 2021	28 Days
Nitrate & Nitrite (as N) - Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA	Melbourne	May 14, 2021	28 Days
Nitrate (as N) - Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA	Melbourne	May 14, 2021	28 Days
Nitrite (as N) - Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA	Melbourne	May 14, 2021	2 Days
Total Kjeldahl Nitrogen (as N) - Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA	Melbourne	May 14, 2021	7 Days
Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P			
Phosphate total (as P) - Method: LTM-INO-4040 Phosphate by CFA	Melbourne	May 14, 2021	28 Days

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Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
Newtown
VIC 3220

Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Order No.:
Report #: 794678
Phone: 5215 4600
Fax: 5224 1368

Received: May 12, 2021 4:59 PM
Due: May 19, 2021
Priority: 5 Day
Contact Name: Adam Wightwick

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	BH61-0.1-0.2	May 11, 2021		Soil	M21-My23624		X	X			X
2	BH62-0.1-0.2	May 11, 2021		Soil	M21-My23625		X	X			
3	BH62-0.4-0.5	May 11, 2021		Soil	M21-My23626		X	X			X
4	BH63-0.15-0.2	May 11, 2021		Soil	M21-My23627		X	X			
5	BH64-0.1-0.2	May 11, 2021		Soil	M21-My23628		X	X			X
6	BH64-0.9-1.0	May 11, 2021		Soil	M21-My23629		X	X			
7	BH65-0.0-0.2	May 10, 2021		Soil	M21-My23630		X	X			
8	BH66-0.0-0.2	May 10, 2021		Soil	M21-My23631		X	X			X
9	BH66-0.3-0.5	May 10, 2021		Soil	M21-My23632		X	X			

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Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
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VIC 3220

Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Order No.:
Report #: 794678
Phone: 5215 4600
Fax: 5224 1368

Received: May 12, 2021 4:59 PM
Due: May 19, 2021
Priority: 5 Day
Contact Name: Adam Wightwick

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
10	BH67-0.1-0.2	May 11, 2021		Soil	M21-My23633		X	X			
11	BH68-0.15-0.2	May 11, 2021		Soil	M21-My23634		X	X			X
12	BH68-0.4-0.5	May 11, 2021		Soil	M21-My23635		X	X			
13	BH69-0.1-0.2	May 11, 2021		Soil	M21-My23636		X	X			
14	BH70-0.1-0.2	May 11, 2021		Soil	M21-My23637		X	X			
15	BH70-1.7-1.8	May 11, 2021		Soil	M21-My23638		X	X			X
16	BH71-0.1-0.2	May 11, 2021		Soil	M21-My23639		X	X			X
17	BH72-0.1-0.2	May 11, 2021		Soil	M21-My23640		X	X			X
18	BH72-0.9-1.0	May 11, 2021		Soil	M21-My23641		X	X			
19	BH73-0.1-0.2	May 11, 2021		Soil	M21-My23642		X	X			X
20	BH74-0.0-0.2	May 11, 2021		Soil	M21-My23643		X	X			X

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Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Order No.:
Report #: 794678
Phone: 5215 4600
Fax: 5224 1368

Received: May 12, 2021 4:59 PM
Due: May 19, 2021
Priority: 5 Day
Contact Name: Adam Wightwick

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
21	BH74-0.3-0.5	May 11, 2021		Soil	M21-My23644		X	X			
22	BH75-0.1-0.2	May 11, 2021		Soil	M21-My23645		X	X			X
23	BH76-0.0-0.2	May 11, 2021		Soil	M21-My23646		X	X			X
24	BH76-0.9-1.0	May 11, 2021		Soil	M21-My23647		X	X			
25	BH68-0.4-0.5 D	May 11, 2021		Soil	M21-My23648		X	X			
26	BH75_0.1-0.2-D	May 11, 2021		Soil	M21-My23649		X	X			X
27	RB100521	May 10, 2021		Water	M21-My23650			X		X	
28	RB110521	May 11, 2021		Water	M21-My23651			X		X	
29	TB100521	May 10, 2021		Water	M21-My23652				X		

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Company Name: Coffey Environments Pty Ltd GEEL
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Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Order No.:
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Received: May 12, 2021 4:59 PM
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Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
30	TB110521	May 11, 2021		Water	M21-My23653				X		
31	BH61-0.4-0.5	May 11, 2021		Soil	M21-My23654	X					
32	BH61-0.9-1.0	May 11, 2021		Soil	M21-My23655	X					
33	BH62-0.9-1.0	May 11, 2021		Soil	M21-My23656	X					
34	BH63-0.4-0.5	May 11, 2021		Soil	M21-My23657	X					
35	BH63-0.9-1.0	May 11, 2021		Soil	M21-My23658	X					
36	BH64-0.4-0.5	May 11, 2021		Soil	M21-My23659	X					
37	BH65-0.3-0.5	May 10, 2021		Soil	M21-My23660	X					
38	BH65-0.8-1.0	May 10, 2021		Soil	M21-My23661	X					
39	BH66-0.8-1.0	May 10, 2021		Soil	M21-My23662	X					
40	BH67-0.4-0.5	May 11, 2021		Soil	M21-My23663	X					

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Melbourne
6 Monterey Road
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NATA # 1261
Site # 23736

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Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
Newtown
VIC 3220

Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Order No.:
Report #: 794678
Phone: 5215 4600
Fax: 5224 1368

Received: May 12, 2021 4:59 PM
Due: May 19, 2021
Priority: 5 Day
Contact Name: Adam Wightwick

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						HOLD	Moisture Set	Eurofins Suite B7	BTEXN and Volatile TRH	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P	Eurofins Suite B19D: Total N, TKN, NOx, NO2, NO3, Total P
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
41	BH67-0.9-1.0	May 11, 2021		Soil	M21-My23664	X					
42	BH68-0.9-1.0	May 11, 2021		Soil	M21-My23665	X					
43	BH69-0.4-0.5	May 11, 2021		Soil	M21-My23666	X					
44	BH69-0.9-1.0	May 11, 2021		Soil	M21-My23667	X					
45	BH70-0.4-0.5	May 11, 2021		Soil	M21-My23668	X					
46	BH70-0.9-1.0	May 11, 2021		Soil	M21-My23669	X					
47	BH71-0.4-0.5	May 11, 2021		Soil	M21-My23670	X					
48	BH71-0.9-1.0	May 11, 2021		Soil	M21-My23671	X					
49	BH72-0.4-0.5	May 11, 2021		Soil	M21-My23672	X					
50	BH73-0.4-0.5	May 11, 2021		Soil	M21-My23673	X					
51	BH73-0.9-1.0	May 11, 2021		Soil	M21-My23674	X					

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Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory - NATA Site # 25079											
External Laboratory											
52	BH74-0.8-1.0	May 11, 2021		Soil	M21-My23675	X					
53	BH75-0.4-0.5	May 11, 2021		Soil	M21-My23676	X					
54	BH75-0.9-1.0	May 11, 2021		Soil	M21-My23677	X					
55	BH76-0.4-0.5	May 11, 2021		Soil	M21-My23678	X					
56	BH71-0.9-1.0 D	May 11, 2021		Soil	M21-My23679	X					
57	BH71_0.9-1.0 T	May 11, 2021		Soil	M21-My23680	X					
Test Counts						27	26	28	2	2	13

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/L	< 0.001			0.001	Pass	
Acenaphthylene	mg/L	< 0.001			0.001	Pass	
Anthracene	mg/L	< 0.001			0.001	Pass	
Benz(a)anthracene	mg/L	< 0.001			0.001	Pass	
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Benzo(b&j)fluoranthene	mg/L	< 0.001			0.001	Pass	
Benzo(g,h,i)perylene	mg/L	< 0.001			0.001	Pass	
Benzo(k)fluoranthene	mg/L	< 0.001			0.001	Pass	
Chrysene	mg/L	< 0.001			0.001	Pass	
Dibenz(a,h)anthracene	mg/L	< 0.001			0.001	Pass	
Fluoranthene	mg/L	< 0.001			0.001	Pass	
Fluorene	mg/L	< 0.001			0.001	Pass	
Indeno(1,2,3-cd)pyrene	mg/L	< 0.001			0.001	Pass	
Naphthalene	mg/L	< 0.001			0.001	Pass	
Phenanthrene	mg/L	< 0.001			0.001	Pass	
Pyrene	mg/L	< 0.001			0.001	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Lead	mg/L	< 0.001			0.001	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	109			70-130	Pass	
TRH C10-C14	%	106			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	102			70-130	Pass	
Toluene	%	99			70-130	Pass	
Ethylbenzene	%	98			70-130	Pass	
m&p-Xylenes	%	100			70-130	Pass	
Xylenes - Total*	%	99			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	90			70-130	Pass	
TRH C6-C10	%	103			70-130	Pass	
TRH >C10-C16	%	101			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	94			70-130	Pass	
Acenaphthylene	%	109			70-130	Pass	
Anthracene	%	74			70-130	Pass	
Benz(a)anthracene	%	81			70-130	Pass	
Benzo(a)pyrene	%	81			70-130	Pass	
Benzo(b&j)fluoranthene	%	105			70-130	Pass	
Benzo(g,h,i)perylene	%	90			70-130	Pass	
Benzo(k)fluoranthene	%	74			70-130	Pass	
Chrysene	%	104			70-130	Pass	
Dibenz(a,h)anthracene	%	76			70-130	Pass	
Fluoranthene	%	92			70-130	Pass	
Fluorene	%	101			70-130	Pass	
Indeno(1,2,3-cd)pyrene	%	84			70-130	Pass	
Naphthalene	%	93			70-130	Pass	
Phenanthrene	%	72			70-130	Pass	
Pyrene	%	94			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	108			70-130	Pass	
Nitrate & Nitrite (as N)	%	106			70-130	Pass	
Nitrate (as N)	%	106			70-130	Pass	
Nitrite (as N)	%	120			70-130	Pass	
Phosphate total (as P)	%	100			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	84			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	120			80-120	Pass	
Cadmium	%	108			80-120	Pass	
Chromium	%	111			80-120	Pass	
Copper	%	111			80-120	Pass	
Lead	%	102			80-120	Pass	
Mercury	%	102			80-120	Pass	
Nickel	%	120			80-120	Pass	
Zinc	%	113			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M21-My24708	NCP	%	124			70-130	Pass	
TRH C10-C14	B21-My18660	NCP	%	95			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M21-My24708	NCP	%	108			70-130	Pass	
Toluene	M21-My24708	NCP	%	100			70-130	Pass	
Ethylbenzene	M21-My24708	NCP	%	114			70-130	Pass	
m&p-Xylenes	M21-My24708	NCP	%	116			70-130	Pass	
o-Xylene	M21-My24708	NCP	%	111			70-130	Pass	
Xylenes - Total*	M21-My24708	NCP	%	114			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M21-My24708	NCP	%	99			70-130	Pass	
TRH C6-C10	M21-My24708	NCP	%	115			70-130	Pass	
TRH >C10-C16	B21-My18660	NCP	%	96			70-130	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M21-My24677	NCP	%	102			70-130	Pass	
Nitrate & Nitrite (as N)	M21-My24677	NCP	%	99			70-130	Pass	
Nitrate (as N)	M21-My24677	NCP	%	99			70-130	Pass	
Nitrite (as N)	M21-My29638	NCP	%	108			70-130	Pass	
Phosphate total (as P)	M21-My29638	NCP	%	114			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M21-My29765	NCP	%	72			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M21-My27737	NCP	%	119			75-125	Pass	
Cadmium	M21-My27737	NCP	%	115			75-125	Pass	
Chromium	M21-My27737	NCP	%	123			75-125	Pass	
Copper	M21-My27737	NCP	%	110			75-125	Pass	
Lead	M21-My27737	NCP	%	101			75-125	Pass	
Mercury	M21-My27737	NCP	%	87			75-125	Pass	
Nickel	M21-My27737	NCP	%	118			75-125	Pass	
Zinc	M21-My27737	NCP	%	119			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M21-My24707	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M21-My26677	NCP	mg/L	1.0	0.95	9.0	30%	Pass	
TRH C15-C28	M21-My26677	NCP	mg/L	0.1	0.1	2.0	30%	Pass	
TRH C29-C36	M21-My26677	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M21-My24707	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M21-My24707	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M21-My24707	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M21-My24707	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M21-My24707	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M21-My24707	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	

Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	M21-My24707	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass
TRH C6-C10	M21-My24707	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass
TRH >C10-C16	M21-My26677	NCP	mg/L	0.89	0.83	7.0	30%	Pass
TRH >C16-C34	M21-My26677	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass
TRH >C34-C40	M21-My26677	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass
Duplicate								
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD		
Acenaphthene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Acenaphthylene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Anthracene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Benz(a)anthracene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Benzo(a)pyrene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Benzo(b&j)fluoranthene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Benzo(g,h,i)perylene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Benzo(k)fluoranthene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Chrysene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Dibenz(a,h)anthracene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Fluoranthene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Fluorene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Indeno(1,2,3-cd)pyrene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Naphthalene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Phenanthrene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Pyrene	M21-My14373	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Ammonia (as N)	M21-My29638	NCP	mg/L	0.06	0.06	12	30%	Pass
Nitrate & Nitrite (as N)	M21-My29638	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Nitrate (as N)	M21-My29638	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass
Nitrite (as N)	M21-My29638	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass
Phosphate total (as P)	P21-My18920	NCP	mg/L	1.1	1.1	<1	30%	Pass
Total Kjeldahl Nitrogen (as N)	B21-My21258	NCP	mg/L	< 2	< 2	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	M21-My27737	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cadmium	M21-My27737	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium	M21-My27737	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper	M21-My27737	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Lead	M21-My27737	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Mercury	M21-My27737	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel	M21-My27737	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Zinc	M21-My27737	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised by:

Harry Bacalis	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Scott Beddoes	Senior Analyst-Inorganic (VIC)
Vivian Wang	Senior Analyst-Volatile (VIC)



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please [click here](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

RE: Eurofins Sample Receipt Advice - Report 794678 : Site GEELON SALEYARDS (754-GEXEN282929)

Harry Bacalis <HarryBacalis@eurofins.com>

Mon 31/05/2021 12:21 PM

To: Chapman, Chris <Chris.Chapman@coffey.com>

Cc: Wightwick, Adam <Adam.Wightwick@coffey.com>; #AU_CAU001_EnviroSampleVic <EnviroSampleVic@eurofins.com>

Thanks Chris

Canh - STD TAT

Kind regards,

Harry Bacalis

Phone: +61 3 8564 5064

Mobile: +61 438 858 924

Email : HarryBacalis@eurofins.com**From:** Chapman, Chris <Chris.Chapman@coffey.com>**Sent:** Monday, 31 May 2021 12:14 PM**To:** Harry Bacalis <HarryBacalis@eurofins.com>**Cc:** Wightwick, Adam <Adam.Wightwick@coffey.com>**Subject:** RE: Eurofins Sample Receipt Advice - Report 794678 : Site GEELON SALEYARDS (754-GEXEN282929)

EXTERNAL EMAIL*

Hi Harry,

Are you able to arrange for the following samples in this report for ASLP testing?

- BH65-0.0-0.2 for lead ASLP
- BH71-0.1-0.2 for Arsenic ASLP
- BH72-0.1-0.2 For Nickel ASLP
- BH66-0.0-0.2 For Zinc ASLP
- BH74-0.0-0.2 for B(a)P and TRH fractions ASLP

my23636-GT104-F9201
my23639-GT1170-F9102
my23640-↓
my23631-GT104-F9201
my23643-GT1170-F9102

Regards,

Chris Chapman, Environmental ConsultantDirect +61 4 5215 4607 | Business +61 4 5215 4600 | Mobile +61 420 328 050 | chris.chapman@tetratech.com

#799226
ur 31/05/21

From: EnviroSampleVic@eurofins.com <EnviroSampleVic@eurofins.com>**Sent:** Thursday, 13 May 2021 7:49 AM**To:** Wightwick, Adam <Adam.Wightwick@coffey.com>**Cc:** Chapman, Chris <Chris.Chapman@coffey.com>**Subject:** Eurofins Sample Receipt Advice - Report 794678 : Site GEELON SALEYARDS (754-GEXEN282929)

⚠ **CAUTION:** This email originated from an external sender. Verify the source before opening links or attachments. ⚠

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Christchurch

43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name: Coffey Environments Pty Ltd GEEL
Contact name: Chris Chapman
Project name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929
Turnaround time: 5 Day
Date/Time received: May 31, 2021 12:14 PM
Eurofins reference: 799226

Sample Information

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

Notes

Contact

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

Harry Bacalis on phone : or by email: HarryBacalis@eurofins.com

Results will be delivered electronically via email to Chris Chapman - Chris.Chapman@coffey.com.

Note: A copy of these results will also be delivered to the general Coffey Environments Pty Ltd GEEL email address.

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ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
Newtown
VIC 3220

Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Order No.:
Report #: 799226
Phone: 5215 4600
Fax: 5224 1368

Received: May 31, 2021 12:14 PM
Due: Jun 7, 2021
Priority: 5 Day
Contact Name: Chris Chapman

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						Arsenic	Benzo(a)pyrene	Lead	Nickel	Zinc	Total Recoverable Hydrocarbons - 1999 NEPM Fractions	AUS Leaching Procedure	Total Recoverable Hydrocarbons - 2013 NEPM Fractions
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217													
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
Mayfield Laboratory - NATA Site # 25079													
External Laboratory													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	BH65-0.0-0.2	May 10, 2021		AUS Leachate	M21-My60335			X				X	
2	BH71-0.1-0.2	May 11, 2021		AUS Leachate	M21-My60336	X						X	
3	BH72-0.1-0.2	May 11, 2021		AUS Leachate	M21-My60337				X			X	
4	BH66-0.0-0.2	May 10, 2021		AUS Leachate	M21-My60338					X		X	
5	BH74-0.0-0.2	May 11, 2021		AUS Leachate	M21-My60339		X				X	X	X
Test Counts						1	1	1	1	1	1	5	1

Coffey Environments Pty Ltd GEEL
Level 1, 23 West Fyans Street
Newtown
VIC 3220



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition
Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection and proficiency testing scheme providers
reports.

Attention: Chris Chapman

Report 799226-L
Project name GEELONG SALEYARDS
Project ID 754-GEXEN282929
Received Date May 31, 2021

Client Sample ID			BH65-0.0-0.2	BH71-0.1-0.2	BH72-0.1-0.2	BH66-0.0-0.2
Sample Matrix			AUS Leachate	AUS Leachate	AUS Leachate	AUS Leachate
Eurofins Sample No.			M21-My60335	M21-My60336	M21-My60337	M21-My60338
Date Sampled			May 10, 2021	May 11, 2021	May 11, 2021	May 10, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	0.01	mg/L	-	2.8	-	-
Lead	0.01	mg/L	0.09	-	-	-
Nickel	0.01	mg/L	-	-	0.04	-
Zinc	0.01	mg/L	-	-	-	1.4
AUS Leaching Procedure						
Leachate Fluid ^{C01}		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	6.7	6.2	6.5	6.7
pH (Leachate fluid)	0.1	pH Units	5.1	5.1	5.1	5.1
pH (off)	0.1	pH Units	5.1	5.0	5.1	5.4

Client Sample ID			BH74-0.0-0.2
Sample Matrix			AUS Leachate
Eurofins Sample No.			M21-My60339
Date Sampled			May 11, 2021
Test/Reference	LOR	Unit	
AUS Leaching Procedure			
Leachate Fluid ^{C01}		comment	1.0
pH (initial)	0.1	pH Units	6.9
pH (Leachate fluid)	0.1	pH Units	5.1
pH (off)	0.1	pH Units	5.0
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C10-C14	0.1	mg/L	< 0.1
TRH C15-C28	0.2	mg/L	< 0.2
TRH C29-C36	0.2	mg/L	< 0.2
TRH C10-C36 (Total)	0.5	mg/L	< 0.2
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene	0.001	mg/L	< 0.001
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	May 31, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
AUS Leaching Procedure			
pH (initial)	Melbourne	May 31, 2021	0 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			
pH (Leachate fluid)	Melbourne	May 31, 2021	0 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			
pH (off)	Melbourne	May 31, 2021	0 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	May 31, 2021	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Melbourne	May 31, 2021	7 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	May 31, 2021	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			

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IANZ # 1290

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Company Name: Coffey Environments Pty Ltd GEEL
Address: Level 1, 23 West Fyans Street
Newtown
VIC 3220

Order No.:
Report #: 799226
Phone: 5215 4600
Fax: 5224 1368

Received: May 31, 2021 12:14 PM
Due: Jun 7, 2021
Priority: 5 Day
Contact Name: Chris Chapman

Project Name: GEELONG SALEYARDS
Project ID: 754-GEXEN282929

Eurofins Analytical Services Manager : Harry Bacalis

Sample Detail						Arsenic	Benzo(a)pyrene	Lead	Nickel	Zinc	Total Recoverable Hydrocarbons - 1999 NEPM Fractions	AUS Leaching Procedure	Total Recoverable Hydrocarbons - 2013 NEPM Fractions
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217													
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
Mayfield Laboratory - NATA Site # 25079													
External Laboratory													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	BH65-0.0-0.2	May 10, 2021		AUS Leachate	M21-My60335			X				X	
2	BH71-0.1-0.2	May 11, 2021		AUS Leachate	M21-My60336	X						X	
3	BH72-0.1-0.2	May 11, 2021		AUS Leachate	M21-My60337				X			X	
4	BH66-0.0-0.2	May 10, 2021		AUS Leachate	M21-My60338					X		X	
5	BH74-0.0-0.2	May 11, 2021		AUS Leachate	M21-My60339		X				X	X	X
Test Counts						1	1	1	1	1	1	5	1

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

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

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Arsenic			mg/L	< 0.01			0.01	Pass	
Lead			mg/L	< 0.01			0.01	Pass	
Nickel			mg/L	< 0.01			0.01	Pass	
Zinc			mg/L	< 0.01			0.01	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	M21-My60442	NCP	%	100			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M21-My60442	NCP	%	101			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Nickel	M21-My60442	NCP	%	102			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Zinc	M21-My60442	NCP	%	105			75-125	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Benzo(a)pyrene	M21-My57306	NCP	%	75			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	M21-My60442	NCP	mg/L	< 0.01	0.01	7.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M21-My60442	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Nickel	M21-My60442	NCP	mg/L	0.03	0.03	5.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Zinc	M21-My60442	NCP	mg/L	0.15	0.15	4.0	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Benzo(a)pyrene	M21-My57305	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other

Authorised by:

Harry Bacalis	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please [click here](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

Reference No. _____

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST



TETRA TECH COMPANY

Consigning Office: Geelong
Report Results to: Adam.Wightwick@coffey.com & chris.chapman@coffey.com
Invoices to: lisa.marnell@coffey.com Phone: _____ Email: _____

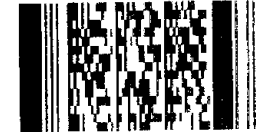
Project No:	754-GEXEN282929	Task No:	
Project Name:	Geelong Saleyards	Laboratory:	Eurofins
Sampler's Name:	CC / JR / KV	Project Manager:	AW
Special Instructions:	Please forward BH68-0.4-0.5_T and BH75-0.1-0.2_T to ALS for analysis		

Analysis Request Section

Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	B7 Suite	B19D suite	hold						
	BH72-0.9-1.0	11/05/2021		soil	1 jar	standard	X								
	BH73-0.1-0.2	11/05/2021		soil	1 jar	standard	X	X							
	BH73-0.4-0.5	11/05/2021		soil	1 jar	standard			X						
	BH73-0.9-1.0	11/05/2021		soil	1 jar	standard			X						
	BH74-0.0-0.2	11/05/2021		soil	1 jar	standard	X	X							
	BH74-0.3-0.5	11/05/2021		soil	1 jar	standard	X								
	BH74-0.8-1.0	11/05/2021		soil	1 jar	standard			X						
	BH75-0.1-0.2	11/05/2021		soil	1 jar	standard	X	X							
	BH75-0.4-0.5	11/05/2021		soil	1 jar	standard			X						
	BH75-0.9-1.0	11/05/2021		soil	1 jar	standard			X						
	BH76-0.0-0.2	11/05/2021		soil	1 jar	standard	X	X							
	BH76-0.4-0.5	11/05/2021		soil	1 jar	standard			X						
	BH76-0.9-1.0	11/05/2021		soil	1 jar	standard	X								
	BH68-0.4-0.5_D	11/05/2021		soil	1 jar	standard	X								
①	BH68-0.4-0.5_T	11/05/2021		soil	1 jar	standard	X								
	BH71-0.9-1.0_D	11/05/2021		soil	1 jar	standard			X						
	BH71-0.9-1.0_T	11/05/2021		soil	1 jar	standard			X						
	BH75-0.1-0.2-D	11/05/2021		soil	1 jar	standard	X	X							

NOTES

Environmental Division
Melbourne
Work Order Reference
EM2108933



Telephone : + 61-3-8549 9600

Received: 13/5-9-20 Carrier:
C/note:
Temp: 5.4°C Seal: Y/N
Ice / Reelbricks / NA



RELINQUISHED BY

Name: <i>Chris. Chapman</i>	Date: <i>12/5/21</i>
Coffey Environments <i>[Signature]</i>	Time: <i>12:30</i>
Name: <i>[Signature]</i>	Date:
Company:	Time:

RECEIVED BY

Name: <u>HARPER S EGGY</u>	Date: <u>12/5/21</u>
Company: <u>Josie's T/I</u>	Time: <u>2:00</u>
Name: <u>Carla W</u>	Date: <u>12/5/21</u>
Company: <u>Enobas</u>	Time: <u>4:59 pm</u>

Sample Receipt Advice: {Lab Use Only}

All Samples Received in Good Condition	
All Documentation is in Proper Order	
Samples Received Properly Chilled	
Lab. Ref/Batch No.	

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Relinquished By L. Poyess 12/5

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

[illegible]

Relinquished By C. Angers
12/5/21
Issue Date: 16/02

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EM2108933

Client : COFFEY ENVIRONMENTS PTY LTD Contact : MR ADAM WIGHTWICK Address : LEVEL 1 436 JOHNSTON STREET ABBOTSFORD VIC, AUSTRALIA 3067 E-mail : adam.wightwick@coffey.com Telephone : +61 03 5215 4600 Facsimile : ---- Project : 754-GEXEN282929 Order number : ---- C-O-C number : ---- Site : Sampler : CC/JR/KV	Laboratory : Environmental Division Melbourne Contact : Graeme Jablonskas Address : 4 Westall Rd Springvale VIC Australia 3171 E-mail : graeme.jablonskas@alsglobal.com Telephone : +6138549 9609 Facsimile : +61-3-8549 9626 Page : 1 of 2 Quote number : ES2018COFENV0007 (EN/222) QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 13-May-2021 09:20	Issue Date : 14-May-2021
Client Requested Due : 20-May-2021	Scheduled Reporting Date : 20-May-2021
Date	

Delivery Details

Mode of Delivery : Carrier	Security Seal : Not Available
No. of coolers/boxes : 1	Temperature : 5.4°C - Ice Bricks 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
- **Sample(s) received in non-ALS container(s).**
- **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	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - NT-11S Total N + Total P	SOIL - NT-4S NO2 and NO3	SOIL - S-26 8 metals/TRH/BTEXN/PAH
EM2108933-001	11-May-2021 00:00	BH68-0.4-0.5_T	✓			✓
EM2108933-002	11-May-2021 00:00	BH75-0.1-0.2_T	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

ADAM WIGHTWICK

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

ESDAT REPORTS

- *AU Certificate of Analysis - NATA (COA)	Email	esdat_labreports@coffey.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	esdat_labreports@coffey.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	esdat_labreports@coffey.com
- EDI Format - ESDAT (ESDAT)	Email	esdat_labreports@coffey.com

INVOICES ABBOTSFORD

- A4 - AU Tax Invoice (INV)	Email	ABTF_ENVI_Invoices@coffey.com

CERTIFICATE OF ANALYSIS

Work Order : **EM2108933**
Client : **TETRA TECH COFFEY PTY LTD**
Contact : **MR ADAM WIGHTWICK**
Address : **LEVEL 1 436 JOHNSTON STREET**
ABBOTSFORD VIC, AUSTRALIA 3067
Telephone : **+61 03 5215 4600**
Project : **754-GEXEN282929**
Order number : **----**
C-O-C number : **----**
Sampler : **CC/JR/KV**
Site : **----**
Quote number : **EN/222**
No. of samples received : **2**
No. of samples analysed : **2**

Page : 1 of 6
Laboratory : Environmental Division Melbourne
Contact : Graeme Jablonskas
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +6138549 9609
Date Samples Received : 13-May-2021 09:20
Date Analysis Commenced : 17-May-2021
Issue Date : 20-May-2021 17:39



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Arenie Vijayaratham	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	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 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 the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- 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.
- EK061G: EM2108348 #3 Poor matrix spike recovery for TKN due to sample matrix. Confirmed by re-extraction and re-analysis.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH68-0.4-0.5_T	BH75-0.1-0.2_T	----	----	----
Sampling date / time					11-May-2021 00:00	11-May-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2108933-001	EM2108933-002	-----	-----	-----
				Result	Result		----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		22.1	13.8	----	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		22	8	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg		45	7	----	----	----
Copper	7440-50-8	5	mg/kg		<5	<5	----	----	----
Lead	7439-92-1	5	mg/kg		10	5	----	----	----
Nickel	7440-02-0	2	mg/kg		19	4	----	----	----
Zinc	7440-66-6	5	mg/kg		7	8	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg		----	<0.1	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg		----	0.2	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg		----	0.2	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg		----	600	----	----	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg		----	600	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg		----	526	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	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	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH68-0.4-0.5_T	BH75-0.1-0.2_T	----	----	----
Sampling date / time					11-May-2021 00:00	11-May-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2108933-001	EM2108933-002	-----	-----	-----
				Result	Result		----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	----	----	----
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	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
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									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>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	----	----	----
EP080: BTEXN									
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	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH68-0.4-0.5_T	BH75-0.1-0.2_T	----	----	----
Sampling date / time					11-May-2021 00:00	11-May-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2108933-001	EM2108933-002	-----	-----	-----
					Result	Result	----	----	----
EP080: BTEXN - Continued									
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		78.6	74.9	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		81.4	80.1	----	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%		71.2	71.0	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		86.5	83.7	----	----	----
Anthracene-d10	1719-06-8	0.5	%		106	104	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		98.7	96.2	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		80.9	81.2	----	----	----
Toluene-D8	2037-26-5	0.2	%		78.4	76.0	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		82.7	76.2	----	----	----



Surrogate Control Limits

Sub-Matrix: **SOIL**

		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2,4,6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

QUALITY CONTROL REPORT

Work Order	: EM2108933	Page	: 1 of 7
Client	: TETRA TECH COFFEY PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: MR ADAM WIGHTWICK	Contact	: Graeme Jablonskas
Address	: LEVEL 1 436 JOHNSTON STREET ABBOTSFORD VIC, AUSTRALIA 3067	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 5215 4600	Telephone	: +6138549 9609
Project	: 754-GEXEN282929	Date Samples Received	: 13-May-2021
Order number	: ----	Date Analysis Commenced	: 17-May-2021
C-O-C number	: ----	Issue Date	: 20-May-2021
Sampler	: CC/JR/KV		
Site	:		
Quote number	: EN/222		
No. of samples received	: 2		
No. of samples analysed	: 2		



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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Arenie Vijayaratham	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

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

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

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3680878)									
EM2108734-009	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	19	20	7.5	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	39	43	9.8	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	84	94	10.8	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	569	607	6.4	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	732	749	2.3	0% - 20%
EM2108835-005	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	136	133	2.2	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	84	78	7.3	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	27	26	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	13	12	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	152	141	7.8	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3683157)									
EM2108933-001	BH68-0.4-0.5_T	EA055: Moisture Content	----	0.1	%	22.1	21.7	1.7	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3680879)									
EM2108734-009	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	0.2	0.0	No Limit
EM2108835-005	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3680702)									
EM2108933-002	BH75-0.1-0.2_T	EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3680701)									
EM2108933-002	BH75-0.1-0.2_T	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	0.2	0.2	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3686255)									

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 Work Order : EM2108933
 Client : TETRA TECH COFFEY PTY LTD
 Project : 754-GEXEN282929



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3686255) - continued									
EM2108348-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	3300	2710	19.7	0% - 20%
EM2108348-022	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	910	960	4.8	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3686254)									
EM2108348-001	Anonymous	EK067G: Total Phosphorus as P	----	2	mg/kg	1320	1160	13.6	0% - 20%
EM2108348-022	Anonymous	EK067G: Total Phosphorus as P	----	2	mg/kg	624	603	3.4	0% - 20%
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3682737)									
EM2108285-024	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EM2108808-030	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3680047)									
EM2108285-024	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EM2108837-024	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3682738)									
EM2108285-024	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.0	No Limit
EM2108808-030	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	120	<100	18.9	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	120	<50	82.4	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3680047)									
EM2108285-024	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EM2108837-024	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3682738)									
EM2108285-024	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.0	No Limit
EM2108808-030	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	130	<100	25.1	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	130	<50	88.9	No Limit
EP080: BTEXN (QC Lot: 3680047)									
EM2108285-024	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EM2108837-024	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit



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

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3680878)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	123 mg/kg	102	70.0	130
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	1.23 mg/kg	67.7	50.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	20.2 mg/kg	109	70.0	130
EG005T: Copper	7440-50-8	5	mg/kg	<5	55.9 mg/kg	99.4	70.0	130
EG005T: Lead	7439-92-1	5	mg/kg	<5	62.4 mg/kg	93.6	70.0	130
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.4 mg/kg	102	70.0	130
EG005T: Zinc	7440-66-6	5	mg/kg	<5	162 mg/kg	79.6	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3680879)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.64 mg/kg	97.6	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3680702)								
EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	2.5 mg/kg	108	88.9	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3680701)								
EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	2.5 mg/kg	102	89.5	119
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3686255)								
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	500 mg/kg	107	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3686254)								
EK067G: Total Phosphorus as P	----	2	mg/kg	<2	221 mg/kg	99.5	78.3	127
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3682737)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	106	85.7	123
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	94.2	81.0	123
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	101	83.6	120
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	96.6	81.3	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	103	79.4	123
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	102	81.7	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	102	78.3	124
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	104	79.9	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	97.2	76.9	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	112	80.9	130
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	3 mg/kg	84.5	70.0	121
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	106	80.4	130
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	86.8	70.2	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	93.0	67.9	122
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	91.1	65.8	123



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3682737) - continued								
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	91.0	65.8	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3680047)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	74.4	58.6	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3682738)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	840 mg/kg	85.6	75.0	128
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	2900 mg/kg	93.2	82.0	123
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1490 mg/kg	90.9	82.4	121
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3680047)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	76.5	59.3	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3682738)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1110 mg/kg	90.0	77.0	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3900 mg/kg	91.5	81.5	120
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	290 mg/kg	75.2	73.3	137
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 3680047)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	82.2	61.6	117
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	82.3	65.8	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	81.1	65.8	124
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	4 mg/kg	81.2	64.8	134
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	82.5	68.7	132
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	78.3	61.8	123

Matrix Spike (MS) Report

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

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3680878)							
EM2108734-010	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	108	78.0	124
		EG005T: Cadmium	7440-43-9	50 mg/kg	101	79.7	116
		EG005T: Chromium	7440-47-3	50 mg/kg	102	79.0	121
		EG005T: Copper	7440-50-8	250 mg/kg	103	80.0	120
		EG005T: Lead	7439-92-1	250 mg/kg	93.5	80.0	120
		EG005T: Nickel	7440-02-0	50 mg/kg	89.9	78.0	120



Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3680878) - continued							
EM2108734-010	Anonymous	EG005T: Zinc	7440-66-6	250 mg/kg	92.9	80.0	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3680879)							
EM2108734-010	Anonymous	EG035T: Mercury	7439-97-6	0.5 mg/kg	91.7	76.0	116
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3680701)							
EM2108844-002	Anonymous	EK059G: Nitrite + Nitrate as N (Sol.)	----	2.5 mg/kg	75.9	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3686255)							
EM2108348-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	# 178	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3686254)							
EM2108348-003	Anonymous	EK067G: Total Phosphorus as P	----	100 mg/kg	# Not Determined	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3682737)							
EM2108285-025	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	93.1	77.2	116
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	92.6	65.5	136
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3680047)							
EM2108285-025	Anonymous	EP080: C6 - C9 Fraction	----	28 mg/kg	74.2	33.4	124
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3682738)							
EM2108285-027	Anonymous	EP071: C10 - C14 Fraction	----	840 mg/kg	85.0	71.2	125
		EP071: C15 - C28 Fraction	----	2900 mg/kg	92.9	75.6	122
		EP071: C29 - C36 Fraction	----	1490 mg/kg	90.8	78.0	120
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3680047)							
EM2108285-025	Anonymous	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	71.3	30.8	120
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3682738)							
EM2108285-027	Anonymous	EP071: >C10 - C16 Fraction	----	1110 mg/kg	89.6	72.2	128
		EP071: >C16 - C34 Fraction	----	3900 mg/kg	91.2	76.5	119
		EP071: >C34 - C40 Fraction	----	290 mg/kg	74.4	66.8	138
EP080: BTEXN (QCLot: 3680047)							
EM2108285-025	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	97.9	54.4	127
		EP080: Toluene	108-88-3	2 mg/kg	98.1	57.1	131

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM2108933	Page	: 1 of 7
Client	: TETRA TECH COFFEY PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: MR ADAM WIGHTWICK	Telephone	: +6138549 9609
Project	: 754-GEXEN282929	Date Samples Received	: 13-May-2021
Site	:	Issue Date	: 20-May-2021
Sampler	: CC/JR/KV	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

- 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 ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	EM2108348--003	Anonymous	Total Kjeldahl Nitrogen as N	----	178 %	70.0-130%	Recovery greater than upper data quality objective
EK067G: Total Phosphorus as P by Discrete Analyser	EM2108348--003	Anonymous	Total Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Matrix Spikes (MS)					
Nitrite as N - Soluble by Discrete Analyser	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: **SOIL**

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

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) BH68-0.4-0.5_T, BH75-0.1-0.2_T	11-May-2021	----	----	----	18-May-2021	25-May-2021	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) BH68-0.4-0.5_T, BH75-0.1-0.2_T	11-May-2021	18-May-2021	07-Nov-2021	✓	19-May-2021	07-Nov-2021	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) BH68-0.4-0.5_T, BH75-0.1-0.2_T	11-May-2021	18-May-2021	08-Jun-2021	✓	19-May-2021	08-Jun-2021	✓
EK057G: Nitrite as N by Discrete Analyser							
Soil Glass Jar - Unpreserved (EK057G) BH75-0.1-0.2_T	11-May-2021	17-May-2021	18-May-2021	✓	18-May-2021	19-May-2021	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Soil Glass Jar - Unpreserved (EK059G) BH75-0.1-0.2_T	11-May-2021	17-May-2021	08-Jun-2021	✓	18-May-2021	19-May-2021	✓



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Soil Glass Jar - Unpreserved (EK061G) BH75-0.1-0.2_T	11-May-2021	20-May-2021	08-Jun-2021	✓	20-May-2021	17-Jun-2021	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Soil Glass Jar - Unpreserved (EK067G) BH75-0.1-0.2_T	11-May-2021	20-May-2021	08-Jun-2021	✓	20-May-2021	17-Jun-2021	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH68-0.4-0.5_T, BH75-0.1-0.2_T	11-May-2021	18-May-2021	25-May-2021	✓	18-May-2021	27-Jun-2021	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) BH68-0.4-0.5_T, BH75-0.1-0.2_T	11-May-2021	17-May-2021	25-May-2021	✓	17-May-2021	25-May-2021	✓
Soil Glass Jar - Unpreserved (EP071) BH68-0.4-0.5_T, BH75-0.1-0.2_T	11-May-2021	18-May-2021	25-May-2021	✓	18-May-2021	27-Jun-2021	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) BH68-0.4-0.5_T, BH75-0.1-0.2_T	11-May-2021	17-May-2021	25-May-2021	✓	17-May-2021	25-May-2021	✓
Soil Glass Jar - Unpreserved (EP071) BH68-0.4-0.5_T, BH75-0.1-0.2_T	11-May-2021	18-May-2021	25-May-2021	✓	18-May-2021	27-Jun-2021	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) BH68-0.4-0.5_T, BH75-0.1-0.2_T	11-May-2021	17-May-2021	25-May-2021	✓	17-May-2021	25-May-2021	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Moisture Content	EA055	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	2	18	11.11	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
Total Phosphorus By Discrete Analyser	EK067G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	18	5.56	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
Total Phosphorus By Discrete Analyser	EK067G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	18	5.56	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
Total Phosphorus By Discrete Analyser	EK067G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	9	11.11	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							
Nitrite as N - Soluble by Discrete Analyser	EK057G	0	1	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	18	5.56	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
Total Phosphorus By Discrete Analyser	EK067G	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	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
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 (SnCl ₂) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Nitrite as N - Soluble by Discrete Analyser	EK057G	SOIL	In house: Referenced to APHA 4500-NO ₃ - B. Nitrite in a water extract is determined by direct colourimetry by Discrete Analyser.
Nitrate as N - Soluble by Discrete Analyser	EK058G	SOIL	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate in the 1:5 soil:water extract is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Nitrite and Nitrate as N (NO _x)- Soluble by Discrete Analyser	EK059G	SOIL	In house: Thermo Scientific Method D08727 and NEMI (National Environmental Method Index) Method ID: 9171. This method covers the determination of total oxidised nitrogen (NO _x -N) and nitrate (NO ₃ -N) by calculation, Combined oxidised Nitrogen (NO ₂ +NO ₃) in a water extract is determined by direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	In house: Referenced to APHA 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Nitrogen as N (TKN + NO _x) By Discrete Analyser	EK062G	SOIL	In house: Referenced to APHA 4500 Norg/NO ₃ - Total Nitrogen is determined as the sum of TKN and Oxidised Nitrogen, each determined seperately as N.
Total Phosphorus By Discrete Analyser	EK067G	SOIL	In house: Referenced to APHA 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	SOIL	In house: Referenced to APHA 4500 Norg- D; APHA 4500 P - H. Macro Kjeldahl digestion.



Preparation Methods	Method	Matrix	Method Descriptions
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
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 for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

APPENDIX E: DATA QUALITY REVIEW

QA/QC DATA VALIDATION REPORT

Job No: 754-GEXEN282929_R01

Batch Nos: 794678-S, 794678-W, 799226-L, EM2108933

I. SAMPLE HANDLING

	Yes	No (Comment below)
1. Were the sample holding times met for COPC?	☒	☐
2. Were the samples in proper custody between the field and reaching the laboratory?	☒	☐
3. Were the samples properly and adequately preserved? <i>This includes keeping the samples chilled, where applicable.</i>	☒	☐
4. Were the samples received by the laboratory in good condition?	☒	☐

COMMENTS:

- All samples were sent to laboratories in eskies with ice present (attempt to chill was evident).

Sample Handling was:	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

II. PRECISION/ACCURACY ASSESSMENT

	Yes	No (Comment below)
1. Was a NATA registered laboratory used?	☒	☐
2. Did the laboratory perform the requested tests?	☒	☐
3. Were the laboratory methods adopted NATA endorsed?	☒	☐
4. Were the appropriate test procedures followed?	☒	☐
5. Were the reporting limits satisfactory?	☒	☐
6. Was the NATA Seal on the reports?	☒	☐
7. Were the reports signed by an authorised person?	☒	☐

COMMENTS:

- All laboratory methods were identified as being NATA accredited

Precision/Accuracy of the Laboratory Report	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

QA/QC DATA VALIDATION REPORT

Job No: 754-GEXEN282929_R01

Batch Nos: 794678-S, 794678-W, 799226-L, EM2108933

III. FIELD QA/QC FOR SOIL & GROUNDWATER

Number of primary samples analysed	24
Number of days sampling	2
Field Duplicates collected (at least 1 in 20 samples)	3 intra-lab and 3 inter-lab
Trip Blanks (at least 1/esky or sampling event)	2
Rinsate Blanks (at least 1/day/matrix/equipment)	2

1. FIELD DUPLICATES

	Yes	No (Comment below)
A. Were an <u>Adequate Number</u> of field duplicates analysed?	☒	☐
B. Were RPDs within Control Limits? (30 %)	☐	☒

Comments:

- RPD exceedences were reported for the primary/ duplicate and primary/ triplicate samples in soil for arsenic, lead, ammonia, TKN and total nitrogen. The RPD exceedences are considered likely to be relation to the relatively low concentrations of these analytes of the field duplicate samples and the heterogeneous nature of the soils. These exceedences are not considered to affect the integrity of the data as the highest analytical results from the primary/ duplicate/ triplicate samples have been considered in interpreting the results from the investigation.

2. TRIP BLANKS

	Yes	No (Comment below)
A. Were an <u>Adequate Number</u> of trip blanks collected?	☒	☐
B. Were the Trip Blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)	☒	☐

COMMENTS:

- One trip blank was collected for each day of sampling

QA/QC DATA VALIDATION REPORT

Job No: 754-GEXEN282929_R01

Batch Nos: 794678-S, 794678-W, 799226-L, EM2108933

3. RINSATE BLANKS

	Yes	No (Comment below)
A. Were an adequate number of Rinsate Blanks collected?	☒	☐
B. Were the Rinsate Blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)	☐	☒

COMMENTS:

- One rinsate blank was collected for each day of sampling
- A trace concentration of TRHC16 – C34 (0.1 mg/L) was detected in rinsate blank RB100521 collected on the 10/5/21.
- A trace concentration of ammonia (0.03 mg/L) was detected in rinsate blank RB110521 collected on 11/5/21
- The detection of the TRHC16 – C34 and ammonia in the rinsate blanks indicates some potential cross-contamination from re-usable sampling equipment. However, the concentrations of analytes detected in rinsate blanks were low and considered unlikely to have significantly altered the concentrations measured in the resultant soil samples

4. FIELD BLANKS

	Yes	No (Comment below)
A. Were an adequate number of Field Blanks collected?	☒	☐
B. Were the Field Blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)	☒	☐

COMMENTS:

- Nil

Field QA/QC was:	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

V. LABORATORY INTERNAL QUALITY CONTROL PROCEDURES

COMMENTS

A review of the the Laboratory Quality Control reports identified the following minor non-conformances:

- Laboratory duplicates for arsenic, lead and ammonia with RPDs outside the acceptable range in Eurofins report 794678-S. Eurofins stated that the RPDs were within Eurofins internal QC acceptance criteria.
- Matrix spike outliers were identified for TKN and total P in ALS report EM2108933
- Quality control sample frequency outliers were identified for nitrate in ALS report EM2108933

QA/QC DATA VALIDATION REPORT

Job No: 754-GEXEN282929_R01

Batch Nos: 794678-S, 794678-W, 799226-L, EM2108933

5. The laboratory internal QA/QC was:	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

VI. DATA USABILITY

1. Data Directly Usable	☒
2. Data Usable with the following corrections/modifications (see comment below)	☐
3. Data Not Usable.	☐

COMMENTS:

- Nil

QA/ QC Report Prepared by

Chris Chapman

QA/ QC Report Reviewed by:

Adam Wightwick

APPENDIX F: DATA ANALYSIS

	A	B	C	D	E	F	G	H	I	J	K	L		
1	UCL Statistics for Uncensored Full Data Sets													
2														
3	User Selected Options													
4	Date/Time of Computation			ProUCL 5.116/06/2021 2:21:19 PM										
5	From File			WorkSheet.xls										
6	Full Precision			OFF										
7	Confidence Coefficient			95%										
8	Number of Bootstrap Operations			2000										
9														
10														
11	As													
12														
13	General Statistics													
14	Total Number of Observations				22		Number of Distinct Observations				19			
15							Number of Missing Observations				0			
16	Minimum				2		Mean				16.05			
17	Maximum				77		Median				13			
18	SD				15.97		Std. Error of Mean				3.405			
19	Coefficient of Variation				0.995		Skewness				2.837			
20														
21	Normal GOF Test													
22	Shapiro Wilk Test Statistic				0.705		Shapiro Wilk GOF Test							
23	5% Shapiro Wilk Critical Value				0.911		Data Not Normal at 5% Significance Level							
24	Lilliefors Test Statistic				0.224		Lilliefors GOF Test							
25	5% Lilliefors Critical Value				0.184		Data Not Normal at 5% Significance Level							
26	Data Not Normal at 5% Significance Level													
27														
28	Assuming Normal Distribution													
29	95% Normal UCL					95% UCLs (Adjusted for Skewness)								
30	95% Student's-t UCL				21.91		95% Adjusted-CLT UCL (Chen-1995)				23.86			
31							95% Modified-t UCL (Johnson-1978)				22.26			
32														
33	Gamma GOF Test													
34	A-D Test Statistic				0.32		Anderson-Darling Gamma GOF Test							
35	5% A-D Critical Value				0.758		Detected data appear Gamma Distributed at 5% Significance Level							
36	K-S Test Statistic				0.113		Kolmogorov-Smirnov Gamma GOF Test							
37	5% K-S Critical Value				0.188		Detected data appear Gamma Distributed at 5% Significance Level							
38	Detected data appear Gamma Distributed at 5% Significance Level													
39														
40	Gamma Statistics													
41	k hat (MLE)				1.576		k star (bias corrected MLE)				1.392			
42	Theta hat (MLE)				10.18		Theta star (bias corrected MLE)				11.54			
43	nu hat (MLE)				69.36		nu star (bias corrected)				61.24			
44	MLE Mean (bias corrected)				16.05		MLE Sd (bias corrected)				13.61			
45						Approximate Chi Square Value (0.05)							44.24	
46	Adjusted Level of Significance				0.0386		Adjusted Chi Square Value				43.16			
47														
48	Assuming Gamma Distribution													
49	95% Approximate Gamma UCL (use when n>=50)				22.22		95% Adjusted Gamma UCL (use when n<50)				22.78			
50														
51	Lognormal GOF Test													
52	Shapiro Wilk Test Statistic				0.984		Shapiro Wilk Lognormal GOF Test							
53	5% Shapiro Wilk Critical Value				0.911		Data appear Lognormal at 5% Significance Level							
54	Lilliefors Test Statistic				0.128		Lilliefors Lognormal GOF Test							
55	5% Lilliefors Critical Value				0.184		Data appear Lognormal at 5% Significance Level							

	A	B	C	D	E	F	G	H	I	J	K	L
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data				0.693		Mean of logged Data				2.426	
60	Maximum of Logged Data				4.344		SD of logged Data				0.859	
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL				25.64		90% Chebyshev (MVUE) UCL				25.69	
64	95% Chebyshev (MVUE) UCL				30.07		97.5% Chebyshev (MVUE) UCL				36.16	
65	99% Chebyshev (MVUE) UCL				48.11							
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL				21.65		95% Jackknife UCL				21.91	
72	95% Standard Bootstrap UCL				21.38		95% Bootstrap-t UCL				26.57	
73	95% Hall's Bootstrap UCL				46.6		95% Percentile Bootstrap UCL				21.91	
74	95% BCA Bootstrap UCL				23.99							
75	90% Chebyshev(Mean, Sd) UCL				26.27		95% Chebyshev(Mean, Sd) UCL				30.9	
76	97.5% Chebyshev(Mean, Sd) UCL				37.32		99% Chebyshev(Mean, Sd) UCL				49.93	
77												
78	Suggested UCL to Use											
79	95% Adjusted Gamma UCL				22.78							
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												
86												
87	Ni											
88												
89	General Statistics											
90	Total Number of Observations				22		Number of Distinct Observations				14	
91							Number of Missing Observations				0	
92	Minimum				5		Mean				21.44	
93	Maximum				110		Median				14.5	
94	SD				23.11		Std. Error of Mean				4.926	
95	Coefficient of Variation				1.078		Skewness				3.046	
96												
97	Normal GOF Test											
98	Shapiro Wilk Test Statistic				0.627		Shapiro Wilk GOF Test					
99	5% Shapiro Wilk Critical Value				0.911		Data Not Normal at 5% Significance Level					
100	Lilliefors Test Statistic				0.303		Lilliefors GOF Test					
101	5% Lilliefors Critical Value				0.184		Data Not Normal at 5% Significance Level					
102	Data Not Normal at 5% Significance Level											
103												
104	Assuming Normal Distribution											
105	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
106	95% Student's-t UCL				29.91		95% Adjusted-CLT UCL (Chen-1995)				32.96	
107							95% Modified-t UCL (Johnson-1978)				30.45	
108												
109	Gamma GOF Test											
110	A-D Test Statistic				0.995		Anderson-Darling Gamma GOF Test					

A	B	C	D	E	F	G	H	I	J	K	L
111	5% A-D Critical Value				0.758	Data Not Gamma Distributed at 5% Significance Level					
112	K-S Test Statistic				0.239	Kolmogorov-Smimov Gamma GOF Test					
113	5% K-S Critical Value				0.188	Data Not Gamma Distributed at 5% Significance Level					
114	Data Not Gamma Distributed at 5% Significance Level										
115											
116	Gamma Statistics										
117	k hat (MLE)				1.701	k star (bias corrected MLE)					1.499
118	Theta hat (MLE)				12.6	Theta star (bias corrected MLE)					14.3
119	nu hat (MLE)				74.84	nu star (bias corrected)					65.97
120	MLE Mean (bias corrected)				21.44	MLE Sd (bias corrected)					17.51
121						Approximate Chi Square Value (0.05)					48.28
122	Adjusted Level of Significance				0.0386	Adjusted Chi Square Value					47.15
123											
124	Assuming Gamma Distribution										
125	95% Approximate Gamma UCL (use when n>=50))				29.29	95% Adjusted Gamma UCL (use when n<50)					29.99
126											
127	Lognormal GOF Test										
128	Shapiro Wilk Test Statistic				0.945	Shapiro Wilk Lognormal GOF Test					
129	5% Shapiro Wilk Critical Value				0.911	Data appear Lognormal at 5% Significance Level					
130	Lilliefors Test Statistic				0.18	Lilliefors Lognormal GOF Test					
131	5% Lilliefors Critical Value				0.184	Data appear Lognormal at 5% Significance Level					
132	Data appear Lognormal at 5% Significance Level										
133											
134	Lognormal Statistics										
135	Minimum of Logged Data				1.609	Mean of logged Data					2.743
136	Maximum of Logged Data				4.7	SD of logged Data					0.754
137											
138	Assuming Lognormal Distribution										
139	95% H-UCL				29.96	90% Chebyshev (MVUE) UCL					30.89
140	95% Chebyshev (MVUE) UCL				35.68	97.5% Chebyshev (MVUE) UCL					42.33
141	99% Chebyshev (MVUE) UCL				55.4						
142											
143	Nonparametric Distribution Free UCL Statistics										
144	Data appear to follow a Discernible Distribution at 5% Significance Level										
145											
146	Nonparametric Distribution Free UCLs										
147	95% CLT UCL				29.54	95% Jackknife UCL					29.91
148	95% Standard Bootstrap UCL				29.46	95% Bootstrap-t UCL					39.87
149	95% Hall's Bootstrap UCL				64.73	95% Percentile Bootstrap UCL					29.4
150	95% BCA Bootstrap UCL				33.98						
151	90% Chebyshev(Mean, Sd) UCL				36.22	95% Chebyshev(Mean, Sd) UCL					42.91
152	97.5% Chebyshev(Mean, Sd) UCL				52.2	99% Chebyshev(Mean, Sd) UCL					70.45
153											
154	Suggested UCL to Use										
155	95% H-UCL				29.96						
156											
157	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
158	Recommendations are based upon data size, data distribution, and skewness.										
159	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
160	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
161											
162	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.										
163	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.										
164	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.										
165	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.										

	A	B	C	D	E	F	G	H	I	J	K	L
166												
167												
168	Zn											
169												
170	General Statistics											
171	Total Number of Observations					22	Number of Distinct Observations					20
172							Number of Missing Observations					0
173	Minimum					5	Mean					41.6
174	Maximum					380	Median					14.5
175	SD					85.37	Std. Error of Mean					18.2
176	Coefficient of Variation					2.052	Skewness					3.498
177												
178	Normal GOF Test											
179	Shapiro Wilk Test Statistic					0.452	Shapiro Wilk GOF Test					
180	5% Shapiro Wilk Critical Value					0.911	Data Not Normal at 5% Significance Level					
181	Lilliefors Test Statistic					0.395	Lilliefors GOF Test					
182	5% Lilliefors Critical Value					0.184	Data Not Normal at 5% Significance Level					
183	Data Not Normal at 5% Significance Level											
184												
185	Assuming Normal Distribution											
186	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
187	95% Student's-t UCL					72.92	95% Adjusted-CLT UCL (Chen-1995)					86.05
188							95% Modified-t UCL (Johnson-1978)					75.19
189												
190	Gamma GOF Test											
191	A-D Test Statistic					2.579	Anderson-Darling Gamma GOF Test					
192	5% A-D Critical Value					0.787	Data Not Gamma Distributed at 5% Significance Level					
193	K-S Test Statistic					0.309	Kolmogorov-Smirnov Gamma GOF Test					
194	5% K-S Critical Value					0.193	Data Not Gamma Distributed at 5% Significance Level					
195	Data Not Gamma Distributed at 5% Significance Level											
196												
197	Gamma Statistics											
198	k hat (MLE)					0.697	k star (bias corrected MLE)					0.632
199	Theta hat (MLE)					59.69	Theta star (bias corrected MLE)					65.8
200	nu hat (MLE)					30.67	nu star (bias corrected)					27.82
201	MLE Mean (bias corrected)					41.6	MLE Sd (bias corrected)					52.32
202							Approximate Chi Square Value (0.05)					16.79
203	Adjusted Level of Significance					0.0386	Adjusted Chi Square Value					16.15
204												
205	Assuming Gamma Distribution											
206	95% Approximate Gamma UCL (use when n>=50))					68.94	95% Adjusted Gamma UCL (use when n<50)					71.67
207												
208	Lognormal GOF Test											
209	Shapiro Wilk Test Statistic					0.852	Shapiro Wilk Lognormal GOF Test					
210	5% Shapiro Wilk Critical Value					0.911	Data Not Lognormal at 5% Significance Level					
211	Lilliefors Test Statistic					0.217	Lilliefors Lognormal GOF Test					
212	5% Lilliefors Critical Value					0.184	Data Not Lognormal at 5% Significance Level					
213	Data Not Lognormal at 5% Significance Level											
214												
215	Lognormal Statistics											
216	Minimum of Logged Data					1.609	Mean of logged Data					2.861
217	Maximum of Logged Data					5.94	SD of logged Data					1.109
218												
219	Assuming Lognormal Distribution											
220	95% H-UCL					62.66	90% Chebyshev (MVUE) UCL					56.19

	A	B	C	D	E	F	G	H	I	J	K	L
221	95% Chebyshev (MVUE) UCL					67.6	97.5% Chebyshev (MVUE) UCL					83.45
222	99% Chebyshev (MVUE) UCL					114.6						
223												
224	Nonparametric Distribution Free UCL Statistics											
225	Data do not follow a Discernible Distribution (0.05)											
226												
227	Nonparametric Distribution Free UCLs											
228	95% CLT UCL					71.54	95% Jackknife UCL					72.92
229	95% Standard Bootstrap UCL					70.86	95% Bootstrap-t UCL					201.4
230	95% Hall's Bootstrap UCL					193.6	95% Percentile Bootstrap UCL					73.18
231	95% BCA Bootstrap UCL					91.78						
232	90% Chebyshev(Mean, Sd) UCL					96.21	95% Chebyshev(Mean, Sd) UCL					120.9
233	97.5% Chebyshev(Mean, Sd) UCL					155.3	99% Chebyshev(Mean, Sd) UCL					222.7
234												
235	Suggested UCL to Use											
236	95% Chebyshev (Mean, Sd) UCL					120.9						
237												
238	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
239	Recommendations are based upon data size, data distribution, and skewness.											
240	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
241	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
242												
243												
244	BaP											
245												
246	General Statistics											
247	Total Number of Observations					22	Number of Distinct Observations					10
248							Number of Missing Observations					0
249	Minimum					0.5	Mean					4.891
250	Maximum					56	Median					0.5
251	SD					12.29	Std. Error of Mean					2.62
252	Coefficient of Variation					2.513	Skewness					3.831
253												
254	Normal GOF Test											
255	Shapiro Wilk Test Statistic					0.413	Shapiro Wilk GOF Test					
256	5% Shapiro Wilk Critical Value					0.911	Data Not Normal at 5% Significance Level					
257	Lilliefors Test Statistic					0.388	Lilliefors GOF Test					
258	5% Lilliefors Critical Value					0.184	Data Not Normal at 5% Significance Level					
259	Data Not Normal at 5% Significance Level											
260												
261	Assuming Normal Distribution											
262	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
263	95% Student's-t UCL					9.4	95% Adjusted-CLT UCL (Chen-1995)					11.49
264							95% Modified-t UCL (Johnson-1978)					9.756
265												
266	Gamma GOF Test											
267	A-D Test Statistic					3.639	Anderson-Darling Gamma GOF Test					
268	5% A-D Critical Value					0.812	Data Not Gamma Distributed at 5% Significance Level					
269	K-S Test Statistic					0.362	Kolmogorov-Smirnov Gamma GOF Test					
270	5% K-S Critical Value					0.197	Data Not Gamma Distributed at 5% Significance Level					
271	Data Not Gamma Distributed at 5% Significance Level											
272												
273	Gamma Statistics											
274	k hat (MLE)					0.466	k star (bias corrected MLE)					0.432
275	Theta hat (MLE)					10.51	Theta star (bias corrected MLE)					11.31

	A	B	C	D	E	F	G	H	I	J	K	L
276	nu hat (MLE)					20.49	nu star (bias corrected)					19.03
277	MLE Mean (bias corrected)					4.891	MLE Sd (bias corrected)					7.438
278							Approximate Chi Square Value (0.05)					10.14
279	Adjusted Level of Significance					0.0386	Adjusted Chi Square Value					9.653
280												
281	Assuming Gamma Distribution											
282	95% Approximate Gamma UCL (use when n>=50))					9.18	95% Adjusted Gamma UCL (use when n<50)					9.64
283												
284	Lognormal GOF Test											
285	Shapiro Wilk Test Statistic					0.71	Shapiro Wilk Lognormal GOF Test					
286	5% Shapiro Wilk Critical Value					0.911	Data Not Lognormal at 5% Significance Level					
287	Lilliefors Test Statistic					0.287	Lilliefors Lognormal GOF Test					
288	5% Lilliefors Critical Value					0.184	Data Not Lognormal at 5% Significance Level					
289	Data Not Lognormal at 5% Significance Level											
290												
291	Lognormal Statistics											
292	Minimum of Logged Data					-0.693	Mean of logged Data					0.208
293	Maximum of Logged Data					4.025	SD of logged Data					1.391
294												
295	Assuming Lognormal Distribution											
296	95% H-UCL					8.479	90% Chebyshev (MVUE) UCL					6.189
297	95% Chebyshev (MVUE) UCL					7.635	97.5% Chebyshev (MVUE) UCL					9.641
298	99% Chebyshev (MVUE) UCL					13.58						
299												
300	Nonparametric Distribution Free UCL Statistics											
301	Data do not follow a Discernible Distribution (0.05)											
302												
303	Nonparametric Distribution Free UCLs											
304	95% CLT UCL					9.201	95% Jackknife UCL					9.4
305	95% Standard Bootstrap UCL					9.059	95% Bootstrap-t UCL					25.19
306	95% Hall's Bootstrap UCL					24.13	95% Percentile Bootstrap UCL					9.491
307	95% BCA Bootstrap UCL					12.95						
308	90% Chebyshev(Mean, Sd) UCL					12.75	95% Chebyshev(Mean, Sd) UCL					16.31
309	97.5% Chebyshev(Mean, Sd) UCL					21.25	99% Chebyshev(Mean, Sd) UCL					30.96
310												
311	Suggested UCL to Use											
312	95% Chebyshev (Mean, Sd) UCL					16.31						
313												
314	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
315	Recommendations are based upon data size, data distribution, and skewness.											
316	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
317	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
318												
319												
320	BaPTEQ											
321												
322	General Statistics											
323	Total Number of Observations					22	Number of Distinct Observations					10
324							Number of Missing Observations					0
325	Minimum					1.2	Mean					7.636
326	Maximum					86	Median					1.2
327	SD					18.74	Std. Error of Mean					3.996
328	Coefficient of Variation					2.454	Skewness					3.899
329												
330	Normal GOF Test											

	A	B	C	D	E	F	G	H	I	J	K	L
331	Shapiro Wilk Test Statistic					0.395	Shapiro Wilk GOF Test					
332	5% Shapiro Wilk Critical Value					0.911	Data Not Normal at 5% Significance Level					
333	Lilliefors Test Statistic					0.387	Lilliefors GOF Test					
334	5% Lilliefors Critical Value					0.184	Data Not Normal at 5% Significance Level					
335	Data Not Normal at 5% Significance Level											
336												
337	Assuming Normal Distribution											
338	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
339	95% Student's-t UCL					14.51	95% Adjusted-CLT UCL (Chen-1995)					17.76
340							95% Modified-t UCL (Johnson-1978)					15.07
341												
342	Gamma GOF Test											
343	A-D Test Statistic					4.054	Anderson-Darling Gamma GOF Test					
344	5% A-D Critical Value					0.8	Data Not Gamma Distributed at 5% Significance Level					
345	K-S Test Statistic					0.387	Kolmogorov-Smirnov Gamma GOF Test					
346	5% K-S Critical Value					0.195	Data Not Gamma Distributed at 5% Significance Level					
347	Data Not Gamma Distributed at 5% Significance Level											
348												
349	Gamma Statistics											
350	k hat (MLE)					0.552	k star (bias corrected MLE)					0.507
351	Theta hat (MLE)					13.84	Theta star (bias corrected MLE)					15.06
352	nu hat (MLE)					24.28	nu star (bias corrected)					22.3
353	MLE Mean (bias corrected)					7.636	MLE Sd (bias corrected)					10.73
354							Approximate Chi Square Value (0.05)					12.57
355	Adjusted Level of Significance					0.0386	Adjusted Chi Square Value					12.02
356												
357	Assuming Gamma Distribution											
358	95% Approximate Gamma UCL (use when n>=50))					13.55	95% Adjusted Gamma UCL (use when n<50)					14.17
359												
360	Lognormal GOF Test											
361	Shapiro Wilk Test Statistic					0.668	Shapiro Wilk Lognormal GOF Test					
362	5% Shapiro Wilk Critical Value					0.911	Data Not Lognormal at 5% Significance Level					
363	Lilliefors Test Statistic					0.309	Lilliefors Lognormal GOF Test					
364	5% Lilliefors Critical Value					0.184	Data Not Lognormal at 5% Significance Level					
365	Data Not Lognormal at 5% Significance Level											
366												
367	Lognormal Statistics											
368	Minimum of Logged Data					0.182	Mean of logged Data					0.899
369	Maximum of Logged Data					4.454	SD of logged Data					1.205
370												
371	Assuming Lognormal Distribution											
372	95% H-UCL					10.84	90% Chebyshev (MVUE) UCL					9.15
373	95% Chebyshev (MVUE) UCL					11.11	97.5% Chebyshev (MVUE) UCL					13.83
374	99% Chebyshev (MVUE) UCL					19.18						
375												
376	Nonparametric Distribution Free UCL Statistics											
377	Data do not follow a Discernible Distribution (0.05)											
378												
379	Nonparametric Distribution Free UCLs											
380	95% CLT UCL					14.21	95% Jackknife UCL					14.51
381	95% Standard Bootstrap UCL					14.05	95% Bootstrap-t UCL					45.99
382	95% Hall's Bootstrap UCL					40.27	95% Percentile Bootstrap UCL					14.97
383	95% BCA Bootstrap UCL					19.13						
384	90% Chebyshev(Mean, Sd) UCL					19.62	95% Chebyshev(Mean, Sd) UCL					25.05
385	97.5% Chebyshev(Mean, Sd) UCL					32.59	99% Chebyshev(Mean, Sd) UCL					47.39

	A	B	C	D	E	F	G	H	I	J	K	L
386												
387	Suggested UCL to Use											
388	95% Chebyshev (Mean, Sd) UCL					25.05						
389												
390	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
391	Recommendations are based upon data size, data distribution, and skewness.											
392	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
393	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
394												
395												
396	PAH											
397												
398	General Statistics											
399	Total Number of Observations					21	Number of Distinct Observations					10
400							Number of Missing Observations					0
401	Minimum					0.5	Mean					45.16
402	Maximum					524.5	Median					0.5
403	SD					121.3	Std. Error of Mean					26.46
404	Coefficient of Variation					2.685	Skewness					3.575
405												
406	Normal GOF Test											
407	Shapiro Wilk Test Statistic					0.425	Shapiro Wilk GOF Test					
408	5% Shapiro Wilk Critical Value					0.908	Data Not Normal at 5% Significance Level					
409	Lilliefors Test Statistic					0.367	Lilliefors GOF Test					
410	5% Lilliefors Critical Value					0.188	Data Not Normal at 5% Significance Level					
411	Data Not Normal at 5% Significance Level											
412												
413	Assuming Normal Distribution											
414	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
415	95% Student's-t UCL					90.8	95% Adjusted-CLT UCL (Chen-1995)					110.7
416							95% Modified-t UCL (Johnson-1978)					94.24
417												
418	Gamma GOF Test											
419	A-D Test Statistic					2.562	Anderson-Darling Gamma GOF Test					
420	5% A-D Critical Value					0.864	Data Not Gamma Distributed at 5% Significance Level					
421	K-S Test Statistic					0.334	Kolmogorov-Smirnov Gamma GOF Test					
422	5% K-S Critical Value					0.207	Data Not Gamma Distributed at 5% Significance Level					
423	Data Not Gamma Distributed at 5% Significance Level											
424												
425	Gamma Statistics											
426	k hat (MLE)					0.263	k star (bias corrected MLE)					0.258
427	Theta hat (MLE)					171.4	Theta star (bias corrected MLE)					175.4
428	nu hat (MLE)					11.06	nu star (bias corrected)					10.82
429	MLE Mean (bias corrected)					45.16	MLE Sd (bias corrected)					88.99
430							Approximate Chi Square Value (0.05)					4.459
431	Adjusted Level of Significance					0.0383	Adjusted Chi Square Value					4.148
432												
433	Assuming Gamma Distribution											
434	95% Approximate Gamma UCL (use when n>=50))					109.6	95% Adjusted Gamma UCL (use when n<50)					117.8
435												
436	Lognormal GOF Test											
437	Shapiro Wilk Test Statistic					0.768	Shapiro Wilk Lognormal GOF Test					
438	5% Shapiro Wilk Critical Value					0.908	Data Not Lognormal at 5% Significance Level					
439	Lilliefors Test Statistic					0.351	Lilliefors Lognormal GOF Test					
440	5% Lilliefors Critical Value					0.188	Data Not Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
441	Data Not Lognormal at 5% Significance Level											
442												
443	Lognormal Statistics											
444	Minimum of Logged Data				-0.693		Mean of logged Data				1.137	
445	Maximum of Logged Data				6.262		SD of logged Data				2.372	
446												
447	Assuming Lognormal Distribution											
448	95% H-UCL				658.3		90% Chebyshev (MVUE) UCL				103.5	
449	95% Chebyshev (MVUE) UCL				134.4		97.5% Chebyshev (MVUE) UCL				177.3	
450	99% Chebyshev (MVUE) UCL				261.7							
451												
452	Nonparametric Distribution Free UCL Statistics											
453	Data do not follow a Discernible Distribution (0.05)											
454												
455	Nonparametric Distribution Free UCLs											
456	95% CLT UCL				88.69		95% Jackknife UCL				90.8	
457	95% Standard Bootstrap UCL				87.53		95% Bootstrap-t UCL				305.4	
458	95% Hall's Bootstrap UCL				268.8		95% Percentile Bootstrap UCL				90.77	
459	95% BCA Bootstrap UCL				121							
460	90% Chebyshev(Mean, Sd) UCL				124.5		95% Chebyshev(Mean, Sd) UCL				160.5	
461	97.5% Chebyshev(Mean, Sd) UCL				210.4		99% Chebyshev(Mean, Sd) UCL				308.4	
462												
463	Suggested UCL to Use											
464	97.5% Chebyshev (Mean, Sd) UCL				210.4							
465												
466	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
467	Recommendations are based upon data size, data distribution, and skewness.											
468	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
469	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
470												
471												
472	C16-C34											
473												
474	General Statistics											
475	Total Number of Observations				22		Number of Distinct Observations				6	
476							Number of Missing Observations				0	
477	Minimum				100		Mean				286.8	
478	Maximum				2700		Median				100	
479	SD				571.8		Std. Error of Mean				121.9	
480	Coefficient of Variation				1.993		Skewness				3.961	
481												
482	Normal GOF Test											
483	Shapiro Wilk Test Statistic				0.378		Shapiro Wilk GOF Test					
484	5% Shapiro Wilk Critical Value				0.911		Data Not Normal at 5% Significance Level					
485	Lilliefors Test Statistic				0.426		Lilliefors GOF Test					
486	5% Lilliefors Critical Value				0.184		Data Not Normal at 5% Significance Level					
487	Data Not Normal at 5% Significance Level											
488												
489	Assuming Normal Distribution											
490	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
491	95% Student's-t UCL				496.6		95% Adjusted-CLT UCL (Chen-1995)				597.3	
492							95% Modified-t UCL (Johnson-1978)				513.7	
493												
494	Gamma GOF Test											
495	A-D Test Statistic				5.389		Anderson-Darling Gamma GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L	
496	5% A-D Critical Value					0.776	Data Not Gamma Distributed at 5% Significance Level						
497	K-S Test Statistic					0.452	Kolmogorov-Smimov Gamma GOF Test						
498	5% K-S Critical Value					0.192	Data Not Gamma Distributed at 5% Significance Level						
499	Data Not Gamma Distributed at 5% Significance Level												
500													
501	Gamma Statistics												
502	k hat (MLE)					0.886	k star (bias corrected MLE)					0.795	
503	Theta hat (MLE)					323.7	Theta star (bias corrected MLE)					360.6	
504	nu hat (MLE)					38.98	nu star (bias corrected)					35	
505	MLE Mean (bias corrected)					286.8	MLE Sd (bias corrected)					321.6	
506							Approximate Chi Square Value (0.05)					22.47	
507	Adjusted Level of Significance					0.0386	Adjusted Chi Square Value					21.72	
508													
509	Assuming Gamma Distribution												
510	95% Approximate Gamma UCL (use when n>=50))					446.9	95% Adjusted Gamma UCL (use when n<50)					462.3	
511													
512	Lognormal GOF Test												
513	Shapiro Wilk Test Statistic					0.516	Shapiro Wilk Lognormal GOF Test						
514	5% Shapiro Wilk Critical Value					0.911	Data Not Lognormal at 5% Significance Level						
515	Lilliefors Test Statistic					0.443	Lilliefors Lognormal GOF Test						
516	5% Lilliefors Critical Value					0.184	Data Not Lognormal at 5% Significance Level						
517	Data Not Lognormal at 5% Significance Level												
518													
519	Lognormal Statistics												
520	Minimum of Logged Data					4.605	Mean of logged Data					4.998	
521	Maximum of Logged Data					7.901	SD of logged Data					0.893	
522													
523	Assuming Lognormal Distribution												
524	95% H-UCL					354.7	90% Chebyshev (MVUE) UCL					351.3	
525	95% Chebyshev (MVUE) UCL					412.9	97.5% Chebyshev (MVUE) UCL					498.4	
526	99% Chebyshev (MVUE) UCL					666.3							
527													
528	Nonparametric Distribution Free UCL Statistics												
529	Data do not follow a Discernible Distribution (0.05)												
530													
531	Nonparametric Distribution Free UCLs												
532	95% CLT UCL					487.3	95% Jackknife UCL					496.6	
533	95% Standard Bootstrap UCL					483.8	95% Bootstrap-t UCL					989.4	
534	95% Hall's Bootstrap UCL					1064	95% Percentile Bootstrap UCL					518.6	
535	95% BCA Bootstrap UCL					668.6							
536	90% Chebyshev(Mean, Sd) UCL					652.5	95% Chebyshev(Mean, Sd) UCL					818.2	
537	97.5% Chebyshev(Mean, Sd) UCL					1048	99% Chebyshev(Mean, Sd) UCL					1500	
538													
539	Suggested UCL to Use												
540	95% Chebyshev (Mean, Sd) UCL					818.2							
541													
542	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
543	Recommendations are based upon data size, data distribution, and skewness.												
544	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
545	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
546													
547													
548	C10-C36												
549													
550	General Statistics												

	A	B	C	D	E	F	G	H	I	J	K	L
551	Total Number of Observations					22	Number of Distinct Observations					9
552							Number of Missing Observations					0
553	Minimum					50	Mean					289.9
554	Maximum					3233	Median					50
555	SD					704.8	Std. Error of Mean					150.3
556	Coefficient of Variation					2.431	Skewness					3.852
557												
558	Normal GOF Test											
559	Shapiro Wilk Test Statistic					0.396	Shapiro Wilk GOF Test					
560	5% Shapiro Wilk Critical Value					0.911	Data Not Normal at 5% Significance Level					
561	Lilliefors Test Statistic					0.402	Lilliefors GOF Test					
562	5% Lilliefors Critical Value					0.184	Data Not Normal at 5% Significance Level					
563	Data Not Normal at 5% Significance Level											
564												
565	Assuming Normal Distribution											
566	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
567	95% Student's-t UCL					548.5	95% Adjusted-CLT UCL (Chen-1995)					669
568							95% Modified-t UCL (Johnson-1978)					569
569												
570	Gamma GOF Test											
571	A-D Test Statistic					4.965	Anderson-Darling Gamma GOF Test					
572	5% A-D Critical Value					0.801	Data Not Gamma Distributed at 5% Significance Level					
573	K-S Test Statistic					0.45	Kolmogorov-Smirnov Gamma GOF Test					
574	5% K-S Critical Value					0.195	Data Not Gamma Distributed at 5% Significance Level					
575	Data Not Gamma Distributed at 5% Significance Level											
576												
577	Gamma Statistics											
578	k hat (MLE)					0.541	k star (bias corrected MLE)					0.498
579	Theta hat (MLE)					535.4	Theta star (bias corrected MLE)					582.2
580	nu hat (MLE)					23.82	nu star (bias corrected)					21.91
581	MLE Mean (bias corrected)					289.9	MLE Sd (bias corrected)					410.9
582							Approximate Chi Square Value (0.05)					12.27
583	Adjusted Level of Significance					0.0386	Adjusted Chi Square Value					11.73
584												
585	Assuming Gamma Distribution											
586	95% Approximate Gamma UCL (use when n>=50))					517.7	95% Adjusted Gamma UCL (use when n<50)					541.4
587												
588	Lognormal GOF Test											
589	Shapiro Wilk Test Statistic					0.57	Shapiro Wilk Lognormal GOF Test					
590	5% Shapiro Wilk Critical Value					0.911	Data Not Lognormal at 5% Significance Level					
591	Lilliefors Test Statistic					0.423	Lilliefors Lognormal GOF Test					
592	5% Lilliefors Critical Value					0.184	Data Not Lognormal at 5% Significance Level					
593	Data Not Lognormal at 5% Significance Level											
594												
595	Lognormal Statistics											
596	Minimum of Logged Data					3.912	Mean of logged Data					4.511
597	Maximum of Logged Data					8.081	SD of logged Data					1.212
598												
599	Assuming Lognormal Distribution											
600	95% H-UCL					407.7	90% Chebyshev (MVUE) UCL					342.6
601	95% Chebyshev (MVUE) UCL					416.2	97.5% Chebyshev (MVUE) UCL					518.5
602	99% Chebyshev (MVUE) UCL					719.4						
603												
604	Nonparametric Distribution Free UCL Statistics											
605	Data do not follow a Discernible Distribution (0.05)											

	A	B	C	D	E	F	G	H	I	J	K	L
606												
607	Nonparametric Distribution Free UCLs											
608	95% CLT UCL					537.1	95% Jackknife UCL					548.5
609	95% Standard Bootstrap UCL					532.6	95% Bootstrap-t UCL					1108
610	95% Hall's Bootstrap UCL					1222	95% Percentile Bootstrap UCL					544.5
611	95% BCA Bootstrap UCL					719.7						
612	90% Chebyshev(Mean, Sd) UCL					740.7	95% Chebyshev(Mean, Sd) UCL					944.9
613	97.5% Chebyshev(Mean, Sd) UCL					1228	99% Chebyshev(Mean, Sd) UCL					1785
614												
615	Suggested UCL to Use											
616	95% Chebyshev (Mean, Sd) UCL					944.9						
617												
618	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
619	Recommendations are based upon data size, data distribution, and skewness.											
620	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
621	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
622												
623												
624	TN											
625												
626	General Statistics											
627	Total Number of Observations					18	Number of Distinct Observations					18
628							Number of Missing Observations					0
629	Minimum					100	Mean					711
630	Maximum					4100	Median					465
631	SD					901.3	Std. Error of Mean					212.4
632	Coefficient of Variation					1.268	Skewness					3.445
633												
634	Normal GOF Test											
635	Shapiro Wilk Test Statistic					0.569	Shapiro Wilk GOF Test					
636	5% Shapiro Wilk Critical Value					0.897	Data Not Normal at 5% Significance Level					
637	Lilliefors Test Statistic					0.268	Lilliefors GOF Test					
638	5% Lilliefors Critical Value					0.202	Data Not Normal at 5% Significance Level					
639	Data Not Normal at 5% Significance Level											
640												
641	Assuming Normal Distribution											
642	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
643	95% Student's-t UCL					1081	95% Adjusted-CLT UCL (Chen-1995)					1245
644							95% Modified-t UCL (Johnson-1978)					1109
645												
646	Gamma GOF Test											
647	A-D Test Statistic					0.646	Anderson-Darling Gamma GOF Test					
648	5% A-D Critical Value					0.76	Detected data appear Gamma Distributed at 5% Significance Level					
649	K-S Test Statistic					0.154	Kolmogorov-Smirnov Gamma GOF Test					
650	5% K-S Critical Value					0.208	Detected data appear Gamma Distributed at 5% Significance Level					
651	Detected data appear Gamma Distributed at 5% Significance Level											
652												
653	Gamma Statistics											
654	k hat (MLE)					1.338	k star (bias corrected MLE)					1.152
655	Theta hat (MLE)					531.5	Theta star (bias corrected MLE)					617.3
656	nu hat (MLE)					48.16	nu star (bias corrected)					41.46
657	MLE Mean (bias corrected)					711	MLE Sd (bias corrected)					662.5
658							Approximate Chi Square Value (0.05)					27.71
659	Adjusted Level of Significance					0.0357	Adjusted Chi Square Value					26.63
660												

	A	B	C	D	E	F	G	H	I	J	K	L
661	Assuming Gamma Distribution											
662	95% Approximate Gamma UCL (use when n>=50)					1064	95% Adjusted Gamma UCL (use when n<50)					1107
663												
664	Lognormal GOF Test											
665	Shapiro Wilk Test Statistic					0.964	Shapiro Wilk Lognormal GOF Test					
666	5% Shapiro Wilk Critical Value					0.897	Data appear Lognormal at 5% Significance Level					
667	Lilliefors Test Statistic					0.129	Lilliefors Lognormal GOF Test					
668	5% Lilliefors Critical Value					0.202	Data appear Lognormal at 5% Significance Level					
669	Data appear Lognormal at 5% Significance Level											
670												
671	Lognormal Statistics											
672	Minimum of Logged Data					4.605	Mean of logged Data					6.148
673	Maximum of Logged Data					8.319	SD of logged Data					0.886
674												
675	Assuming Lognormal Distribution											
676	95% H-UCL					1179	90% Chebyshev (MVUE) UCL					1133
677	95% Chebyshev (MVUE) UCL					1342	97.5% Chebyshev (MVUE) UCL					1631
678	99% Chebyshev (MVUE) UCL					2200						
679												
680	Nonparametric Distribution Free UCL Statistics											
681	Data appear to follow a Discernible Distribution at 5% Significance Level											
682												
683	Nonparametric Distribution Free UCLs											
684	95% CLT UCL					1060	95% Jackknife UCL					1081
685	95% Standard Bootstrap UCL					1047	95% Bootstrap-t UCL					1578
686	95% Hall's Bootstrap UCL					2404	95% Percentile Bootstrap UCL					1094
687	95% BCA Bootstrap UCL					1328						
688	90% Chebyshev(Mean, Sd) UCL					1348	95% Chebyshev(Mean, Sd) UCL					1637
689	97.5% Chebyshev(Mean, Sd) UCL					2038	99% Chebyshev(Mean, Sd) UCL					2825
690												
691	Suggested UCL to Use											
692	95% Adjusted Gamma UCL					1107						
693												
694	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
695	Recommendations are based upon data size, data distribution, and skewness.											
696	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
697	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
698												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.111/06/2021 12:11:16 PM								
5	From File			WorkSheet.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	AREA B											
11	As											
12												
13	General Statistics											
14	Total Number of Observations				16		Number of Distinct Observations				14	
15							Number of Missing Observations				0	
16	Minimum				3.1		Mean				14.66	
17	Maximum				39		Median				13	
18	SD				11.6		Std. Error of Mean				2.899	
19	Coefficient of Variation				0.791		Skewness				1.176	
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic				0.848		Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value				0.887		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.176		Lilliefors GOF Test					
25	5% Lilliefors Critical Value				0.213		Data appear Normal at 5% Significance Level					
26	Data appear Approximate Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
30	95% Student's-t UCL				19.75		95% Adjusted-CLT UCL (Chen-1995)				20.34	
31							95% Modified-t UCL (Johnson-1978)				19.89	
32												
33	Gamma GOF Test											
34	A-D Test Statistic				0.346		Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value				0.752		Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.132		Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value				0.218		Detected data appear Gamma Distributed at 5% Significance Level					
38	Detected data appear Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)				1.828		k star (bias corrected MLE)				1.527	
42	Theta hat (MLE)				8.02		Theta star (bias corrected MLE)				9.601	
43	nu hat (MLE)				58.51		nu star (bias corrected)				48.87	
44	MLE Mean (bias corrected)				14.66		MLE Sd (bias corrected)				11.86	
45						Approximate Chi Square Value (0.05)						
46	Adjusted Level of Significance				0.0335		Adjusted Chi Square Value					
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))				21.19		95% Adjusted Gamma UCL (use when n<50)				22.12	
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic				0.95		Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk Critical Value				0.887		Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic				0.124		Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value				0.213		Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data				1.131	Mean of logged Data				2.388		
60	Maximum of Logged Data				3.664	SD of logged Data				0.816		
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL				25.36	90% Chebyshev (MVUE) UCL				24.51		
64	95% Chebyshev (MVUE) UCL				28.91	97.5% Chebyshev (MVUE) UCL				35.02		
65	99% Chebyshev (MVUE) UCL				47.02							
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL				19.43	95% Jackknife UCL				19.75		
72	95% Standard Bootstrap UCL				19.27	95% Bootstrap-t UCL				21.85		
73	95% Hall's Bootstrap UCL				22.63	95% Percentile Bootstrap UCL				19.39		
74	95% BCA Bootstrap UCL				20.21							
75	90% Chebyshev(Mean, Sd) UCL				23.36	95% Chebyshev(Mean, Sd) UCL				27.3		
76	97.5% Chebyshev(Mean, Sd) UCL				32.77	99% Chebyshev(Mean, Sd) UCL				43.51		
77												
78	Suggested UCL to Use											
79	95% Student's-t UCL				19.75							
80												
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
83												
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
85	Recommendations are based upon data size, data distribution, and skewness.											
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
88	BaP											
89												
90	General Statistics											
91	Total Number of Observations				16	Number of Distinct Observations				8		
92						Number of Missing Observations				0		
93	Minimum				0.5	Mean				4.725		
94	Maximum				42	Median				0.5		
95	SD				10.71	Std. Error of Mean				2.677		
96	Coefficient of Variation				2.267	Skewness				3.251		
97												
98	Normal GOF Test											
99	Shapiro Wilk Test Statistic				0.466	Shapiro Wilk GOF Test						
100	5% Shapiro Wilk Critical Value				0.887	Data Not Normal at 5% Significance Level						
101	Lilliefors Test Statistic				0.384	Lilliefors GOF Test						
102	5% Lilliefors Critical Value				0.213	Data Not Normal at 5% Significance Level						
103	Data Not Normal at 5% Significance Level											
104												
105	Assuming Normal Distribution											
106	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
107	95% Student's-t UCL				9.419	95% Adjusted-CLT UCL (Chen-1995)				11.45		
108						95% Modified-t UCL (Johnson-1978)				9.781		
109												
110	Gamma GOF Test											

	A	B	C	D	E	F	G	H	I	J	K	L	
111	A-D Test Statistic					2.545	Anderson-Darling Gamma GOF Test						
112	5% A-D Critical Value					0.8	Data Not Gamma Distributed at 5% Significance Level						
113	K-S Test Statistic					0.316	Kolmogorov-Smirnov Gamma GOF Test						
114	5% K-S Critical Value					0.228	Data Not Gamma Distributed at 5% Significance Level						
115	Data Not Gamma Distributed at 5% Significance Level												
116													
117	Gamma Statistics												
118	k hat (MLE)					0.483	k star (bias corrected MLE)					0.434	
119	Theta hat (MLE)					9.792	Theta star (bias corrected MLE)					10.89	
120	nu hat (MLE)					15.44	nu star (bias corrected)					13.88	
121	MLE Mean (bias corrected)					4.725	MLE Sd (bias corrected)					7.175	
122							Approximate Chi Square Value (0.05)					6.489	
123	Adjusted Level of Significance					0.0335	Adjusted Chi Square Value					5.921	
124													
125	Assuming Gamma Distribution												
126	95% Approximate Gamma UCL (use when n>=50))					10.11	95% Adjusted Gamma UCL (use when n<50)					11.08	
127													
128	Lognormal GOF Test												
129	Shapiro Wilk Test Statistic					0.719	Shapiro Wilk Lognormal GOF Test						
130	5% Shapiro Wilk Critical Value					0.887	Data Not Lognormal at 5% Significance Level						
131	Lilliefors Test Statistic					0.304	Lilliefors Lognormal GOF Test						
132	5% Lilliefors Critical Value					0.213	Data Not Lognormal at 5% Significance Level						
133	Data Not Lognormal at 5% Significance Level												
134													
135	Lognormal Statistics												
136	Minimum of Logged Data					-0.693	Mean of logged Data					0.229	
137	Maximum of Logged Data					3.738	SD of logged Data					1.42	
138													
139	Assuming Lognormal Distribution												
140	95% H-UCL					12	90% Chebyshev (MVUE) UCL					6.863	
141	95% Chebyshev (MVUE) UCL					8.573	97.5% Chebyshev (MVUE) UCL					10.95	
142	99% Chebyshev (MVUE) UCL					15.61							
143													
144	Nonparametric Distribution Free UCL Statistics												
145	Data do not follow a Discernible Distribution (0.05)												
146													
147	Nonparametric Distribution Free UCLs												
148	95% CLT UCL					9.129	95% Jackknife UCL					9.419	
149	95% Standard Bootstrap UCL					8.853	95% Bootstrap-t UCL					29.98	
150	95% Hall's Bootstrap UCL					27.22	95% Percentile Bootstrap UCL					9.538	
151	95% BCA Bootstrap UCL					11.94							
152	90% Chebyshev(Mean, Sd) UCL					12.76	95% Chebyshev(Mean, Sd) UCL					16.4	
153	97.5% Chebyshev(Mean, Sd) UCL					21.45	99% Chebyshev(Mean, Sd) UCL					31.37	
154													
155	Suggested UCL to Use												
156	95% Chebyshev (Mean, Sd) UCL					16.4							
157													
158	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
159	Recommendations are based upon data size, data distribution, and skewness.												
160	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
161	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
162													
163													
164	BaPTEQ												
165													

	A	B	C	D	E	F	G	H	I	J	K	L
166	General Statistics											
167	Total Number of Observations					16	Number of Distinct Observations					8
168							Number of Missing Observations					0
169	Minimum					1.2	Mean					7.694
170	Maximum					67	Median					1.2
171	SD					16.94	Std. Error of Mean					4.236
172	Coefficient of Variation					2.202	Skewness					3.301
173												
174	Normal GOF Test											
175	Shapiro Wilk Test Statistic					0.453	Shapiro Wilk GOF Test					
176	5% Shapiro Wilk Critical Value					0.887	Data Not Normal at 5% Significance Level					
177	Lilliefors Test Statistic					0.394	Lilliefors GOF Test					
178	5% Lilliefors Critical Value					0.213	Data Not Normal at 5% Significance Level					
179	Data Not Normal at 5% Significance Level											
180												
181	Assuming Normal Distribution											
182	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
183	95% Student's-t UCL					15.12	95% Adjusted-CLT UCL (Chen-1995)					18.4
184							95% Modified-t UCL (Johnson-1978)					15.7
185												
186	Gamma GOF Test											
187	A-D Test Statistic					2.847	Anderson-Darling Gamma GOF Test					
188	5% A-D Critical Value					0.791	Data Not Gamma Distributed at 5% Significance Level					
189	K-S Test Statistic					0.325	Kolmogorov-Smirnov Gamma GOF Test					
190	5% K-S Critical Value					0.226	Data Not Gamma Distributed at 5% Significance Level					
191	Data Not Gamma Distributed at 5% Significance Level											
192												
193	Gamma Statistics											
194	k hat (MLE)					0.563	k star (bias corrected MLE)					0.499
195	Theta hat (MLE)					13.66	Theta star (bias corrected MLE)					15.41
196	nu hat (MLE)					18.02	nu star (bias corrected)					15.98
197	MLE Mean (bias corrected)					7.694	MLE Sd (bias corrected)					10.89
198							Approximate Chi Square Value (0.05)					7.945
199	Adjusted Level of Significance					0.0335	Adjusted Chi Square Value					7.308
200												
201	Assuming Gamma Distribution											
202	95% Approximate Gamma UCL (use when n>=50))					15.47	95% Adjusted Gamma UCL (use when n<50)					16.82
203												
204	Lognormal GOF Test											
205	Shapiro Wilk Test Statistic					0.681	Shapiro Wilk Lognormal GOF Test					
206	5% Shapiro Wilk Critical Value					0.887	Data Not Lognormal at 5% Significance Level					
207	Lilliefors Test Statistic					0.308	Lilliefors Lognormal GOF Test					
208	5% Lilliefors Critical Value					0.213	Data Not Lognormal at 5% Significance Level					
209	Data Not Lognormal at 5% Significance Level											
210												
211	Lognormal Statistics											
212	Minimum of Logged Data					0.182	Mean of logged Data					0.933
213	Maximum of Logged Data					4.205	SD of logged Data					1.25
214												
215	Assuming Lognormal Distribution											
216	95% H-UCL					15.14	90% Chebyshev (MVUE) UCL					10.58
217	95% Chebyshev (MVUE) UCL					13.05	97.5% Chebyshev (MVUE) UCL					16.47
218	99% Chebyshev (MVUE) UCL					23.19						
219												
220	Nonparametric Distribution Free UCL Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
221	Data do not follow a Discernible Distribution (0.05)											
222												
223	Nonparametric Distribution Free UCLs											
224	95% CLT UCL				14.66	95% Jackknife UCL				15.12		
225	95% Standard Bootstrap UCL				14.51	95% Bootstrap-t UCL				51.24		
226	95% Hall's Bootstrap UCL				54.01	95% Percentile Bootstrap UCL				15.57		
227	95% BCA Bootstrap UCL				19.24							
228	90% Chebyshev(Mean, Sd) UCL				20.4	95% Chebyshev(Mean, Sd) UCL				26.16		
229	97.5% Chebyshev(Mean, Sd) UCL				34.15	99% Chebyshev(Mean, Sd) UCL				49.84		
230												
231	Suggested UCL to Use											
232	95% Chebyshev (Mean, Sd) UCL				26.16							
233												
234	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
235	Recommendations are based upon data size, data distribution, and skewness.											
236	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
237	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
238												
239												
240	PAH											
241												
242	General Statistics											
243	Total Number of Observations				16	Number of Distinct Observations				8		
244						Number of Missing Observations				0		
245	Minimum				0.5	Mean				48.18		
246	Maximum				410.6	Median				0.5		
247	SD				111	Std. Error of Mean				27.74		
248	Coefficient of Variation				2.304	Skewness				2.843		
249												
250	Normal GOF Test											
251	Shapiro Wilk Test Statistic				0.509	Shapiro Wilk GOF Test						
252	5% Shapiro Wilk Critical Value				0.887	Data Not Normal at 5% Significance Level						
253	Lilliefors Test Statistic				0.375	Lilliefors GOF Test						
254	5% Lilliefors Critical Value				0.213	Data Not Normal at 5% Significance Level						
255	Data Not Normal at 5% Significance Level											
256												
257	Assuming Normal Distribution											
258	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
259	95% Student's-t UCL				96.81	95% Adjusted-CLT UCL (Chen-1995)				114.9		
260						95% Modified-t UCL (Johnson-1978)				100.1		
261												
262	Gamma GOF Test											
263	A-D Test Statistic				1.856	Anderson-Darling Gamma GOF Test						
264	5% A-D Critical Value				0.853	Data Not Gamma Distributed at 5% Significance Level						
265	K-S Test Statistic				0.333	Kolmogorov-Smirnov Gamma GOF Test						
266	5% K-S Critical Value				0.235	Data Not Gamma Distributed at 5% Significance Level						
267	Data Not Gamma Distributed at 5% Significance Level											
268												
269	Gamma Statistics											
270	k hat (MLE)				0.267	k star (bias corrected MLE)				0.258		
271	Theta hat (MLE)				180.5	Theta star (bias corrected MLE)				186.4		
272	nu hat (MLE)				8.539	nu star (bias corrected)				8.271		
273	MLE Mean (bias corrected)				48.18	MLE Sd (bias corrected)				94.76		
274						Approximate Chi Square Value (0.05)				2.893		
275	Adjusted Level of Significance				0.0335	Adjusted Chi Square Value				2.543		

	A	B	C	D	E	F	G	H	I	J	K	L
276												
277	Assuming Gamma Distribution											
278	95% Approximate Gamma UCL (use when n>=50))					137.7	95% Adjusted Gamma UCL (use when n<50)					156.7
279												
280	Lognormal GOF Test											
281	Shapiro Wilk Test Statistic					0.77	Shapiro Wilk Lognormal GOF Test					
282	5% Shapiro Wilk Critical Value					0.887	Data Not Lognormal at 5% Significance Level					
283	Lilliefors Test Statistic					0.345	Lilliefors Lognormal GOF Test					
284	5% Lilliefors Critical Value					0.213	Data Not Lognormal at 5% Significance Level					
285	Data Not Lognormal at 5% Significance Level											
286												
287	Lognormal Statistics											
288	Minimum of Logged Data					-0.693	Mean of logged Data					1.241
289	Maximum of Logged Data					6.018	SD of logged Data					2.474
290												
291	Assuming Lognormal Distribution											
292	95% H-UCL					2298	90% Chebyshev (MVUE) UCL					133.6
293	95% Chebyshev (MVUE) UCL					174.8	97.5% Chebyshev (MVUE) UCL					231.9
294	99% Chebyshev (MVUE) UCL					344.1						
295												
296	Nonparametric Distribution Free UCL Statistics											
297	Data do not follow a Discernible Distribution (0.05)											
298												
299	Nonparametric Distribution Free UCLs											
300	95% CLT UCL					93.81	95% Jackknife UCL					96.81
301	95% Standard Bootstrap UCL					92.09	95% Bootstrap-t UCL					256.6
302	95% Hall's Bootstrap UCL					276.5	95% Percentile Bootstrap UCL					97.97
303	95% BCA Bootstrap UCL					115.9						
304	90% Chebyshev(Mean, Sd) UCL					131.4	95% Chebyshev(Mean, Sd) UCL					169.1
305	97.5% Chebyshev(Mean, Sd) UCL					221.4	99% Chebyshev(Mean, Sd) UCL					324.2
306												
307	Suggested UCL to Use											
308	99% Chebyshev (Mean, Sd) UCL					324.2						
309												
310	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
311	Recommendations are based upon data size, data distribution, and skewness.											
312	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
313	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
314												
315												
316	C16-C34											
317												
318	General Statistics											
319	Total Number of Observations					14	Number of Distinct Observations					4
320							Number of Missing Observations					0
321	Minimum					100	Mean					235
322	Maximum					1400	Median					100
323	SD					365.7	Std. Error of Mean					97.75
324	Coefficient of Variation					1.556	Skewness					2.98
325												
326	Normal GOF Test											
327	Shapiro Wilk Test Statistic					0.44	Shapiro Wilk GOF Test					
328	5% Shapiro Wilk Critical Value					0.874	Data Not Normal at 5% Significance Level					
329	Lilliefors Test Statistic					0.46	Lilliefors GOF Test					
330	5% Lilliefors Critical Value					0.226	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
331	Data Not Normal at 5% Significance Level											
332												
333	Assuming Normal Distribution											
334	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
335	95% Student's-t UCL					408.1	95% Adjusted-CLT UCL (Chen-1995)					479
336							95% Modified-t UCL (Johnson-1978)					421.1
337												
338	Gamma GOF Test											
339	A-D Test Statistic					3.739	Anderson-Darling Gamma GOF Test					
340	5% A-D Critical Value					0.758	Data Not Gamma Distributed at 5% Significance Level					
341	K-S Test Statistic					0.462	Kolmogorov-Smirnov Gamma GOF Test					
342	5% K-S Critical Value					0.235	Data Not Gamma Distributed at 5% Significance Level					
343	Data Not Gamma Distributed at 5% Significance Level											
344												
345	Gamma Statistics											
346	k hat (MLE)					1.121	k star (bias corrected MLE)					0.929
347	Theta hat (MLE)					209.6	Theta star (bias corrected MLE)					253.1
348	nu hat (MLE)					31.39	nu star (bias corrected)					26
349	MLE Mean (bias corrected)					235	MLE Sd (bias corrected)					243.9
350							Approximate Chi Square Value (0.05)					15.38
351	Adjusted Level of Significance					0.0312	Adjusted Chi Square Value					14.3
352												
353	Assuming Gamma Distribution											
354	95% Approximate Gamma UCL (use when n>=50))					397.3	95% Adjusted Gamma UCL (use when n<50)					427.2
355												
356	Lognormal GOF Test											
357	Shapiro Wilk Test Statistic					0.49	Shapiro Wilk Lognormal GOF Test					
358	5% Shapiro Wilk Critical Value					0.874	Data Not Lognormal at 5% Significance Level					
359	Lilliefors Test Statistic					0.448	Lilliefors Lognormal GOF Test					
360	5% Lilliefors Critical Value					0.226	Data Not Lognormal at 5% Significance Level					
361	Data Not Lognormal at 5% Significance Level											
362												
363	Lognormal Statistics											
364	Minimum of Logged Data					4.605	Mean of logged Data					4.951
365	Maximum of Logged Data					7.244	SD of logged Data					0.828
366												
367	Assuming Lognormal Distribution											
368	95% H-UCL					355	90% Chebyshev (MVUE) UCL					329.5
369	95% Chebyshev (MVUE) UCL					391.4	97.5% Chebyshev (MVUE) UCL					477.2
370	99% Chebyshev (MVUE) UCL					645.8						
371												
372	Nonparametric Distribution Free UCL Statistics											
373	Data do not follow a Discernible Distribution (0.05)											
374												
375	Nonparametric Distribution Free UCLs											
376	95% CLT UCL					395.8	95% Jackknife UCL					408.1
377	95% Standard Bootstrap UCL					N/A	95% Bootstrap-t UCL					N/A
378	95% Hall's Bootstrap UCL					N/A	95% Percentile Bootstrap UCL					N/A
379	95% BCA Bootstrap UCL					N/A						
380	90% Chebyshev(Mean, Sd) UCL					528.2	95% Chebyshev(Mean, Sd) UCL					661.1
381	97.5% Chebyshev(Mean, Sd) UCL					845.4	99% Chebyshev(Mean, Sd) UCL					1208
382												
383	Suggested UCL to Use											
384	95% Chebyshev (Mean, Sd) UCL					661.1						
385												

	A	B	C	D	E	F	G	H	I	J	K	L
386	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
387	Recommendations are based upon data size, data distribution, and skewness.											
388	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
389	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
390												
391												
392	C10-C36											
393												
394	General Statistics											
395	Total Number of Observations				14		Number of Distinct Observations				5	
396							Number of Missing Observations				0	
397	Minimum				50		Mean				217.9	
398	Maximum				1562		Median				50	
399	SD				435.1		Std. Error of Mean				116.3	
400	Coefficient of Variation				1.997		Skewness				2.805	
401												
402	Normal GOF Test											
403	Shapiro Wilk Test Statistic				0.46		Shapiro Wilk GOF Test					
404	5% Shapiro Wilk Critical Value				0.874		Data Not Normal at 5% Significance Level					
405	Lilliefors Test Statistic				0.437		Lilliefors GOF Test					
406	5% Lilliefors Critical Value				0.226		Data Not Normal at 5% Significance Level					
407	Data Not Normal at 5% Significance Level											
408												
409	Assuming Normal Distribution											
410	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
411	95% Student's-t UCL				423.8		95% Adjusted-CLT UCL (Chen-1995)				502.2	
412							95% Modified-t UCL (Johnson-1978)				438.3	
413												
414	Gamma GOF Test											
415	A-D Test Statistic				3.488		Anderson-Darling Gamma GOF Test					
416	5% A-D Critical Value				0.78		Data Not Gamma Distributed at 5% Significance Level					
417	K-S Test Statistic				0.451		Kolmogorov-Smirnov Gamma GOF Test					
418	5% K-S Critical Value				0.239		Data Not Gamma Distributed at 5% Significance Level					
419	Data Not Gamma Distributed at 5% Significance Level											
420												
421	Gamma Statistics											
422	k hat (MLE)				0.644		k star (bias corrected MLE)				0.554	
423	Theta hat (MLE)				338.1		Theta star (bias corrected MLE)				393.3	
424	nu hat (MLE)				18.04		nu star (bias corrected)				15.51	
425	MLE Mean (bias corrected)				217.9		MLE Sd (bias corrected)				292.7	
426							Approximate Chi Square Value (0.05)				7.616	
427	Adjusted Level of Significance				0.0312		Adjusted Chi Square Value				6.894	
428												
429	Assuming Gamma Distribution											
430	95% Approximate Gamma UCL (use when n>=50))				443.6		95% Adjusted Gamma UCL (use when n<50)				490.1	
431												
432	Lognormal GOF Test											
433	Shapiro Wilk Test Statistic				0.537		Shapiro Wilk Lognormal GOF Test					
434	5% Shapiro Wilk Critical Value				0.874		Data Not Lognormal at 5% Significance Level					
435	Lilliefors Test Statistic				0.415		Lilliefors Lognormal GOF Test					
436	5% Lilliefors Critical Value				0.226		Data Not Lognormal at 5% Significance Level					
437	Data Not Lognormal at 5% Significance Level											
438												
439	Lognormal Statistics											
440	Minimum of Logged Data				3.912		Mean of logged Data				4.435	

	A	B	C	D	E	F	G	H	I	J	K	L
441	Maximum of Logged Data					7.354	SD of logged Data					1.131
442												
443	Assuming Lognormal Distribution											
444	95% H-UCL				411.9	90% Chebyshev (MVUE) UCL					298.7	
445	95% Chebyshev (MVUE) UCL				366.3	97.5% Chebyshev (MVUE) UCL					460.1	
446	99% Chebyshev (MVUE) UCL				644.3							
447												
448	Nonparametric Distribution Free UCL Statistics											
449	Data do not follow a Discernible Distribution (0.05)											
450												
451	Nonparametric Distribution Free UCLs											
452	95% CLT UCL				409.1	95% Jackknife UCL					423.8	
453	95% Standard Bootstrap UCL				408.5	95% Bootstrap-t UCL					3514	
454	95% Hall's Bootstrap UCL				4208	95% Percentile Bootstrap UCL					427.6	
455	95% BCA Bootstrap UCL				534.7							
456	90% Chebyshev(Mean, Sd) UCL				566.7	95% Chebyshev(Mean, Sd) UCL					724.7	
457	97.5% Chebyshev(Mean, Sd) UCL				944	99% Chebyshev(Mean, Sd) UCL					1375	
458												
459	Suggested UCL to Use											
460	95% Chebyshev (Mean, Sd) UCL				724.7							
461												
462	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
463	Recommendations are based upon data size, data distribution, and skewness.											
464	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
465	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
466												
467												
468	TN											
469												
470	General Statistics											
471	Total Number of Observations				13	Number of Distinct Observations					12	
472						Number of Missing Observations					0	
473	Minimum				120	Mean					1253	
474	Maximum				11033	Median					470	
475	SD				2957	Std. Error of Mean					820.2	
476	Coefficient of Variation				2.36	Skewness					3.528	
477												
478	Normal GOF Test											
479	Shapiro Wilk Test Statistic				0.398	Shapiro Wilk GOF Test						
480	5% Shapiro Wilk Critical Value				0.866	Data Not Normal at 5% Significance Level						
481	Lilliefors Test Statistic				0.428	Lilliefors GOF Test						
482	5% Lilliefors Critical Value				0.234	Data Not Normal at 5% Significance Level						
483	Data Not Normal at 5% Significance Level											
484												
485	Assuming Normal Distribution											
486	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
487	95% Student's-t UCL				2715	95% Adjusted-CLT UCL (Chen-1995)					3460	
488						95% Modified-t UCL (Johnson-1978)					2849	
489												
490	Gamma GOF Test											
491	A-D Test Statistic				1.902	Anderson-Darling Gamma GOF Test						
492	5% A-D Critical Value				0.781	Data Not Gamma Distributed at 5% Significance Level						
493	K-S Test Statistic				0.356	Kolmogorov-Smirnov Gamma GOF Test						
494	5% K-S Critical Value				0.248	Data Not Gamma Distributed at 5% Significance Level						
495	Data Not Gamma Distributed at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
496												
497	Gamma Statistics											
498	k hat (MLE)				0.608		k star (bias corrected MLE)				0.519	
499	Theta hat (MLE)				2062		Theta star (bias corrected MLE)				2416	
500	nu hat (MLE)				15.8		nu star (bias corrected)				13.49	
501	MLE Mean (bias corrected)				1253		MLE Sd (bias corrected)				1740	
502							Approximate Chi Square Value (0.05)				6.223	
503	Adjusted Level of Significance				0.0301		Adjusted Chi Square Value				5.535	
504												
505	Assuming Gamma Distribution											
506	95% Approximate Gamma UCL (use when n>=50))				2717		95% Adjusted Gamma UCL (use when n<50)				3055	
507												
508	Lognormal GOF Test											
509	Shapiro Wilk Test Statistic				0.833		Shapiro Wilk Lognormal GOF Test					
510	5% Shapiro Wilk Critical Value				0.866		Data Not Lognormal at 5% Significance Level					
511	Lilliefors Test Statistic				0.23		Lilliefors Lognormal GOF Test					
512	5% Lilliefors Critical Value				0.234		Data appear Lognormal at 5% Significance Level					
513	Data appear Approximate Lognormal at 5% Significance Level											
514												
515	Lognormal Statistics											
516	Minimum of Logged Data				4.787		Mean of logged Data				6.119	
517	Maximum of Logged Data				9.309		SD of logged Data				1.165	
518												
519	Assuming Lognormal Distribution											
520	95% H-UCL				2573		90% Chebyshev (MVUE) UCL				1705	
521	95% Chebyshev (MVUE) UCL				2103		97.5% Chebyshev (MVUE) UCL				2654	
522	99% Chebyshev (MVUE) UCL				3737							
523												
524	Nonparametric Distribution Free UCL Statistics											
525	Data appear to follow a Discernible Distribution at 5% Significance Level											
526												
527	Nonparametric Distribution Free UCLs											
528	95% CLT UCL				2602		95% Jackknife UCL				2715	
529	95% Standard Bootstrap UCL				2535		95% Bootstrap-t UCL				17011	
530	95% Hall's Bootstrap UCL				9325		95% Percentile Bootstrap UCL				2868	
531	95% BCA Bootstrap UCL				3745							
532	90% Chebyshev(Mean, Sd) UCL				3714		95% Chebyshev(Mean, Sd) UCL				4828	
533	97.5% Chebyshev(Mean, Sd) UCL				6375		99% Chebyshev(Mean, Sd) UCL				9414	
534												
535	Suggested UCL to Use											
536	95% Chebyshev (Mean, Sd) UCL				4828							
537												
538	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
539	Recommendations are based upon data size, data distribution, and skewness.											
540	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
541	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
542												

1	A	B	C	D	E	F	G	H	I	J	K	L
2	UCL Statistics for Uncensored Full Data Sets											
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.116/06/2021 11:55:46 AM								
5	From File			WorkSheet.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	As											
12												
13	General Statistics											
14	Total Number of Observations				13		Number of Distinct Observations				12	
15							Number of Missing Observations				0	
16	Minimum				5.6		Mean				16.81	
17	Maximum				29		Median				18	
18	SD				7.608		Std. Error of Mean				2.11	
19	Coefficient of Variation				0.453		Skewness				0.0236	
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic				0.952		Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value				0.866		Data appear Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.122		Lilliefors GOF Test					
25	5% Lilliefors Critical Value				0.234		Data appear Normal at 5% Significance Level					
26	Data appear Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL				20.57		95% Adjusted-CLT UCL (Chen-1995)				20.29	
31							95% Modified-t UCL (Johnson-1978)				20.57	
32												
33	Gamma GOF Test											
34	A-D Test Statistic				0.398		Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value				0.737		Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.163		Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value				0.238		Detected data appear Gamma Distributed at 5% Significance Level					
38	Detected data appear Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)				4.417		k star (bias corrected MLE)				3.449	
42	Theta hat (MLE)				3.805		Theta star (bias corrected MLE)				4.873	
43	nu hat (MLE)				114.8		nu star (bias corrected)				89.67	
44	MLE Mean (bias corrected)				16.81		MLE Sd (bias corrected)				9.05	
45							Approximate Chi Square Value (0.05)				68.84	
46	Adjusted Level of Significance				0.0301		Adjusted Chi Square Value				66.24	
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))				21.89		95% Adjusted Gamma UCL (use when n<50)				22.75	
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic				0.91		Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk Critical Value				0.866		Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic				0.195		Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value				0.234		Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data				1.723		Mean of logged Data				2.704	
60	Maximum of Logged Data				3.367		SD of logged Data				0.537	
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL				24.13		90% Chebyshev (MVUE) UCL				24.91	
64	95% Chebyshev (MVUE) UCL				28.47		97.5% Chebyshev (MVUE) UCL				33.4	
65	99% Chebyshev (MVUE) UCL				43.1							
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL				20.28		95% Jackknife UCL				20.57	
72	95% Standard Bootstrap UCL				20.19		95% Bootstrap-t UCL				20.75	
73	95% Hall's Bootstrap UCL				20.3		95% Percentile Bootstrap UCL				20.18	
74	95% BCA Bootstrap UCL				19.88							
75	90% Chebyshev(Mean, Sd) UCL				23.14		95% Chebyshev(Mean, Sd) UCL				26	
76	97.5% Chebyshev(Mean, Sd) UCL				29.98		99% Chebyshev(Mean, Sd) UCL				37.8	
77												
78	Suggested UCL to Use											
79	95% Student's-t UCL				20.57							
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												
86												
87	Cu											
88												
89	General Statistics											
90	Total Number of Observations				13		Number of Distinct Observations				8	
91							Number of Missing Observations				0	
92	Minimum				5		Mean				28.12	
93	Maximum				130		Median				7	
94	SD				44.06		Std. Error of Mean				12.22	
95	Coefficient of Variation				1.567		Skewness				1.998	
96												
97	Normal GOF Test											
98	Shapiro Wilk Test Statistic				0.585		Shapiro Wilk GOF Test					
99	5% Shapiro Wilk Critical Value				0.866		Data Not Normal at 5% Significance Level					
100	Lilliefors Test Statistic				0.353		Lilliefors GOF Test					
101	5% Lilliefors Critical Value				0.234		Data Not Normal at 5% Significance Level					
102	Data Not Normal at 5% Significance Level											
103												
104	Assuming Normal Distribution											
105	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
106	95% Student's-t UCL				49.9		95% Adjusted-CLT UCL (Chen-1995)				55.45	
107							95% Modified-t UCL (Johnson-1978)				51.03	
108												
109	Gamma GOF Test											
110	A-D Test Statistic				1.794		Anderson-Darling Gamma GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L	
111	5% A-D Critical Value					0.773	Data Not Gamma Distributed at 5% Significance Level						
112	K-S Test Statistic					0.322	Kolmogorov-Smimov Gamma GOF Test						
113	5% K-S Critical Value					0.246	Data Not Gamma Distributed at 5% Significance Level						
114	Data Not Gamma Distributed at 5% Significance Level												
115													
116	Gamma Statistics												
117	k hat (MLE)					0.713	k star (bias corrected MLE)					0.6	
118	Theta hat (MLE)					39.43	Theta star (bias corrected MLE)					46.88	
119	nu hat (MLE)					18.54	nu star (bias corrected)					15.59	
120	MLE Mean (bias corrected)					28.12	MLE Sd (bias corrected)					36.31	
121							Approximate Chi Square Value (0.05)					7.675	
122	Adjusted Level of Significance					0.0301	Adjusted Chi Square Value					6.898	
123													
124	Assuming Gamma Distribution												
125	95% Approximate Gamma UCL (use when n>=50))					57.12	95% Adjusted Gamma UCL (use when n<50)					63.56	
126													
127	Lognormal GOF Test												
128	Shapiro Wilk Test Statistic					0.746	Shapiro Wilk Lognormal GOF Test						
129	5% Shapiro Wilk Critical Value					0.866	Data Not Lognormal at 5% Significance Level						
130	Lilliefors Test Statistic					0.263	Lilliefors Lognormal GOF Test						
131	5% Lilliefors Critical Value					0.234	Data Not Lognormal at 5% Significance Level						
132	Data Not Lognormal at 5% Significance Level												
133													
134	Lognormal Statistics												
135	Minimum of Logged Data					1.609	Mean of logged Data					2.491	
136	Maximum of Logged Data					4.868	SD of logged Data					1.22	
137													
138	Assuming Lognormal Distribution												
139	95% H-UCL					79.61	90% Chebyshev (MVUE) UCL					49.19	
140	95% Chebyshev (MVUE) UCL					60.93	97.5% Chebyshev (MVUE) UCL					77.23	
141	99% Chebyshev (MVUE) UCL					109.2							
142													
143	Nonparametric Distribution Free UCL Statistics												
144	Data do not follow a Discernible Distribution (0.05)												
145													
146	Nonparametric Distribution Free UCLs												
147	95% CLT UCL					48.22	95% Jackknife UCL					49.9	
148	95% Standard Bootstrap UCL					47.62	95% Bootstrap-t UCL					112.5	
149	95% Hall's Bootstrap UCL					145.9	95% Percentile Bootstrap UCL					48.31	
150	95% BCA Bootstrap UCL					55.86							
151	90% Chebyshev(Mean, Sd) UCL					64.78	95% Chebyshev(Mean, Sd) UCL					81.39	
152	97.5% Chebyshev(Mean, Sd) UCL					104.4	99% Chebyshev(Mean, Sd) UCL					149.7	
153													
154	Suggested UCL to Use												
155	95% Chebyshev (Mean, Sd) UCL					81.39							
156													
157	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
158	Recommendations are based upon data size, data distribution, and skewness.												
159	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
160	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
161													
162													
163	Pb												
164													
165	General Statistics												

	A	B	C	D	E	F	G	H	I	J	K	L
166	Total Number of Observations					13	Number of Distinct Observations					13
167							Number of Missing Observations					0
168	Minimum					5	Mean					122.9
169	Maximum					720	Median					28
170	SD					229.7	Std. Error of Mean					63.71
171	Coefficient of Variation					1.869	Skewness					2.232
172												
173	Normal GOF Test											
174	Shapiro Wilk Test Statistic					0.558	Shapiro Wilk GOF Test					
175	5% Shapiro Wilk Critical Value					0.866	Data Not Normal at 5% Significance Level					
176	Lilliefors Test Statistic					0.384	Lilliefors GOF Test					
177	5% Lilliefors Critical Value					0.234	Data Not Normal at 5% Significance Level					
178	Data Not Normal at 5% Significance Level											
179												
180	Assuming Normal Distribution											
181	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
182	95% Student's-t UCL					236.5	95% Adjusted-CLT UCL (Chen-1995)					269.9
183							95% Modified-t UCL (Johnson-1978)					243
184												
185	Gamma GOF Test											
186	A-D Test Statistic					1.312	Anderson-Darling Gamma GOF Test					
187	5% A-D Critical Value					0.789	Data Not Gamma Distributed at 5% Significance Level					
188	K-S Test Statistic					0.274	Kolmogorov-Smirnov Gamma GOF Test					
189	5% K-S Critical Value					0.25	Data Not Gamma Distributed at 5% Significance Level					
190	Data Not Gamma Distributed at 5% Significance Level											
191												
192	Gamma Statistics											
193	k hat (MLE)					0.514	k star (bias corrected MLE)					0.446
194	Theta hat (MLE)					239.4	Theta star (bias corrected MLE)					275.4
195	nu hat (MLE)					13.35	nu star (bias corrected)					11.6
196	MLE Mean (bias corrected)					122.9	MLE Sd (bias corrected)					184
197							Approximate Chi Square Value (0.05)					4.967
198	Adjusted Level of Significance					0.0301	Adjusted Chi Square Value					4.365
199												
200	Assuming Gamma Distribution											
201	95% Approximate Gamma UCL (use when n>=50))					287.1	95% Adjusted Gamma UCL (use when n<50)					326.8
202												
203	Lognormal GOF Test											
204	Shapiro Wilk Test Statistic					0.904	Shapiro Wilk Lognormal GOF Test					
205	5% Shapiro Wilk Critical Value					0.866	Data appear Lognormal at 5% Significance Level					
206	Lilliefors Test Statistic					0.172	Lilliefors Lognormal GOF Test					
207	5% Lilliefors Critical Value					0.234	Data appear Lognormal at 5% Significance Level					
208	Data appear Lognormal at 5% Significance Level											
209												
210	Lognormal Statistics											
211	Minimum of Logged Data					1.609	Mean of logged Data					3.58
212	Maximum of Logged Data					6.579	SD of logged Data					1.505
213												
214	Assuming Lognormal Distribution											
215	95% H-UCL					578	90% Chebyshev (MVUE) UCL					228.2
216	95% Chebyshev (MVUE) UCL					288.4	97.5% Chebyshev (MVUE) UCL					371.9
217	99% Chebyshev (MVUE) UCL					536						
218												
219	Nonparametric Distribution Free UCL Statistics											
220	Data appear to follow a Discernible Distribution at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
221												
222	Nonparametric Distribution Free UCLs											
223	95% CLT UCL					227.7	95% Jackknife UCL					236.5
224	95% Standard Bootstrap UCL					221	95% Bootstrap-t UCL					906.1
225	95% Hall's Bootstrap UCL					852.5	95% Percentile Bootstrap UCL					229.2
226	95% BCA Bootstrap UCL					268.9						
227	90% Chebyshev(Mean, Sd) UCL					314	95% Chebyshev(Mean, Sd) UCL					400.6
228	97.5% Chebyshev(Mean, Sd) UCL					520.8	99% Chebyshev(Mean, Sd) UCL					756.8
229												
230	Suggested UCL to Use											
231	99% Chebyshev (Mean, Sd) UCL					756.8						
232												
233	Recommended UCL exceeds the maximum observation											
234												
235	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
236	Recommendations are based upon data size, data distribution, and skewness.											
237	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
238	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
239												
240												
241	Ni											
242												
243	General Statistics											
244	Total Number of Observations					13	Number of Distinct Observations					11
245							Number of Missing Observations					0
246	Minimum					5	Mean					20.59
247	Maximum					130	Median					10
248	SD					33.49	Std. Error of Mean					9.288
249	Coefficient of Variation					1.626	Skewness					3.382
250												
251	Normal GOF Test											
252	Shapiro Wilk Test Statistic					0.478	Shapiro Wilk GOF Test					
253	5% Shapiro Wilk Critical Value					0.866	Data Not Normal at 5% Significance Level					
254	Lilliefors Test Statistic					0.383	Lilliefors GOF Test					
255	5% Lilliefors Critical Value					0.234	Data Not Normal at 5% Significance Level					
256	Data Not Normal at 5% Significance Level											
257												
258	Assuming Normal Distribution											
259	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
260	95% Student's-t UCL					37.15	95% Adjusted-CLT UCL (Chen-1995)					45.18
261							95% Modified-t UCL (Johnson-1978)					38.6
262												
263	Gamma GOF Test											
264	A-D Test Statistic					1.284	Anderson-Darling Gamma GOF Test					
265	5% A-D Critical Value					0.757	Data Not Gamma Distributed at 5% Significance Level					
266	K-S Test Statistic					0.237	Kolmogorov-Smirnov Gamma GOF Test					
267	5% K-S Critical Value					0.243	Detected data appear Gamma Distributed at 5% Significance Level					
268	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
269												
270	Gamma Statistics											
271	k hat (MLE)					1.062	k star (bias corrected MLE)					0.868
272	Theta hat (MLE)					19.38	Theta star (bias corrected MLE)					23.71
273	nu hat (MLE)					27.62	nu star (bias corrected)					22.58
274	MLE Mean (bias corrected)					20.59	MLE Sd (bias corrected)					22.1
275						Approximate Chi Square Value (0.05)					12.77	

	A	B	C	D	E	F	G	H	I	J	K	L
276	Adjusted Level of Significance					0.0301	Adjusted Chi Square Value					11.73
277												
278	Assuming Gamma Distribution											
279	95% Approximate Gamma UCL (use when n>=50)					36.4	95% Adjusted Gamma UCL (use when n<50)					39.63
280												
281	Lognormal GOF Test											
282	Shapiro Wilk Test Statistic					0.851	Shapiro Wilk Lognormal GOF Test					
283	5% Shapiro Wilk Critical Value					0.866	Data Not Lognormal at 5% Significance Level					
284	Lilliefors Test Statistic					0.167	Lilliefors Lognormal GOF Test					
285	5% Lilliefors Critical Value					0.234	Data appear Lognormal at 5% Significance Level					
286	Data appear Approximate Lognormal at 5% Significance Level											
287												
288	Lognormal Statistics											
289	Minimum of Logged Data					1.609	Mean of logged Data					2.485
290	Maximum of Logged Data					4.868	SD of logged Data					0.905
291												
292	Assuming Lognormal Distribution											
293	95% H-UCL					36.52	90% Chebyshev (MVUE) UCL					31.33
294	95% Chebyshev (MVUE) UCL					37.66	97.5% Chebyshev (MVUE) UCL					46.44
295	99% Chebyshev (MVUE) UCL					63.7						
296												
297	Nonparametric Distribution Free UCL Statistics											
298	Data appear to follow a Discernible Distribution at 5% Significance Level											
299												
300	Nonparametric Distribution Free UCLs											
301	95% CLT UCL					35.87	95% Jackknife UCL					37.15
302	95% Standard Bootstrap UCL					35.11	95% Bootstrap-t UCL					87.59
303	95% Hall's Bootstrap UCL					92.5	95% Percentile Bootstrap UCL					38.19
304	95% BCA Bootstrap UCL					47.79						
305	90% Chebyshev(Mean, Sd) UCL					48.46	95% Chebyshev(Mean, Sd) UCL					61.08
306	97.5% Chebyshev(Mean, Sd) UCL					78.59	99% Chebyshev(Mean, Sd) UCL					113
307												
308	Suggested UCL to Use											
309	95% Adjusted Gamma UCL					39.63						
310												
311	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
312	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
313												
314	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
315	Recommendations are based upon data size, data distribution, and skewness.											
316	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
317	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
318												
319												
320	Zn											
321												
322	General Statistics											
323	Total Number of Observations					13	Number of Distinct Observations					13
324							Number of Missing Observations					0
325	Minimum					5	Mean					200.3
326	Maximum					1600	Median					27
327	SD					445.8	Std. Error of Mean					123.6
328	Coefficient of Variation					2.226	Skewness					3.043
329												
330	Normal GOF Test											

	A	B	C	D	E	F	G	H	I	J	K	L	
331	Shapiro Wilk Test Statistic					0.491	Shapiro Wilk GOF Test						
332	5% Shapiro Wilk Critical Value					0.866	Data Not Normal at 5% Significance Level						
333	Lilliefors Test Statistic					0.426	Lilliefors GOF Test						
334	5% Lilliefors Critical Value					0.234	Data Not Normal at 5% Significance Level						
335	Data Not Normal at 5% Significance Level												
336													
337	Assuming Normal Distribution												
338	95% Normal UCL						95% UCLs (Adjusted for Skewness)						
339	95% Student's-t UCL					420.6	95% Adjusted-CLT UCL (Chen-1995)					515.2	
340							95% Modified-t UCL (Johnson-1978)					438	
341													
342	Gamma GOF Test												
343	A-D Test Statistic					1.297	Anderson-Darling Gamma GOF Test						
344	5% A-D Critical Value					0.802	Data Not Gamma Distributed at 5% Significance Level						
345	K-S Test Statistic					0.283	Kolmogorov-Smirnov Gamma GOF Test						
346	5% K-S Critical Value					0.252	Data Not Gamma Distributed at 5% Significance Level						
347	Data Not Gamma Distributed at 5% Significance Level												
348													
349	Gamma Statistics												
350	k hat (MLE)					0.44	k star (bias corrected MLE)					0.39	
351	Theta hat (MLE)					455.3	Theta star (bias corrected MLE)					514	
352	nu hat (MLE)					11.44	nu star (bias corrected)					10.13	
353	MLE Mean (bias corrected)					200.3	MLE Sd (bias corrected)					320.8	
354							Approximate Chi Square Value (0.05)					4.025	
355	Adjusted Level of Significance					0.0301	Adjusted Chi Square Value					3.493	
356													
357	Assuming Gamma Distribution												
358	95% Approximate Gamma UCL (use when n>=50))					504.3	95% Adjusted Gamma UCL (use when n<50)					580.9	
359													
360	Lognormal GOF Test												
361	Shapiro Wilk Test Statistic					0.92	Shapiro Wilk Lognormal GOF Test						
362	5% Shapiro Wilk Critical Value					0.866	Data appear Lognormal at 5% Significance Level						
363	Lilliefors Test Statistic					0.203	Lilliefors Lognormal GOF Test						
364	5% Lilliefors Critical Value					0.234	Data appear Lognormal at 5% Significance Level						
365	Data appear Lognormal at 5% Significance Level												
366													
367	Lognormal Statistics												
368	Minimum of Logged Data					1.609	Mean of logged Data					3.827	
369	Maximum of Logged Data					7.378	SD of logged Data					1.632	
370													
371	Assuming Lognormal Distribution												
372	95% H-UCL					1156	90% Chebyshev (MVUE) UCL					360.3	
373	95% Chebyshev (MVUE) UCL					458.5	97.5% Chebyshev (MVUE) UCL					594.9	
374	99% Chebyshev (MVUE) UCL					862.8							
375													
376	Nonparametric Distribution Free UCL Statistics												
377	Data appear to follow a Discernible Distribution at 5% Significance Level												
378													
379	Nonparametric Distribution Free UCLs												
380	95% CLT UCL					403.7	95% Jackknife UCL					420.6	
381	95% Standard Bootstrap UCL					398.4	95% Bootstrap-t UCL					2180	
382	95% Hall's Bootstrap UCL					1413	95% Percentile Bootstrap UCL					407.5	
383	95% BCA Bootstrap UCL					561.8							
384	90% Chebyshev(Mean, Sd) UCL					571.2	95% Chebyshev(Mean, Sd) UCL					739.2	
385	97.5% Chebyshev(Mean, Sd) UCL					972.4	99% Chebyshev(Mean, Sd) UCL					1430	

	A	B	C	D	E	F	G	H	I	J	K	L
386												
387	Suggested UCL to Use											
388	99% Chebyshev (Mean, Sd) UCL					1430						
389												
390	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
391	Recommendations are based upon data size, data distribution, and skewness.											
392	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
393	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
394												
395												
396	BaP											
397												
398	General Statistics											
399	Total Number of Observations					13	Number of Distinct Observations					7
400							Number of Missing Observations					0
401	Minimum					0.5	Mean					1.815
402	Maximum					6.3	Median					0.7
403	SD					1.831	Std. Error of Mean					0.508
404	Coefficient of Variation					1.009	Skewness					1.481
405												
406	Normal GOF Test											
407	Shapiro Wilk Test Statistic					0.768	Shapiro Wilk GOF Test					
408	5% Shapiro Wilk Critical Value					0.866	Data Not Normal at 5% Significance Level					
409	Lilliefors Test Statistic					0.267	Lilliefors GOF Test					
410	5% Lilliefors Critical Value					0.234	Data Not Normal at 5% Significance Level					
411	Data Not Normal at 5% Significance Level											
412												
413	Assuming Normal Distribution											
414	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
415	95% Student's-t UCL					2.721	95% Adjusted-CLT UCL (Chen-1995)					2.874
416							95% Modified-t UCL (Johnson-1978)					2.755
417												
418	Gamma GOF Test											
419	A-D Test Statistic					1.093	Anderson-Darling Gamma GOF Test					
420	5% A-D Critical Value					0.753	Data Not Gamma Distributed at 5% Significance Level					
421	K-S Test Statistic					0.273	Kolmogorov-Smirnov Gamma GOF Test					
422	5% K-S Critical Value					0.242	Data Not Gamma Distributed at 5% Significance Level					
423	Data Not Gamma Distributed at 5% Significance Level											
424												
425	Gamma Statistics											
426	k hat (MLE)					1.278	k star (bias corrected MLE)					1.034
427	Theta hat (MLE)					1.421	Theta star (bias corrected MLE)					1.755
428	nu hat (MLE)					33.22	nu star (bias corrected)					26.89
429	MLE Mean (bias corrected)					1.815	MLE Sd (bias corrected)					1.785
430							Approximate Chi Square Value (0.05)					16.07
431	Adjusted Level of Significance					0.0301	Adjusted Chi Square Value					14.88
432												
433	Assuming Gamma Distribution											
434	95% Approximate Gamma UCL (use when n>=50))					3.038	95% Adjusted Gamma UCL (use when n<50)					3.28
435												
436	Lognormal GOF Test											
437	Shapiro Wilk Test Statistic					0.811	Shapiro Wilk Lognormal GOF Test					
438	5% Shapiro Wilk Critical Value					0.866	Data Not Lognormal at 5% Significance Level					
439	Lilliefors Test Statistic					0.273	Lilliefors Lognormal GOF Test					
440	5% Lilliefors Critical Value					0.234	Data Not Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
441	Data Not Lognormal at 5% Significance Level											
442												
443	Lognormal Statistics											
444	Minimum of Logged Data				-0.693		Mean of logged Data				0.156	
445	Maximum of Logged Data				1.841		SD of logged Data				0.962	
446												
447	Assuming Lognormal Distribution											
448	95% H-UCL				4.019		90% Chebyshev (MVUE) UCL				3.291	
449	95% Chebyshev (MVUE) UCL				3.981		97.5% Chebyshev (MVUE) UCL				4.937	
450	99% Chebyshev (MVUE) UCL				6.816							
451												
452	Nonparametric Distribution Free UCL Statistics											
453	Data do not follow a Discernible Distribution (0.05)											
454												
455	Nonparametric Distribution Free UCLs											
456	95% CLT UCL				2.651		95% Jackknife UCL				2.721	
457	95% Standard Bootstrap UCL				2.633		95% Bootstrap-t UCL				3.248	
458	95% Hall's Bootstrap UCL				2.872		95% Percentile Bootstrap UCL				2.677	
459	95% BCA Bootstrap UCL				2.854							
460	90% Chebyshev(Mean, Sd) UCL				3.339		95% Chebyshev(Mean, Sd) UCL				4.029	
461	97.5% Chebyshev(Mean, Sd) UCL				4.987		99% Chebyshev(Mean, Sd) UCL				6.869	
462												
463	Suggested UCL to Use											
464	95% Chebyshev (Mean, Sd) UCL				4.029							
465												
466	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
467	Recommendations are based upon data size, data distribution, and skewness.											
468	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
469	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
470												
471												
472	BaPTEQ											
473												
474	General Statistics											
475	Total Number of Observations				13		Number of Distinct Observations				7	
476							Number of Missing Observations				0	
477	Minimum				1.2		Mean				2.992	
478	Maximum				9.5		Median				1.4	
479	SD				2.576		Std. Error of Mean				0.715	
480	Coefficient of Variation				0.861		Skewness				1.607	
481												
482	Normal GOF Test											
483	Shapiro Wilk Test Statistic				0.751		Shapiro Wilk GOF Test					
484	5% Shapiro Wilk Critical Value				0.866		Data Not Normal at 5% Significance Level					
485	Lilliefors Test Statistic				0.27		Lilliefors GOF Test					
486	5% Lilliefors Critical Value				0.234		Data Not Normal at 5% Significance Level					
487	Data Not Normal at 5% Significance Level											
488												
489	Assuming Normal Distribution											
490	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
491	95% Student's-t UCL				4.266		95% Adjusted-CLT UCL (Chen-1995)				4.508	
492							95% Modified-t UCL (Johnson-1978)				4.319	
493												
494	Gamma GOF Test											
495	A-D Test Statistic				1.156		Anderson-Darling Gamma GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L	
496	5% A-D Critical Value					0.744	Data Not Gamma Distributed at 5% Significance Level						
497	K-S Test Statistic					0.289	Kolmogorov-Smirnov Gamma GOF Test						
498	5% K-S Critical Value					0.24	Data Not Gamma Distributed at 5% Significance Level						
499	Data Not Gamma Distributed at 5% Significance Level												
500													
501	Gamma Statistics												
502	k hat (MLE)					1.913	k star (bias corrected MLE)					1.522	
503	Theta hat (MLE)					1.565	Theta star (bias corrected MLE)					1.965	
504	nu hat (MLE)					49.73	nu star (bias corrected)					39.58	
505	MLE Mean (bias corrected)					2.992	MLE Sd (bias corrected)					2.425	
506							Approximate Chi Square Value (0.05)					26.17	
507	Adjusted Level of Significance					0.0301	Adjusted Chi Square Value					24.63	
508													
509	Assuming Gamma Distribution												
510	95% Approximate Gamma UCL (use when n>=50))					4.526	95% Adjusted Gamma UCL (use when n<50)					4.81	
511													
512	Lognormal GOF Test												
513	Shapiro Wilk Test Statistic					0.807	Shapiro Wilk Lognormal GOF Test						
514	5% Shapiro Wilk Critical Value					0.866	Data Not Lognormal at 5% Significance Level						
515	Lilliefors Test Statistic					0.275	Lilliefors Lognormal GOF Test						
516	5% Lilliefors Critical Value					0.234	Data Not Lognormal at 5% Significance Level						
517	Data Not Lognormal at 5% Significance Level												
518													
519	Lognormal Statistics												
520	Minimum of Logged Data					0.182	Mean of logged Data					0.812	
521	Maximum of Logged Data					2.251	SD of logged Data					0.75	
522													
523	Assuming Lognormal Distribution												
524	95% H-UCL					5.071	90% Chebyshev (MVUE) UCL					4.819	
525	95% Chebyshev (MVUE) UCL					5.684	97.5% Chebyshev (MVUE) UCL					6.885	
526	99% Chebyshev (MVUE) UCL					9.244							
527													
528	Nonparametric Distribution Free UCL Statistics												
529	Data do not follow a Discernible Distribution (0.05)												
530													
531	Nonparametric Distribution Free UCLs												
532	95% CLT UCL					4.168	95% Jackknife UCL					4.266	
533	95% Standard Bootstrap UCL					4.119	95% Bootstrap-t UCL					5.017	
534	95% Hall's Bootstrap UCL					4.572	95% Percentile Bootstrap UCL					4.185	
535	95% BCA Bootstrap UCL					4.408							
536	90% Chebyshev(Mean, Sd) UCL					5.136	95% Chebyshev(Mean, Sd) UCL					6.107	
537	97.5% Chebyshev(Mean, Sd) UCL					7.455	99% Chebyshev(Mean, Sd) UCL					10.1	
538													
539	Suggested UCL to Use												
540	95% Chebyshev (Mean, Sd) UCL					6.107							
541													
542	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
543	Recommendations are based upon data size, data distribution, and skewness.												
544	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
545	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
546													

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.116/06/2021 12:12:22 PM								
5	From File			WorkSheet.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	As											
12												
13	General Statistics											
14	Total Number of Observations				17		Number of Distinct Observations				16	
15							Number of Missing Observations				0	
16	Minimum				2.5		Mean				103.6	
17	Maximum				440		Median				24	
18	SD				153		Std. Error of Mean				37.11	
19	Coefficient of Variation				1.477		Skewness				1.568	
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic				0.678		Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value				0.892		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.313		Lilliefors GOF Test					
25	5% Lilliefors Critical Value				0.207		Data Not Normal at 5% Significance Level					
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
30	95% Student's-t UCL				168.4		95% Adjusted-CLT UCL (Chen-1995)				179.7	
31							95% Modified-t UCL (Johnson-1978)				170.8	
32												
33	Gamma GOF Test											
34	A-D Test Statistic				0.951		Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value				0.794		Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.208		Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value				0.22		Detected data appear Gamma Distributed at 5% Significance Level					
38	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)				0.54		k star (bias corrected MLE)				0.484	
42	Theta hat (MLE)				191.9		Theta star (bias corrected MLE)				214.2	
43	nu hat (MLE)				18.36		nu star (bias corrected)				16.45	
44	MLE Mean (bias corrected)				103.6		MLE Sd (bias corrected)				149	
45						Approximate Chi Square Value (0.05)					8.28	
46	Adjusted Level of Significance				0.0346		Adjusted Chi Square Value				7.678	
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50)				205.8		95% Adjusted Gamma UCL (use when n<50)				222	
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic				0.926		Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk Critical Value				0.892		Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic				0.154		Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value				0.207		Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data				0.916		Mean of logged Data				3.478	
60	Maximum of Logged Data				6.087		SD of logged Data				1.639	
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL				572.3		90% Chebyshev (MVUE) UCL				255.3	
64	95% Chebyshev (MVUE) UCL				322.8		97.5% Chebyshev (MVUE) UCL				416.4	
65	99% Chebyshev (MVUE) UCL				600.5							
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL				164.7		95% Jackknife UCL				168.4	
72	95% Standard Bootstrap UCL				162.6		95% Bootstrap-t UCL				190.8	
73	95% Hall's Bootstrap UCL				162.8		95% Percentile Bootstrap UCL				166.9	
74	95% BCA Bootstrap UCL				175.5							
75	90% Chebyshev(Mean, Sd) UCL				215		95% Chebyshev(Mean, Sd) UCL				265.4	
76	97.5% Chebyshev(Mean, Sd) UCL				335.4		99% Chebyshev(Mean, Sd) UCL				472.9	
77												
78	Suggested UCL to Use											
79	95% Adjusted Gamma UCL				222							
80												
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
83												
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
85	Recommendations are based upon data size, data distribution, and skewness.											
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
88												
89												
90	BaP											
91												
92	General Statistics											
93	Total Number of Observations				15		Number of Distinct Observations				4	
94							Number of Missing Observations				0	
95	Minimum				0.5		Mean				0.633	
96	Maximum				1.7		Median				0.5	
97	SD				0.333		Std. Error of Mean				0.086	
98	Coefficient of Variation				0.526		Skewness				2.875	
99												
100	Normal GOF Test											
101	Shapiro Wilk Test Statistic				0.476		Shapiro Wilk GOF Test					
102	5% Shapiro Wilk Critical Value				0.881		Data Not Normal at 5% Significance Level					
103	Lilliefors Test Statistic				0.407		Lilliefors GOF Test					
104	5% Lilliefors Critical Value				0.22		Data Not Normal at 5% Significance Level					
105	Data Not Normal at 5% Significance Level											
106												
107	Assuming Normal Distribution											
108	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
109	95% Student's-t UCL				0.785		95% Adjusted-CLT UCL (Chen-1995)				0.843	
110							95% Modified-t UCL (Johnson-1978)				0.795	

A	B	C	D	E	F	G	H	I	J	K	L	
111												
112	Gamma GOF Test											
113	A-D Test Statistic				3.498	Anderson-Darling Gamma GOF Test						
114	5% A-D Critical Value				0.738	Data Not Gamma Distributed at 5% Significance Level						
115	K-S Test Statistic				0.407	Kolmogorov-Smirnov Gamma GOF Test						
116	5% K-S Critical Value				0.222	Data Not Gamma Distributed at 5% Significance Level						
117	Data Not Gamma Distributed at 5% Significance Level											
118												
119	Gamma Statistics											
120	k hat (MLE)				6.578	k star (bias corrected MLE)				5.307		
121	Theta hat (MLE)				0.0963	Theta star (bias corrected MLE)				0.119		
122	nu hat (MLE)				197.3	nu star (bias corrected)				159.2		
123	MLE Mean (bias corrected)				0.633	MLE Sd (bias corrected)				0.275		
124						Approximate Chi Square Value (0.05)				131		
125	Adjusted Level of Significance				0.0324	Adjusted Chi Square Value				127.9		
126												
127	Assuming Gamma Distribution											
128	95% Approximate Gamma UCL (use when n>=50))				0.769	95% Adjusted Gamma UCL (use when n<50)				0.788		
129												
130	Lognormal GOF Test											
131	Shapiro Wilk Test Statistic				0.521	Shapiro Wilk Lognormal GOF Test						
132	5% Shapiro Wilk Critical Value				0.881	Data Not Lognormal at 5% Significance Level						
133	Lilliefors Test Statistic				0.404	Lilliefors Lognormal GOF Test						
134	5% Lilliefors Critical Value				0.22	Data Not Lognormal at 5% Significance Level						
135	Data Not Lognormal at 5% Significance Level											
136												
137	Lognormal Statistics											
138	Minimum of Logged Data				-0.693	Mean of logged Data				-0.535		
139	Maximum of Logged Data				0.531	SD of logged Data				0.359		
140												
141	Assuming Lognormal Distribution											
142	95% H-UCL				0.752	90% Chebyshev (MVUE) UCL				0.798		
143	95% Chebyshev (MVUE) UCL				0.878	97.5% Chebyshev (MVUE) UCL				0.989		
144	99% Chebyshev (MVUE) UCL				1.206							
145												
146	Nonparametric Distribution Free UCL Statistics											
147	Data do not follow a Discernible Distribution (0.05)											
148												
149	Nonparametric Distribution Free UCLs											
150	95% CLT UCL				0.775	95% Jackknife UCL				0.785		
151	95% Standard Bootstrap UCL				N/A	95% Bootstrap-t UCL				N/A		
152	95% Hall's Bootstrap UCL				N/A	95% Percentile Bootstrap UCL				N/A		
153	95% BCA Bootstrap UCL				N/A							
154	90% Chebyshev(Mean, Sd) UCL				0.891	95% Chebyshev(Mean, Sd) UCL				1.008		
155	97.5% Chebyshev(Mean, Sd) UCL				1.17	99% Chebyshev(Mean, Sd) UCL				1.489		
156												
157	Suggested UCL to Use											
158	95% Student's-t UCL				0.785	or 95% Modified-t UCL				0.795		
159												
160	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
161	Recommendations are based upon data size, data distribution, and skewness.											
162	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
163	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
164												