Appendix H – Contamination Assessment



Hunter Water Corporation

Belmont Drought Response Desalination Plant Contamination Assessment Report

November 2019

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List of abbreviations

Abbreviation	Definition		
ANZECC	Australian and New Zealand Environmental Conservation Council		
ACM	Asbestos Containing Material		
ALS	Australian Laboratory Services		
ASS	Acid Sulfate Soil		
bgl	below ground level		
BaP	Benzo(a)pyrene		
BTEXN	Benzene, Toluene, Ethyl benzene, Xylenes, Naphthalene		
CLM Act	Contaminated Land Management Act 1997(incorporating amendments made by the Contaminated Land Management Amendment Act 2003)		
CSMP	Contaminated Soils Management Plan		
NSW DEC	Former Department of Environment and Conservation. The DEC was formed on 1 July 2006 from the amalgamation of the Department of Environment and the Department of Conservation and Land Management.		
NSW DECCW	Former Department of Environment, Climate Change and Water (incorporating the NSW EPA). A new agency formed on 27 April 2007, from the former DEC		
DLWC	Department of Land and Water Conservation		
EIA	Environmental Impact Assessment		
EIL	Ecological Investigation Level		
ESL	Ecological Screening Level		
NSW EPA	NSW Environment Protection Authority		
На	Hectare		
HIL	Health Investigation Level (relating to defined land use scenario)		
HSL	Health Screening Level		
ID	Identification		
LOR	Limit of Reporting		
m bgl	Metres below ground level		
mg/kg	milligrams per kilogram (generally equivalent to parts per million)		
mg/L	Milligrams per litre		
NATA	National Association of Testing Authorities of Australia		
ND	not detected (above laboratory LOR)		
NEPC	National Environment Protection Council		
NEPM	National Environment Protection (Assessment of Site Contamination) Measure		
OCP	Organochlorine Pesticide		
OEH	Office of Environment and Heritage		
PACM	Potential Asbestos Containing Material		
PAH	Polycyclic Aromatic Hydrocarbon		
PCB	Polychlorinated Biphenyl		
PID	Photo-Ionisation Detector		
QA	Quality Assurance		
QC	Quality Control		
RPD	Relative Percent Difference		
SOP	Standard Operating Procedure		
TEQ	Toxic Equivalency		
TOC	Top of Casing		
TPH	Total Petroleum Hydrocarbons		
TRH	Total Recoverable Hydrocarbons		

1. Introduction

This Contamination Assessment report presents the results of the contamination investigation for Hunter Water Corporation's (Hunter Water) proposed drought response desalination plant (also referred to as the temporary desalination plant) and associated water connection routes at Belmont, NSW.

1.1 Project background

Plans for the temporary desalination plant include:

- Seawater intakes The central intake structures would be a concrete structure (referred to as a caisson) of approximately nine to 11 metres diameter, installed to a depth up to 20 m below existing surface levels. The intake structures will be finished above the existing surface (0.5 m to 1 m) to prevent being covered by dune sands over time. The raw feed water (seawater) input is proposed to be extracted from a sub-surface saline aquifer. This would be extracted by intake pipes located approximately eight to 15 m below ground level radiating out from the central structure. Pipelines and pumps are required to transfer the seawater to the desalination plant.
- Water treatment process plant The water treatment process plant would comprise a range of equipment potentially in containerised form. Services to and from the process equipment (e.g. power, communications, and raw feed water (seawater)) would comprise a mix of buried and overhead methods. The general components of the water treatment process would comprise:
 - Pre-treatment: a pre-treatment system is required to remove micro-organisms, sediment, and organic material from the seawater.
 - Desalination: a reverse osmosis (RO) desalination system made up of pressurising pumps and membranes. These would be comprised of modular components. In addition, a number of tanks and internal pipework would be required.
- *Post treatment:* desalinated water would be treated to drinking water standards and stored prior to pumping to the potable water supply network.
- **Pipelines** treated potable water will be delivered to the existing water reticulation system. This will involve trenched pipelines with some trenchless sections at roads or other sensitive areas.
- **Power supply** Power requirements of the plant would be met by a minor upgrade to the existing power supply network in the vicinity of Hudson and Marriot Streets. A power line extension from the existing line along Ocean Park Road into a new substation within the proposed drought response desalination plant would also be required.
- Brine disposal system The desalination process would produce around 28 ML/day of wastewater, comprising predominantly brine, as well as a small amount of pre-treatment and RO membrane cleaning waste. The waste brine from the desalination process would be transferred via a pipeline to the existing nearby Belmont WWTW for disposal via the existing ocean outfall pipe.

1.2 Purpose and scope of this assessment

This report comprises the Contamination Assessment, which has been prepared to inform the Environmental Impact Assessment (EIA) with regard to the potential contamination issues within the study area and recommendations for management and/or remediation measures to be

implemented during construction. The Contamination Assessment study area is shown on Figure 1, Appendix A.

The scope of work for Contamination Assessment included the following:

- Site history review including review of any available existing information including previous soil and groundwater assessment reports, former military uses etc.
- Review of geology, hydrology and topography information for the proposal area.
- Review of NSW Environmental Protection Authority (EPA) record of notices and sites notified to the EPA under the Contaminated Land Management Act 1997 (CLM Act) and Protection of the Environment Operations (POEO) Environmental Protection Licence (EPL) Register.
- Review of the NSW Office of Water Groundwater database on groundwater information for the area.
- A general inspection of the proposal area to identify areas of potential contamination concern.

- Collection of targeted soil samples from boreholes and test pits completed as part of the geotechnical investigations from the following areas:
 - Desalination Plant and Intake Six test pit locations (TP101 to TP106) and five borehole locations (BH101 to BH104 and BH108)
 - Water connections Ten borehole locations (BH301 to BH306 and BHA301 to BHA304)
- Laboratory analysis of selected soil samples from each location for total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCP), polychlorinated biphenyl (PCB), heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn and Hg), pH, cation exchange capacity (CEC) and asbestos.
- Preparation of this report with reference to the Guidelines for Consultants Reporting on Contaminated Proposal sites (OEH 2011) detailing the results of the investigations.

1.3 Limitations

Historical land titles and Council information (Section 10.7 certificates or register of development or building applications) were not reviewed as part of the desktop study. This contamination assessment was limited to soils only. Soil sampling locations were limited to the locations selected as part of the geotechnical investigation. Acid sulfate soils (ASS) were not completed as part of this contamination assessment. The ASS testing results and management options have been reported in the GHD Geotechnical Investigation Report (GHD 2018: Belmont Temporary Desalination Design. Geotechnical Investigation Report November 2018). Groundwater investigations were not completed as part of this assessment. Groundwater monitoring is currently being completed. The groundwater assessment is provided in a separate groundwater assessment report.

2. Site description

The Contamination Assessment study area is shown on Figure 1, Appendix A.

2.1 Proposed desalination plant area

The proposed drought response desalination plant lies directly to the south of the existing Belmont WWTW and within the vicinity of two disused WWTW settlement ponds.

The Pacific Ocean is located approximately 250 m to the east and Belmont Lagoon is located approximately 350 m to the west of the proposed plant.

Development in the area comprises Ocean Park Road, an unnamed access road, the Belmont WWTW and associated infrastructure and a 33 kV Ausgrid power transmission line.

Vegetation across the proposed plant area comprised Bitou bush, exotic grasses and native vegetation. Minor wetland/swamp type vegetation exists in the centre of the more western disused settlement pond.

Topographically the proposed plant lies in a relatively low lying flat area. The surface has been modified to form the embankments for the disused settlement ponds, which vary in height and are estimated to be in the order of 1.5 m - 3.0 m. To the north the Belmont WWTW lies on top of a low rise and to the east are undulating sand dunes.

2.2 Proposed water connection route

To the south of the proposed desalination plant site, the planned water connection route runs alongside Ocean Park Road to McEwan Street, South Belmont. To the north of the proposed desalination plant site, the water connection route follows an existing fire trail for approximately 4 km until the intersection of the fire trail with Kalaroo Road, Jewells. The water connection route then runs through Jewells following Wommara Avenue and Fencott Drive to the Pacific Highway.

Development in the area comprises multiple roads, the unsealed fire trail, the Fernleigh track, the Belmont WWTW, several sewer mains connecting to the WWTW and at the southern and northern extremities of the routes, residential properties.

Vegetation at the time of investigation comprised Bitou bush, exotic grasses and native vegetation including mature trees.

Topographically the area comprises:

- South of the WWTW low lying and relatively flat/swampy area.
- North of the WWTW (fire trail) relatively low lying area with undulating sand dunes to the east and swamp to the west of the proposed route.
- North of the WWTW (Jewells) An undulating area from Kalaroo Road to the intersection of Ntaba Road and Dalrymple Street. Relatively steep upwards slope from the intersection of Ntaba road and the Pacific Highway.

It is noted that the intersection of Ntaba Road and Dalrymple Street lies in the vicinity of a two (2) drainage channels/creeks which connect to Crockers Creek to the east. Both channels pass under Ntaba Road in culverts. The southern culvert was noted to have standing water present at the outflow.

3. Desktop investigation

The following section provides an overview of the environmental setting of the proposal area obtained from publically available information and review of the GHD Geotechnical Investigation Report (GHD 2018: Belmont Temporary Desalination Design. Geotechnical Investigation Report November 2018). The following maps and data sources were reviewed as part of the desk top study:

- Newcastle 1:100,000 scale Coalfields Regional Geology, Geological Series Sheets 9231 and part of 9131, 9132 and 9232, Edition 1. Department of Mineral Resources, NSW
- Gosford Lake Macquarie Special 1:100,000 Geological Sheet 9131 and part 9231. Geological Survey of New South Wales
- 1:25,000 scale Belmont Swansea inset of the Newcastle Hunter Area Coastal Quaternary Geology. Geological Survey of New South Wales
- Soil Landscapes of Gosford Lake Macquarie Special 1:100,000 Sheet 9131 and part 9231. Department of Land and Water Conservation, NSW
- Acid Sulfate Soil Risk Map for Swansea. Department of Natural Resources, NSW
- Groundwater well database. Department of Primary Industries, WaterNSW
- Geoscientific Data Warehouse, Geological Survey of New South Wales

3.1 Soils and geology

Reference to the Newcastle 1:100,000 scale Coalfields Regional Geology, Geological Series Sheets 9231 and part of 9131, 9132 and 9232, Edition 1. Department of Mineral Resources, NSW and the both the regional geological and coastal Quaternary geology maps indicates:

- Medium to fine grained dune and marine sand, disturbed by fill and excavation works related to the construction of the Belmont WWTW underlying the desalination plant site. This unit is disturbed by Defence activities along the water connection alignment adjacent to the Fernleigh Track and south of Kalaroo Road.
- The geology transitions to residual soils overlying weathered sandstone, conglomerate, siltstone, coal and tuff rock of the Boolaroo and Adamstown Subgroups of the Newcastle Coal Measures along the water connection alignment to the west of Kalaroo Road.

Reference to the soil landscape map identified:

• Tuggerah (tg) landscape occurs at the proposed desalination site and along the water connection alignment north of the WWTW to Kalaroo Road and comprises gently undulating to rolling coastal dune fields. Local relief is up to 20 m and slope gradients are in the range of 5% to 45%. Soils include loose sands and are covered with heathland vegetation. Possible limitations include wind erosion hazard, high permeability soils, localized flooding, high water table, strongly acid soil in places and the landscape coincides with a mine subsidence district.

- Warners Bay (wa) landscape occurs in the northern section of the water connection route (west of Kalaroo Road), associated with areas underlain by the Newcastle Coal Measures. This landscape comprises undulating low hills, with localised steep areas, underlain by fine grained moderately deep soils. Expected limitations include moderate to high shrink swell and dispersive soils, and mine subsidence.
- Belmont Swamp (bs) landscape occurs west of the proposed desalination site around Belmont Lagoon and comprises level to very gently undulating coastal swamps including shallow lakes and very shallow water tables. Dominant soil materials consist of organic topsoils underlain by saturated fine to coarse grained sands.
- Woy Woy (ww) landscape occurs adjacent to Pacific Highway and has similar characteristics to Warners Bay landscape. Local relief varies from 5 m to 20 m with slopes also varying between soil landscapes between 5% and 45%. Soils comprise loose shelly beach sands. Limitations include periodic waterlogging in depressions, permanently high water tables and mine subsidence districts.

3.2 Acid sulfate soils

Reference to the risk maps indicate the project is located in a severe ASS risk area with the exception of the beach area east of the proposed temporary desalination plant site and the portion of the water connection alignment west of Kalaroo Road. These areas are mapped as having a low probability and 'no known occurrence' ASS risk respectively.

Further assessment of ASS was completed during the concurrent geotechnical investigation. The ASS testing results and management options have been reported in the GHD Geotechnical Investigation Report (GHD 2018).

3.3 Hydrogeology

An examination of the online WaterNSW register identified 23 registered groundwater bores within 2 km of the site (https://realtimedata.waternsw.com.au/).

Review of the Australian Groundwater Explorer (BoM, 2018) identified 41 bores within 2 km of the site, only 17 were listed as functional. For the functional wells, water uses were recorded as irrigation supply and unknown purposes. Bore depths are no greater than 7 m below ground level. Groundwater on site would be expected to vary between 1 m and 6 m below ground level (bgl).

Based on GHD understanding of the environmental setting of the site, regional groundwater is expected to flow to the east towards the Pacific Ocean.

Based on the bore usage information reviewed as part of the groundwater bore search, it is possible that groundwater within the area could be used for either drinking water, recreational or irrigation purposes.

An ongoing groundwater assessment for the purposes of environmental monitoring and establishing baseline characterisation of the groundwater regime at the site is currently being undertaken. Seven monthly monitoring rounds (September 2018 to March 2019) and one rain event monitoring round (November 2018) were completed from eight wells (GW101 - GW108).

Groundwater samples are analysed for heavy metals, TRH, BTEXN, PAHs, a nutrient suite, biological contaminants (Faecal Coliforms, Total Coliforms, E. Coli and Enterococci) and volatile organic compounds (VOC). The results and conclusions are reported in a separate groundwater report.

3.4 Mining

3.4.1 Coal mining

The Lake Macquarie Mine Subsidence District is located north of Belmont Swamp and west of the Fernleigh Track, including the residential areas of Belmont North, where the northern approximately 1.4 km of the water connection is proposed.

An initial review of coal exploration boreholes and mine working extents based on publicly available data only has been undertaken to identify shallow mine workings. Mine workings from the John Darling Colliery within the Borehole Seam and/or the Victoria Tunnel Seam of the Lambton Subgroup were identified. These workings were identified to extend beneath the proposed drought response desalination plant site and water connection alignments at a depth of 130 m or greater below the existing ground surface.

Mining is understood to have been completed in the late 1980's and no current mining was identified below the project site.

3.4.2 Sand mining

Sand mining for rutile, zircon, monazite and ilmenite was conducted in the hind dunes to the north of the Hunter Water WWTW. Mining occurred between the 1950's and 1967. Approximately 3% of the sites sand was removed during this process (Andrews Neil Pty Ltd, 2010). Extraction of sand for the construction industry commenced in the mid 1970s and continued until BHP vacated the site and large quantities of sand were removed from the site during this period. A number of abandoned quarry pits are reported to remain across the site (Andrews Neil Pty Ltd, 2010).

The sand mining process can lead to the concentration of naturally occurring radioactive fractions within the sand. In 1991, at the Jewells Crossing processing site, adjacent to the Kalaroo Road entrance, a concentration of peak radiation levels were found to exceed the National Health and Medical Research Council (NH&MRC) Action Level Criteria for dwellings, schools (including playgrounds), businesses, factories where occupancies by the same individuals occur regularly on a day to day basis (Andrews Neil Pty Ltd, 2010). Approximately 25,000 tonnes of residues were removed from this area and the area was considered by the Department of Health to be suitable for preparation as a recreational area or for other purposes where occupancy would be intermittent (Andrews Neil Pty Ltd, 2010).

3.5 UXO Desktop Assessment

G-Tek Australia (G-Tek) competed an unexploded ordnance (UXO) desktop review and risk assessment of proposed test locations throughout the project area (G-Tek 2018. UXO Desktop Assessment Report. Pipeline Works, Belmont NSW. G-Tek Australia Pty Ltd. 18019GHDA v1.01. 4 August 2018).

During WWII the coastal area immediately east of Belmont was used as a field firing range and training area by Newcastle garrison units. It is understood that the area was used by units which travelled to the area by train to Jewells Siding and then conducted firing practices and training at Tucks Track within Nine Mile Beach. A Review of the Department of Defence (Defence) UXO website indicates that DCS Site No 132 has been identified as Nine Mile Beach, with alternate names of Red Head, Tucks Track and Jewells Siding and has been classified with an UXO Potential of <u>Slight</u>. Areas categorised as slight will have a confirmed history of military activities that have resulted in residual UXO but which Defence considers it inappropriate to assess as substantial. All land usage and development, within these areas, may continue without further UXO investigation or remediation (www.defence.gov.au). The UXO areas with a potential for slight are presented on Figure 1, Appendix A.

A further review of the Defence UXO site indicates that the Belmont WWTW, while on Cadastre that extends into the Nine Mile Beach Site, is not included within an area with potential for UXO. Further, borehole sites BH303 and BH304 within the Jewells area are outside the Nine Mile Beach Site and are not included within an area with potential for UXO.

BH301 and BH302 are on the boundary of the Nine Mile Beach Site and would appear to be just within the site with a "Slight" potential for remnant UXO. BH305 and BH306 are within the Nine Mile Beach Site with a "Slight" potential for remnant UXO. These four locations are along the proposed north eastern water main connection. Based on this desktop assessment, G-Tek recommended that required intrusive testing works at all indicated sites be conducted without further UXO investigation or safeguarding.

With regards to the wider Project, based on the GTEK report only the water main connection to the north of the WWTW is located either on the boundary or just within the Nine Mile Beach Site, where there is a "slight" potential for remnant UXO. Although the Defence website states that no further UXO investigation or remediation is required for these areas, it is recommended that an UXO assessment is completed on the confirmed pipeline route by the contractor prior to construction.

3.6 Previous investigation reports

A number of previous investigations have been conducted within and surrounding the area. The following reports were reviewed as part of this assessment:

- RCA, 2002, Upgrade of Belmont WWTW, Document Reference 566b-033/0
- SKM, 2012, Spoil Investigation Report, Document Reference EN03103-N-CL-RP-0002
- AECOM, 2017a, Temporary Desalination Project Readiness Activities Stage 1 Belmont Conceptual Hydrogeological Model, Document Reference 60515293_Belmont CSM RPT_Rev 1
- AECOM, 2017b, Phase 1 Site Contamination Review. Potential Temporary Desalination Site, Belmont. Document reference 60515293. Rev B
- AECOM, 2017c, Preliminary Environmental Assessment, Lower Hunter Water Plan: Temporary Desalination Project. Document Reference 60281456. Rev 0

3.6.1 RCA 2002

The RCA investigation comprised the drilling of three boreholes to depths of approximately 8 m including the installation of groundwater piezometers. The report includes a summary of results from a previous RCA investigation performed in 1999 that comprised two boreholes drilled to a depth of up to 6 m and a J&K (1994) geotechnical investigation that included four boreholes of unknown depth.

The results of the investigations indicated the site is underlain by:

- Fill, generally comprising sand with variable quantities of gravel to depths of up to 4.7 m; overlying
- Natural sand, fine to medium grained, medium dense or better, to greater than 8 m depth

Groundwater was encountered in the boreholes at depths ranging from 4.3 m to 5.6 m, approximately 0.5 m AHD.

Laboratory testing indicated the sands were not actual or potential ASS. No contamination testing was undertaken.

3.6.2 SKM 2012

The SKM investigation comprised test pitting, sampling and laboratory analysis to assess the contaminants present in deposited fill materials and the disused settlement ponds adjacent to Belmont WWTW and was undertaken by SKM for Hunter Water Corporation in 2011.

The investigation comprised excavation of 18 test pits, four grab samples and drilling of four boreholes (to facilitate construction of groundwater monitoring wells) to depths ranging 0.2 m to 5 m in the vicinity of the proposed desalination plant.

The WWTW investigation area consisted of undulating sand dunes. To the south of the WWTW site, two decommissioned sludge ponds were dry with a layer of sediment located on the surface of the western pond. Spoil material, approximately 60 m x 80 m x 2 m in extent was deposited along the southern boundary of the sludge ponds. Sampling was based on a 25 m x 25 m grid spacing over the fill placement areas.

Results of the investigation indicated the site is underlain by:

- Fill, generally comprising sand with variable quantities of gravel and concrete with some brick fragments, terracotta pipes and bitumen/asphalt to depths of up to 2.4 m; overlying.
- Sand, generally fine to medium grained, generally medium dense or better, for the remainder of the boreholes.

Results were assessed against the former NEPM 1999 guidelines for commercial/industrial land use (HIL F). Results were reported above the HIL F for benzo(a)pyrene in SP10.1 and SP20.1. Comparison of the concentrations against the current NEPM 2013 guidelines reported concentrations below the commercial/industrial assessment criteria. It was noted that the elevated benzo(a)pyrene in these materials may be attributed asphalt in the fill materials sampled. No asbestos was identified in any sample submitted for analysis.

Two sediment samples collected from the sludge ponds reported elevated ammonia and total nitrogen above the laboratory limit of reporting (LOR). Two samples collected from the sludge ponds were analysed for E Coli, Faecal and Total Coliforms with all samples reporting results below the LOR with the exception of total coliforms in SED 2 which recorded a concentration equal to the LOR.

Based on the results, SKM concluded the risks posed to human health and the environment by the deposited fill material was low. Sediment samples collected from the sludge ponds indicate that the western most pond contains elevated concentrations of phosphorous, ammonia and nitrogen. This sample was collected from dry sludge. Microbial results indicate that minimal coliforms are present in the ponds.

Four groundwater monitoring bores were installed during the investigations and groundwater levels were noted to be in the range of 1.025 m to 2.68 m below the top of the cap. It is noted that no information was available with regards to the height of the well cap above ground.

All groundwater analytical results were reported less than the adopted assessment criteria with the exception of:

- Copper (MW3 and MW4) marginally above the ANZECC 2000 guidelines but below the NEPM 1999 and considered unlikely to warrant further investigation.
- Nickel (MW1) MW1 was considered up gradient and indicative of a background monitoring point. It was considered that nickel may be elevated at background levels.
- Zinc (MW2) marginally above the ANZECC 2000 guidelines but below the NEPM 1999 and considered unlikely to warrant further investigation.

- Ammonia (MW2) Ammonia concentrations in MW2 were five times greater than the ANZECC 2000 guidelines. It was concluded that the source of ammonia was possibly from waste on the adjoining council land.
- Nitrogen at all locations all wells showed elevated levels of total nitrogen indicating background levels may be elevated in the area.
- Phosphorous Concentrations of phosphorous were elevated in all wells with concentration at MW4 more than three times greater than MW1 which may indicate a correlation with elevated phosphorous levels observed in the sediment sample (SED 1) collected from the up-gradient sludge ponds.
- TPH Concentrations were above the LOR but below the adopted assessment criteria for TPH C₁₀-C₃₆ in MW3. It was considered that the TPH was originated from the fill material on site.

3.6.3 AECOM 2017a

This report presents an interpreted hydrogeology model of the site, comprising an unconfined aquifer within the Quaternary aged sands, which confines the underlying aquifer within the Permian aged sandstone (bedrock).

The report finds the water table lies within the sand unit at approximately 4 m below ground level (mbgl). Groundwater flow is expected to be to the east, the degree of which is currently unknown. Localised westward flow may occur proximal to connected surface waters such as Belmont Lagoon. The thickness of the aquifer ranges 15 m to 40 m, however, is expected to thin significantly towards the coast.

3.6.4 AECOM 2017b

This report outlines the findings of Phase 1 Environmental Site Assessment (ESA) for the proposed location of the temporary desalination plant to be located within the boundary of the Belmont WWTW. Key information obtained by AECOM from the review of available historical information and the site inspection is as follows:

- The neighbouring operational WWTW has reported concentrations of nutrients and heavy metals above adopted groundwater criteria and concentrations of microbiological analysis above the LOR which may present potential contamination links to the site (SKM, 2012).
- Filling and waste material stockpiles adjacent to the site as shown on the 2004 aerial photograph (and confirmed during the inspection) may present potential sources of contamination.
- The land has been identified to contain potential Unexploded Ordinance (UXO) Contamination, originating from a field firing range for infantry indirect fire, grenades, explosive charges and artillery which may impact the site.
- Potential filling was evident on and surrounding the site.
- Potential historical infrastructure associated with pipework connections to the old sludge ponds are reported to exist beneath the site.
- Hunter Water maintenance construction compound was located to the west of the site and was established in 2006. During the inspection this area had large stockpiles of spoil labelled as contaminated waste and waste with tar. The surface of the compound appeared to be unsealed compacted gravel, no fuel or chemical storage or infrastructure was observed in this area.

Overall, AECOM considered that there was a moderate risk of potential contamination associated with the site that may present an unacceptable risk to human health and/or the environment. Following the above conclusion, AECOM recommended the following:

- A UXO survey of the site.
- A more detailed contamination assessment of the site with the main objective being assessing the potential contamination status of soil and groundwater and identifying the need for remediation or management measures to mitigate unacceptable contamination risks to make the site suitable for the proposed construction and use of the temporary desalination plant.

3.6.5 AECOM 2017c

This report details the findings of an environmental risk screening undertaken for the desalination plant project, including potential impacts on the surrounding natural and built environment and the potential concerns of the local community and stakeholders.

AECOM 2017b identified a moderate risk of potential contamination associated with the site that may present an unacceptable risk to human health and/or the environment. Contamination sources included:

- Belmont WWTW has previously reported elevated concentrations of nutrients, heavy metals and microbials which may present potential contamination risks.
- Filling and waste material stockpiles as well as redundant evaporation pond infrastructure are located within the temporary desalination plant site footprint and may present potential sources of contamination.
- It is likely that there are potential asbestos/contaminated materials associated with possible remaining subsurface pipework.

The potential for contamination within the indicative project water supply connection corridors is unknown, however contamination is considered to be unlikely considering the proximity of the corridors to natural wetland areas. Contamination issues are more likely to be encountered within these corridors where they are located in proximity to the WWTW.

AECOM 2017b recommended that an intrusive investigation be undertaken as part of the EIS to assess the potential contamination status of soil and groundwater at the site and to identify mitigation and management measures to minimise impacts on the environment during construction and operation of the project.

AECOM 2017c identified key environmental concerns associated with the construction phase, which comprised:

- Erosion and sedimentation of nearby watercourses
- Accidental spillages of chemicals/fuel by construction plant and equipment
- The potential for wind erosion from unsecured stockpiles created during construction
- Disturbance of contaminated soils on-site, if present

It was anticipated that these impacts could be appropriately managed and mitigated in accordance with general construction management measures.

3.7 NSW Environment Protection Authority

A search of the datasets maintained by NSW EPA including notices under the CLM Act and Protection of the Environment Operations (POEO) Act Environment Protection License (EPL) Register was carried out. The search results are summarised below.

Contaminated land record of notices

A site will be on the Contaminated Land: Record of Notices only if the EPA has issued a regulatory notice in relation to the site under the CLM Act. A search of the EPA record of notices for the Belmont, Belmont South and Marks Point suburbs revealed one documented contaminated site to date, summarised below.

Organisation	Address	Date	Reason	Direction
Former Mobil Service Station (now 7-Eleven), Marks Point	770-772 Pacific Highway	2003 - 2015	Agreed voluntary remediation proposal, (2003 and 2007) Site Audit Statement (2015) Notice of completion or withdrawal of VMP (2015) Amendment of repeal of order or notice (2015)	1.5 km SW of proposed plant

Table 3-1 Review of Contaminated Land Record Notices

List of NSW contaminated sites notified to EPA

The sites appearing on the EPA "List of NSW contaminated sites notified to the EPA" indicate that the notifiers consider that the sites are contaminated and warrant reporting to EPA. However, the contamination may or may not be significant enough to warrant regulation by the EPA. The EPA needs to review information before it can make a determination as to whether the site warrants regulation.

The search identified seven sites within 3 km of the study area that has been notified to the NSW EPA.

Organisation	Address	Туре	Status	Distance from study area
Coles Express Belmont	502 Pacific Highway	Service Station	Regulation under CLM Act not required	1.75 km NW
Former Ampol Service Station, Belmont	467-469 Pacific Highway	Former service station	Regulation under CLM Act not required	2.25 km N
Belmont Bus Depot, north Belmont	2 Floraville Road	Other petroleum	Regulation under CLM Act not required	2.75 km N
Caltex, Belmont North	406 Pacific Highway	Service station	Regulation under CLM Act not required	2.75 km N
Woolworths Service station, Belmont North	399 Pacific Highway	Service station	Regulation under CLM Act not required	2.75 km N
Former Mobil Aviation Depot, Belmont Airport, Marks Point	864 Pacific Highway	Other petroleum	Regulation under CLM Act not required	2.75 km S
Former Mobil Service Station (now 7-Eleven), Marks Point	770-772 Pacific Highway	Service station	Contamination formerly regulated under the CLM Act	1.75 km S

Table 3-2 Review of Contaminated Sites Notified to EPA

POEO licence register

The POEO register identifies premises that are licensed for certain activities under the POEO Act. Information listed on the Register of particular relevance to this assessment includes site location, activity type, relevant clean up notice and non-compliance information. Each licence provides information on potential point and non-point sources of soil and groundwater contamination that may be generated on site through standard operations, accidental spills and leaks.

A search of the register identified three premises with a current or previous POEO licence within the study area. This is summarised in Table 3-3.

Organisation	Address	Activity	Distance and direction from plant area	Distance and direction from closest water routes
Hunter and New England Area Health Service	Croudace Road, Belmont	Hospital – hazardous, industrial or Group A waste (generation or storage)	3.2 km NW	1.9 km NW
Hunter Water Corporation	Off Ocean Park Road, Belmont	Waste water treatment works	250 m NE	250 m NE
Lake Macquarie Yacht Club	1 Ada Street, Belmont	Boat mooring and storage	1.4 km NW	360 m W
Marks Point Marina	Edith Street, Marks Point	Boat construction and maintenance	2.3 km SW	1.3 km NE

Table 3-3 Licensed activities under the POEO Act 1997

Of the above sites listed, the WWTW is the only potential area of environmental concern. Due to the distance away from the proposed temporary desalination plant and water connections, the yacht club and hospital area unlikely to affect the proposed development.

3.8 Potential contamination sources

Table 3-4 summarises the potential areas of environmental concern based on the results of the desktop review and site inspection.

Table 3-4 Potential contaminants of concern

Source	Description	Potential Contaminants of Concern
Desalination plant are	ea	
Deposition of wastes and fill from the former WWTW	Historical placement of WWTW wastes	Heavy metals, PAH, TPH, BTEX, phenols, asbestos, nutrient and microbial
Sludge ponds	Sludge from former WWTW operations	Heavy metals, PAH, TPH, BTEX, phenols, asbestos, nutrient and microbial
Leaks and spills from the adjacent WWTW	Leaks and spills associated with the current WWTW	Heavy metals, PAH, TPH, BTEX, phenols, nutrient and microbial
Spillage or leakage of oils, fuels	Spills and leaks associated with equipment and machinery used on former WWTW site	Heavy metals, PAH, TRH, BTEXN, PCBs
Waste stored within Hunter Water compound	Potentially contaminated waste soils (tar etc.)	Heavy metals, PAH, TRH, BTEXN, Phenols, asbestos

Source	Description	Potential Contaminants of Concern
Subsurface infrastructure potentially beneath the site	Subsurface infrastructure (pipes, conduit) potentially containing sludge residues or asbestos	Heavy metals, PAH, TPH, BTEX, phenols and asbestos
Illegal Dumping	Asbestos containing materials (ACM) may be present as a result of illegal dumpling	Asbestos, heavy metals, PAH, TRH, BTEXN, OCPs, OPPs and PCBs
Water connections		
Commercial properties that may store fuels and chemicals	Storage of fuels and chemicals in commercial or industrial properties (past or present) along the water routes	Heavy metals, PAH, TRH, BTEXN
Existing bitumen and road base	Impacts associated with the existing bitumen and road base materials (historical materials may be coal tar based)	TRH, BTEXN and PAH
Illegal Dumping	Asbestos containing materials (ACM) may be present as a result of illegal dumpling along the site	Asbestos, heavy metals, PAH, TRH, BTEXN, OCPs, OPPs and PCBs
Pest and Weed Control	Use of herbicides and pesticides within the road corridor	OCP, OPP, arsenic and lead
UXO	Use of the area for Defence training	UXOs

Based on the results of the desktop assessment, there is a potential for contamination to be present within soils in the former WWTW sludge ponds and surrounding areas due to the deposition of fill. There is also the potential for subsurface infrastructure containing asbestos to remain on site. There is a minor potential for soil contamination along the proposed water connection routes due to existing bitumen road base, adjacent properties, illegal dumping and pest and weed control.

There is also potential for migration of contamination (surface water and groundwater) from these sources.

4.

Sampling and analysis plan and methodology

4.1 Summary of field activities

Field investigations we undertaken between 31 July 2018 and 6 September 2018. A summary of the activities undertaken during this time is presented below.

Table 4-1 Field investigation program

Date	Activity
31 July 2018	Drilling and sampling BH104 – Plant area
14 August 2018	Drilling and sampling from BH305, BHA301 – Water connection
17 August 2018	Drilling and sampling BH102 and BH103 – Plant area
22 August 2018	Drilling and sampling BH108 – Plant area
29 August 2018	Drilling of BH101 – Plant area
30 August 2018	Drilling and sampling from BH301, BH302, BH306, BHA302 and BHA304 – Water connection
4 September 2018	Drilling and sampling from BH303, BH304 and BHA303 - Water connection
6 September 2018	Excavation and sampling from test pits TP101 to TP106 – Plant area

4.2 Sampling and analytical program

4.2.1 Contaminant analysis

Soil samples were collected during geotechnical investigations to provide a preliminary indication of the potential for soil contamination within the study area. Samples were selected based on the findings of the desktop review (Section 3) and field observations and included:

Plant site and intake

• Samples were collected from five boreholes and six test pits with analysis including pH, CEC, asbestos, heavy metals, BTEXN, TRH, PAH. Two composite samples were analysed for OCP and PCB.

Water connections

• Samples were collected from ten boreholes with analysis including pH, CEC, asbestos, heavy metals, BTEXN, TRH, PAH. Three composite samples were analysed for OCP and PCB.

The analytical program is summarised in Table 4-2. The investigation locations are presented in Figure 1, Appendix A.

Location	Total Depth (m)	Investigation Method	Soil Samples Analysed (mbgl)	Analytical Parameters		
Plant site and intake						
BH101	20.0	Borehole	BH101_0.0-0.2 BH101_0.45-0.5	Asbestos, Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH		
BH102	22.0	Borehole	BH102_0.0-0.2 BH102_0.5-0.6	Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH		
BH103	41.1	Borehole	BH103_0.0-0.2 BH103_0.5-0.6	Asbestos, Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH		
BH104	20.0	Borehole	BH104_0.0-0.2 BH104_0.2-0.3	Asbestos, Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH		
BH108	20.5	Borehole	BH108_0.0-0.2	Asbestos, Heavy metals, TRH, BTEXN, PAH		
TP101	2.0	Test pit	TP101_0.0-0.2 TP101_0.5-0.6	pH, CEC, Heavy metals, TRH, BTEXN, PAH pH, CEC		
TP102	2.0	Test pit	TP102_0.0-0.2	Heavy metals, TRH, BTEXN, PAH		
TP103	1.9	Test pit	TP103_0.0-0.2 TP103_1.0-1.1	Heavy metals, TRH, BTEXN, PAH pH		
TP104	2.2	Test pit	TP104_0.0-0.2	Heavy metals, TRH, BTEXN, PAH		
TP105	1.6	Test pit	TP105_0.0-0.2	pH, CEC, Heavy metals, TRH, BTEXN, PAH		
TP106	1.8	Test Pit	TP06_0.0-0.2/FD20	Asbestos, Heavy metals, TRH, BTEXN, PAH		
COMP1	-	-	BH102_0.0-0.2 and BH103_0.0-0.2	OCP, PCBs		
COMP2	-	-	BH101_0.0-0.2 and BH104_0.0-0.2	OCP, PCBs		

Table 4-2 Investigation locations, sampling and analytical program

Location	Total Depth (m)	Investigation Method	Soil Samples Analysed (mbgl)	Analytical Parameters
Water connections				
BH301	5.0	Borehole	BH301_0.0-0.2 BH301_0.45-0.5	Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH
BH302	5.0	Borehole	BH302_0.0-0.2 BH302_0.2-0.3 BH302_4.0-4.5M	Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH pH
BH303	5.0	Borehole	BH303_0.0-0.2 BH303 2.5-2.95M	pH, CEC, Heavy metals, TRH, BTEXN, PAH pH
BH304	1.65	Borehole	BH304_0.0-0.2 BH304_0.45-0.5 BH304 0.5-0.95M	Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH pH
BH305	5.0	Borehole	BH305_0.0-0.2 BH305_0.9-1.0	Asbestos, Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH
BH306	5.0	Borehole	BH306_0.0-0.2 BH306_0.2-0.3	Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH
COMP3	-	-	BH301_0.0-0.2, BH302_0.0- 0.2 and BH306_0.0-0.2	OCP, PCB
BHA301	5.0	Borehole	BHA301_0.0-0.2 BHA301_0.5-0.7	Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH
BHA302	5.0	Borehole	BHA302_0.0-0.2 BHA302_0.45-0.5 BHA302 1.0-1.45M	Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH pH
BHA303	5.0	Borehole	BHA303_0.0-0.2 BHA303_0.45-0.5	Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH
BHA304	5.0	Borehole	BHA304_0.0-0.2 BHA304_0.45-0.5	Asbestos, Heavy metals, TRH, BTEXN, PAH Heavy metals, TRH, BTEXN, PAH

Location	Total Depth (m)	Investigation Method	Soil Samples Analysed (mbgl)	Analytical Parameters
COMP4	-	-	TP101_0.0-0.2, TP103_0.0- 0.2, TP105_0.0-0.2 and TP106_0.0-0.2	OCP, PCB
COMP5	-	-	TP101_0.5-0.6, TP103_0.5- 0.6, TP105_0.6-0.7, TP106_0.6-0.7	OCP, PCB

Metals included As, Cd, Cr, Cu, Hg, Pb, Ni, and Zn

TRH – Total recoverable hydrocarbons

BTEXN - Benzene, toluene, ethylbenzene, xylenes and naphthalene

PAH – Polycyclic aromatic hydrocarbons

OCP - Organochlorine pesticides

PCB – Polychlorinated biphenyl

5. **Quality assurance/quality control**

5.1 Soil sampling methodology

Soil investigations were undertaken by GHD Geotechnical and Environmental Engineers. All works were undertaken in accordance with GHD's written Standard Field Operating Procedures. Soil sampling was undertaken as part of the geotechnical investigations between July 2018 and September 2018.

Geotechnical test pits and boreholes were excavated using either an excavator or truck mounted drill rig.

Soil samples were generally collected at the surface, 0.5 m below ground level (mbgl) and at 0.5 m intervals thereafter. Samples were collected from significant soil horizons encountered including fill materials and underlying natural materials and other strata which exhibited unusual characteristics. Samples collected during the geotechnical investigations were collected either directly from the auger or directly from the excavator bucket. Samples were collected using new, disposable nitrile gloves to limit cross contamination between sampling locations.

Samples were placed in unpreserved laboratory supplied snap lock bags (ASS testing) and glass jars with a Teflon lid (soil contamination testing) and stored in an ice filled cooler for sample preservation prior to and during shipment to the testing laboratory. All sample jars and bags were clearly labelled with a sample number, sample location, sample depth, and sample date. All samples were transported under signed Chain of Custody documentation to ALS Environmental (primary laboratory), an independent and National Association of Testing Authorities Australia (NATA) accredited laboratory for the analysis requested.

Soils encountered during the investigations were described in accordance with the Unified Soil Classification System, with features such as discolouration, staining, odours and other indications of contamination being noted. This information was recorded on field test pit and borehole logging sheets which have been summarised and provided in Appendix B.

5.2 **Data quality objectives**

The purpose of establishing data quality objectives is to ensure the field investigations and analyses are undertaken in a way that enables the collection and reporting of reliable data on which to base the assessment. The data quality objectives and the procedures designed to achieve these objectives are listed in Table 5-1 below.

Process	Response
Step 1. Define the problem that necessitates the study.	The proposed drought response desalination plant lies adjacent to a WWTW and partially over former sludge ponds and has been subject to historical placement of fill. The proposed water connections run alongside fire trails, access tracks, roads and footpaths. As a result, the proposed construction work has a potential to disturb contaminated soils. The presence of contamination impacts within the study area is currently unknown. Hunter Water need to understand the potential risks to workers and environment that may be caused through the disturbance of contaminated soils.

Table 5-1 Data quality objective decision process

Process	Response
Step 2. Identify the Goal of the Study. State how environmental data will be used in meeting objectives and solving the problem, identify study questions, define alternative outcomes.	 The objectives of the investigations were to: Understand the potential contamination issues within the proposal area Provide recommendations for management and/or remediation to be implemented during construction
Step 3. Identify Information Inputs. Identify data and information needed to answer study questions.	 Data inputs for the proposal include: Previous investigations undertaken Desktop review of available information regarding the Site Soil sampling undertaken as part of this investigation
Step 4. Define the Boundaries of the Study. Specify the target population and characteristics of interest, define spatial and temporal limits, scale of inference.	The spatial boundaries of the works are defined by those described in Section 2 and 3 and shown in Figure 1, Appendix A.
Step 5. Develop the Analytic Approach. Define the parameters of interest, specify the type of inference, and develop the logic for drawing conclusions from findings.	Reviews of historical site information and previous assessments as outlined in Section 3 have been used to identify the major contaminants of concern. Results reported as part of this investigation will be used to better characterise the areas of concern.
Step 6. Specify Performance or Acceptance Criteria. Develop performance criteria for new data being collected or acceptable criteria for existing data being considered for use.	The guidelines as listed in Section 6 will be used to assess the contamination status of the soils and groundwater within the study area. Data Quality Indicators as described in Section 5.3 will be used to evaluate the acceptability of the data.
Step 7. Develop the Plan for Obtaining Data. Select the resource- effective sampling and analysis plan that meets the performance criteria.	Samples were collected as per Section 4 from geotechnical boreholes/ test pits. QA/QC procedures were used and QC samples collected to allow evaluation of Data Quality Indicators as described in Appendix C.

5.3 Data Quality Indicators

GHD has selected the following Data Quality Indicators to ensure that the data is of a quality from which to draw conclusions:

- Data Representativeness is the data representative of site conditions?
- Data Completeness are there comprehensive records available from all field work undertaken, and have all areas of concern been sampled and analysed?
- Data Comparability is the quality of the data such that samples analysed at different times can be compared, and is data consistent with field observations?
- Precision and Accuracy for Sampling and Analysis does the laboratory achieve the relevant Quality Control Criteria?

5.4 QA/QC results

The methodology, results and discussion of the Quality assurance/Quality Control program are presented in Appendix C.

6. Basis of assessment

6.1 Framework for assessment

The framework on which the contamination status of the proposal area was assessed was based on guidelines published or approved by the NSW EPA under *Section 105* of the *Contaminated Land Management (CLM) Act 1997*, supplemented by other relevant guidelines where required.

The guidelines that were referenced include the following:

- NEPC (2013). National Environment Protection (Assessment of site Contamination) Measure (NEPM), 1999 as amended in May 2013
- NSW EPA (1995). Contaminated sites: Sampling Design Guidelines, 1995
- OEH (2011). Contaminated sites: Guidelines for Consultants Reporting on Contaminated sites, 2011
- NSW DEC (2017). Contaminated Land Management: Guidelines for NSW site Auditor Scheme, (3rd Edition), 2017
- NSW EPA (2015). Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997, 2015

6.2 Soil assessment criteria

The National Environment Protection (Assessment of Site Contamination) Measure (referred to herein as the NEPM) was produced by the federal National Environmental Protection Council (NEPC) in 1999 and has been revised and updated in 2013 by way of the National Environmental Protection (Assessment of site Contamination) Amendment Measure 2013.

The NEPM includes a range of health investigation levels (HILs) and health screening levels (HSLs), ecological investigation levels (EILs) and ecological screening levels (ESLs) for a range of contaminants and for a range of land use and exposure scenarios. The selection of the assessment criteria has been based on the following site specific characteristics:

- Subsurface materials generally comprised coarse, sandy soils
- There is a potential for direct contact within contaminated soils
- There is a potential for ecological impacts through incorrect management of contaminated soils during construction

6.3 Health investigation levels and health screening levels

Health investigation levels (HILs) and HSLs have been developed for a broad range of metals and organic substances and are applicable for assessing human health risk via all relevant pathways of exposure. The HILs are generic to all soil types. HSLs are specific for soil types. Site specific conditions determine the depth to which HILs apply for land uses other than residential (generally to depth of 3 m). Given that a portion of the investigation area is a former WWTW, and proposed to be a desalination plant and that the water connection routes pass alongside fire trails and roadways, both the recreational and open space and commercial/industrial assessment criteria have been adopted to assess potential risks to human health. The criteria are sourced from Schedule B1 of the NEPM and Table 4 of CRC Care Technical Report No. 10 and are summarised below:

- HIL C Public open space such as park, playgrounds and playing fields, secondary schools and footpaths
- HIL D Commercial/industrial including premises such as shops, offices, factories and industrial sites
- HSLs for Direct Contact HSL C Recreational/open space
- HSLs for Direct Contact HSL D Commercial/industrial

6.4 Ecological investigation levels and ecological screening levels

Ecological investigation levels (EILs) have been developed for selected metals and organic substances and are applicable for assessing risk to terrestrial ecosystems. EILs depend on land use scenarios and generally apply to the top 2 m of soil. Added contaminant limit based EILs have been derived for As, Cu, Cr III, DDT, naphthalene, Ni, Pb and Zn. EILs have been developed for three generic land use settings including areas of ecological significance, urban residential areas and public open space, and commercial and industrial land uses.

The application of added contaminant limit based EILs is also dependent on site specific soil characteristics including pH, cation exchange capacity and clay content. A selection of samples across the site were analysed for pH and CEC and the following assumptions have been made based on the results.

- pH analysis was undertaken as part of the contamination investigation and geotechnical works and ranged between 4.5 and 6.7. The average pH value (of 14 samples) was 5.9. A pH of 6.0 has been adopted for this assessment.
- Cation exchange capacity analysis was undertaken during this assessment on six samples. Values ranged between 0.4 milliequivalents per 100 g and 14 milliequivalents per 100 g. A CEC of 5 milliequivalents per 100 g has been adopted for this assessment as the most conservative CEC.
- Clay content for sand and fill materials was identified during the geotechnical works (GHD, 2018) and ranged between 0.1% and 5.1% with an average of 2.2%. A clay content of 2.5% was adopted for the Cr III criterion as this is the value within the NEPM closest to the average. The selection of Cr III criterion is not CEC or pH dependent.

Ecological Screening Levels (ESLs) have been developed for selected petroleum hydrocarbon compounds and total recoverable hydrocarbon (TRH) fractions and are applicable for assessing risk to terrestrial ecosystems. ESLs also depend on land use scenarios (identical to EILs) and broadly apply to coarse- and fine-grained soils and various land uses. They are generally applicable to the top 2 m of soil.

As with health assessment criteria, based on the previous and current land use, and the proposed end use for the site, the following assessment criteria have been considered:

- Soil specific added contaminant limits (ACL) and ESLs (coarse textures) for urban residential and public open spaces
- Soil specific ACLs and ESLs (coarse textures) for commercial and industrial use

6.5 Asbestos

The NEPM provides guidance relating to the assessment of known and suspected asbestos contamination in soil and addresses both friable and non-friable forms of asbestos. The health screening levels for asbestos in soil have been adopted from the Western Australian Department of Health (WA DoH) *Guidelines for Remediation and Management of Asbestos Contaminated Sites in Western Australia* (WA DoH 2009).

The NEPM guidance emphasises that the assessment and management of asbestos contamination should take into account the condition of the asbestos materials and the potential for damage and resulting release of asbestos fibres. Therefore, for the purposes of assessing the significance of asbestos in soil contamination, three terms are used as summarised below:

- Bonded asbestos containing material (Bonded ACM) sound condition although possibly broken or fragments and the asbestos is bound in a matrix.
- Fibrous asbestos (FA) friable asbestos materials such as severely weathered ACM and asbestos in the form of loose fibrous materials such as insulation.
- Asbestos fines (AF) including free fibres of asbestos, small fibre bundles and also fragmented ACM that passes through a 7 mm x 7 mm sieve.

From a risk to human health perspective, FA and AF are generally considered to be the equivalent to "friable" asbestos in Safe Work Australia (2011), which is defined therein as 'material that is in a powder form or that can be crumbled, pulverised or reduced to a powder by hand pressure when dry, and contains asbestos'.

Bonded asbestos ACM in sound condition represents a low human health risk. However, both FA and AF materials have the potential to generate, or be associated with, free asbestos fibres and may represent a significant human health risk if disturbed and fibres are made airborne.

Commercial/Industrial "D" health screening levels (HSL) have been adopted as the most appropriate to the Assessment Area. The adopted assessment criteria is outlined in Table 6-1.

Table 6-1 Adopted assessment criteria

Form of Asbestos	Health Screening Level (w/w) – Commercial/Industrial
Bonded ACM	0.05%
FA and AFa (friable asbestos)	0.001%
All forms of asbestos	No visible asbestos for surface soil

a. The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres.

A tiered approach to risk assessment of asbestos contamination is recommended, including the development of an appropriate Conceptual Site Model (CSM). A weight of evidence approach is recommended with consideration given to factors such as the distribution of different fill types, the heterogeneity of the contamination and the uncertainty associated with the sampling methodology.

The NEPM states that if the Tier 1 screening levels are not exceeded, and an appropriate level of investigation has been carried out, then no contamination management actions are required except for ensuring the surface soil is free of visual asbestos. This may be achieved by multidirectional raking or tilling and hand-picking of exposed fragments of bonded ACM. Final visual inspection of the assessment and remediated areas should not detect any visible asbestos.

6.6 Aesthetics

Assessment of aesthetic issues was undertaken as outlined in Schedule B(1) of the NEPM (1999) which states that 'there are no specific numeric aesthetic guidelines, however site assessment requires balanced consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity'.

General assessment considerations included:

- That chemically discoloured soils or large quantities of various types of inert refuse, particularly if unsightly, may cause ongoing concern to site users.
- The depth of the materials, including chemical residues, in relation to the final surface of the site.
- The need for, and practicality of, any long-term management of foreign material.

The NEPM notes that in some cases, documentation of the nature and distribution of the foreign material may be sufficient to address concerns relating to potential land use restrictions.

6.7 Selected criteria

The methodology for assessing contamination levels in soils was to use the HILs, HSLs, EILs and ESLs (selected as relevant to the area of the site and the proposed land use) as cut off points to classify soils either as:

- Soils not contaminated, which pose no risk to the environment or human health and warrant no further action, i.e. concentrations less than or equal to the EILs/ESLs.
- Soils containing elevated concentrations of contaminants, which may pose a risk to the environment but pose no risk to human health under the proposed land use scenarios i.e. concentrations greater than the ecological values and less than the adopted HILs. A qualitative risk assessment may be sufficient to evaluate the potential impact for the proposed land use.
- Soils significantly contaminated which pose a risk to both the environment and human health, i.e. concentrations significantly greater than relevant investigation or screening levels. Soils in this category would likely require remediation or management, or further assessment by site-specific health and/or ecological risk assessment (Tier 2 or 3) carried out as appropriate for the proposed land use. This will usually require the collection of additional site data. Alternatively a conservative management approach (such as removal, capping or placement under roadways) may be adopted, depending on the likely cost effectiveness of further assessment when compared with the cost of conservative management.

The assessment criteria used to assess soil contamination levels are provided in Table A, Appendix D.

6.8 Waste classification

Soils that may require offsite disposal as part of site works will need to be classified using the six-step process and criteria detailed in *Waste Classification Guidelines – Part 1: Classification of Waste* (NSW EPA 2014). Analytical results will be assessed against Table 1 of the guidelines to provide an indication of the type of waste classification likely to be present for soils on site.

7. Investigation results

7.1 Soil profile

Borehole and test pit logs that were completed as part of the geotechnical assessment are presented in GHD's Geotechnical Investigation Report (GHD 2018).

Typical subsurface profile encountered across the site comprised fill over alluvial sand. The exceptions to this were:

- BH303, where subsurface conditions comprised fill to 1.8 m depth over alluvial clay.
- BH304, where subsurface conditions comprised fill to 0.3 m depth over overlying residual materials, overlying weathered rock.

A description of the subsurface units encountered during the intrusive works is provided below:

- FILL or TOPSOIL generally comprising silty SAND, sandy GRAVEL and CLAY, to depths of up to 1.3 m.
- ALLUVIAL SAND, SAND and silty SANDS. Thin clay and silt lenses, up to 0.5 m thick, were encountered in BH305, BH306 and BHA304.
- Alluvial CLAY, comprising either Very soft CLAY (BH303 580 metres west of the northern potable pipeline connection - at depth greater than 3.5 m) or Firm CLAY (BH302) below 4.1 m depth, BH303 between 1.8 m and 3.5 m and BH103 (within the proposed temporary desalination plant site) below 31 m depth to the limit of investigation at 41.1 m).
- RESIDUAL, comprising Gravelly SAND (BH304, overlying weathered conglomerate).

No odours or staining was observed during the collection of soil samples. There were no other visual signs of contamination noted within the boreholes and test pits excavated during the assessment. However, coal fragments were noted within the overburden/side bank east of the track around BH305. One fragment of potential asbestos containing material (ACM) was noted on the track halfway between TP106 and GW102. Small fragments of potential ACM were also noted near the surface of.

Each contamination sample was screened for Volatile Organic Compound (VOC) vapours using a Photo-Ionisation Detector (PID). All PID results were below 1.0 ppm.

Groundwater was encountered at all of the test locations, excluding TP101, TP106 and BH304. It is noted that groundwater levels are anticipated to vary based on climatic conditions, tidal variations and rainfall. All of the test pits were seen to collapse prior to achieving target depth. Water levels were logged in boreholes as follows:

- Desalination plant 0.95 mbgl (BH101) to 4.1 mbgl (BH105)
- Water connection route 0.4 mbgl (BHA302) and 3.5 mbgl (BH303)

7.2 Soil analytical results

Analytical results are summarised in Table A in Appendix D, while detailed laboratory results sheets and Chain of Custody documents are provided in Appendix E. Test locations with results above assessment criteria are presented in Figure 2, Appendix A.

7.2.1 Health

All samples reported concentrations below the adopted assessment criteria.

No asbestos was identified in soil samples submitted for analysis.

7.2.2 Ecological

All samples reported concentrations below the adopted assessment criteria, with the exception of the following:

Desalination plant area

- BH104_0.2-0.3 with concentrations of copper above the EIL recreational land use.
- TP106_0.0-0.2 and its duplicate (FD20) with concentrations of copper and zinc above the both the recreational and commercial/industrial land use EILs.
- BH102_0.0-0.2 with concentrations of TRH F3 above the ESL Urban residential (coarse fraction).
- BH104_0.0-0.2 and BH104_0.2-0.3 with concentrations of TRH F3 above the ESL Urban residential (coarse fraction).

Water connection

- BHA303_0.0-0.2 with concentrations of zinc above the EIL urban residential/public open space land use.
- BHA304_0.45-0.5 with concentrations of zinc above the EIL urban residential/public open space land use.
- BHA304_0.0-0.2 with concentrations of benzo(a)pyrene above the ESL Urban residential (coarse fraction).

7.2.3 Waste classification

Soil results were compared against specific contaminant concentration (SCC) for classification without TCLP as outlined in Table 1 of the NSW EPA (2014) *Waste Classification Guidelines.*

Waste classification results are presented in Table B in Appendix D. In summary, soils were generally within with General Solid Waste contaminant threshold (CT1) with the exception of the following:

Desalination plant area

• Lead at TP106 0-0.2 which exceeded the CT1 threshold.

Water connection

• Lead at BHA304 0.45-0.5 which exceeded the CT1 threshold.

Based on the results, soils were generally classified as General Solid Waste with the exception of soils at TP106 0-0.2 which would be classified as restricted solid waste and BHA304 0.45-0.5 which would be classified as hazardous waste. It is noted that soils where either acid sulfate soils or asbestos fragments are identified, these would also be classified as either acid sulfate soils or asbestos waste.

8. Discussion

8.1 Investigation results

8.1.1 Subsurface conditions

The typical subsurface profile encountered across the site comprised varying depths of fill over alluvial sands although alluvial clays were present from 1.8 mbgl at BH303 and residual weathered rock was present at 0.3 mbgl at BH304.

Groundwater was encountered in all but three of the test locations (TP101, TP106 and BH304). Water levels were logged at the desalination plant site between 0.95 mbgl (BH101) to 4.1 mbgl (BH105), along the water connection route between 0.4 mbgl (BHA302) and 3.5 mbgl (BH303).

8.1.2 Health assessment criteria

The soil sampling program undertaken as part of this investigation reported concentrations of contaminants below both HIL C and HIL D for all samples..

No asbestos was detected in soil samples analysed. However, one fragment of non-friable potential ACM was observed between TP106 and GW102 within the proposed temporary desalination plant site and other small fragments of non-friable potential ACM were found on the surface near GW108 (70 m west of the construction footprint opposite the proposed desalination plant site). These fragments were bonded and given that there was no fibres identified in soils, the risk to workers is considered to be low and can be managed through an unexpected finds protocol in a contaminated soil management plan (CSMP).

8.1.3 Ecological assessment criteria

Desalination Plant

Concentrations of copper and zinc were above both recreational and commercial/industrial land use EILs in TP106_0.0-0.2/FD20. TP106 was located adjacent to an access track and the results are considered to be due to the presence of fill consisting of silty sand with gravel including asphalt, concrete, bricks and rock.

Concentrations of copper (BH104_0.0-0.2) and TRH F3 (BH104_0.0-0.2 and BH104_0.2-0.3) in fill samples from BH104 were above urban residential land use. This location was located on the northern boundary of the former sludge ponds. Fill at this location was described as dark grey to brown silty sands and sands.

Concentrations of TRH F3 above the urban residential ESL in BH102_0.0-0.2 which was located south of the sludge ponds. Fill at this location was described as brown to grey sand with rootlets and trace plastic and wire.

Although levels of contaminants were found to above both the recreational and commercial/ industrial EILs/ESLs, based on the former use of a portion of the site as a WWTW and the proposed future use as a desalination plant, there is limited ecological amenity in this area and it is considered unlikely that these contaminants would present a significant risk to the environment in this area.

Water connection

Concentrations of zinc were above recreational land use EILs in shallow fill of BH303 which was located adjacent to an access track in a bushland area. The elevated results are considered to be due to the presence of fill consisting of clayey sands with gravel including concrete.

Concentrations of benzo(a)pyrene were above the recreational ESLs in shallow fill from BHA304. Further, concentrations of zinc were above recreational EILs in deeper fill materials (0.45-0.5 mbgl). BHA304 was located at the western end of a southern water connection route adjacent to a roadway and bushland. Fill was described as silty sand with gravel, trace coal and concrete fragments. As these locations are nearby to bushland areas, there is a potential risk to the environment should these soils be disturbed in an uncontrolled manner. This risk can be mitigated with the implementation of soil management plans during construction.

8.2 Waste classification

Based on review of results against the NSW EPA Waste classification guidelines, soils would generally be classified as General Solid Waste, with the exception of the following

- Soils at TP106 and BH304 which would be classified as Restricted Solid waste based on lead concentrations.
- Soils where asbestos is identified would also be classified as asbestos waste.
- Soils where acid sulfate soils are identified would be classified as acid sulfate soil waste.

These classifications are only preliminary and further testing and analysis would be required to confirm the classification of soils prior to disposal.

8.3 Site conceptual model

Based on the findings of this investigation the following site conceptual model was developed.

8.3.1 Sources

The following potential sources of contamination have been identified across the proposal area:

Desalination plant area

- Placement of fill in the footprint of the former WWTW settling ponds
- Spillage or leakage of oils, fuels
- Wastes stored within Hunter Water compounds
- Subsurface infrastructure beneath the site

Water connection routes

- Commercial properties that may store/use fuels and chemicals
- Existing bitumen and road base and run-off from roadways (fuel and oil residues)
- Illegal dumping of waste along the connection routes
- Historical use of herbicides and pesticides
- Migration of contamination (soil, surface water and groundwater) from adjoining commercial/industrial properties that may store fuels, oils and chemicals (cemetery, TAFE college)

8.3.2 Pathways

Migration pathways

The following migration pathways were identified for the proposal area:

- Vertical and horizontal migration of surface water and sediment
- Vertical and horizontal migration of groundwater
- Windborne dust

Exposure (contaminant uptake) pathways

Based on the identified receptors and the release, fate, and transport characteristics of the chemicals of potential concern, pathways through which receptors may become exposed include inhalation, ingestion and dermal absorption. These are discussed briefly below in the context of the site setting:

- Inhalation Exposure Pathway: There is the potential for creation of dust from unsealed surfaces and filled areas of the site. Risk of potential inhalation of asbestos fibres contaminated dusts. Soil or groundwater vapour inhalation is also possible but unlikely.
- Ingestion Exposure Pathway: Ingestion of contaminants by current and future site workers through construction and/or maintenance activities which may involve direct contact with contaminated soils or groundwater.
- Dermal Exposure Pathway: Exposure may occur via sorption through biological membranes such as skin. This pathway may be a concern whenever contaminated soil, groundwater comes into direct contact with a biological membrane. This pathway could also be a concern if contaminated surface water (runoff from the sites) was to come into direct contact with benthic and aquatic flora and fauna within off-site surface-water receiving environments.

8.3.3 Potential receptors

The following potential sensitive human and environmental receptors of contamination were identified for the site and surrounding areas:

- Human health receptors:
 - Site workers or visitors (e.g. workers, subcontractors and members of public)
 - Off-site receptors (users of surrounding water bodies, beach areas or walking tracks for recreational purposes)
 - Current and future occupants of surrounding properties
- Environmental receptors
 - Flora and fauna within the proposal area and surrounding land
 - Local drainage channels and surface water
 - Groundwater beneath the study area
 - Off-site ecosystems

9. Conclusions and recommendations

This Contamination Assessment report presents the results of the contamination investigation for Hunter Water's proposed drought response desalination plant and associated water routes at Belmont, NSW. This report comprises the Contamination Assessment, which has been prepared to inform the Environmental Impact Assessment (EIA) with regard to the potential contamination issues within the study area and recommendations for management and/or remediation measures to be implemented during construction.

The desktop review portion of the works identified that a potential exists for contamination to be present in the following areas of the site:

- Fill material and potentially contaminated soils within the footprint of the former WWTW (sludge ponds) and Hunter Water compounds
- Existing bitumen and road base
- Historical use of herbicides and pesticides
- Illegal dumping of waste along the access tracks, trails and road corridor
- Other commercial/industrial properties that may store oils, fuels, grease, herbicides and pesticides

As such, further assessment of soils throughout the study area was undertaken, targeting the proposed temporary desalination plant area and locations along the water connection routes.

One potential ACM fragment was noted on the surface between TP106 and GW103 (within the temporary desalination plant site), with additional smaller fragments noted near GW108 (70 m west of the temporary desalination plant site, outside of the construction footprint). These fragments were bonded and given that there were no fibres identified in soils, these are considered to be a low risk to workers. The results of the investigation indicates that soils within the proposed area are unlikely to present a significant health risk to workers during construction works and future site users post construction. The risk of exposure from any isolated contaminated areas or unexpected finds can be managed during construction with a CSMP.

Concentrations of copper, zinc, TRH and benzo(a)pyrene were reported above the EILs and ESLs in five locations across all three sub-areas. The concentrations of contaminants are most likely attributable to the presence of fill materials and proximity of the samples to either the former WWTW sludge ponds or being adjacent to roadways. The elevated levels of these contaminants could present a potential environmental risk to nearby sensitive receptors such as bushland and waterways if not managed appropriately during construction.

Based on the investigations undertaken to date and taking into account the proposed future land use (desalination plant and associated service corridors), the site is considered suitable from a contamination perspective for redevelopment. As no significant human health or environmental risks to construction workers or future site users have been identified, no remediation within the site is proposed at this stage.

Soils at the study area would generally be classified as General Solid Waste, with the exception of soils at TP106 and BHA304 which are currently classified as Restricted Solid Waste. These classifications may be reduced with further sampling and TCLP analysis. In addition, soils where either asbestos fragments or acid sulfate soils are identified would also be classified as either asbestos waste or acid sulfate soil waste. It is noted that these classifications are preliminary only and further sampling and analysis would be required prior to disposal off site.

The desktop review identified that the northern portion of the water main connection was noted to be either on the boundary or just within an area of a former Defence military area which was classified as having a Slight potential for residual UXO (Figure 1, Appendix A). Although the Defence website states that no further UXO investigation or remediation is required for these areas, it is recommended that an UXO assessment is completed on the confirmed pipeline route by the contractor prior to construction.

Recommendations

Based on the desk top review and the results of the current investigations, it is considered that the potential risks from disturbance and exposure of potential contamination within the site can be managed development of a CSMP as part of the Construction Environmental Management Plan, which would include requirements for:

- Stockpiling soils away from sensitive receptors such as waterways and drainage lines
- Testing of soils to assess suitability if they are to be placed near sensitive receptors
- Waste management
- Management and safe guarding procedures for UXO waste
- Unexpected contaminated soils finds protocols

The site has been investigated for contamination as detailed in this report. However, a degree of uncertainty is inherent in any site contamination investigation and a potential exists for undetected contaminated soils, wastes or hazardous building materials to be identified during any future works that disturb the ground surface. In particular, there is a potential for unidentified contaminated materials to be present under areas of the site not investigated or in any fill materials that may be present on site. Indications of potential contamination may include:

- Stained or discoloured fill, soils or seepage water
- Construction/demolition wastes such as concrete, bricks, timber, tiles, fibre cement sheeting, fragments and pipes
- General rubbish such as plastic, glass, packaging
- Imported materials such as ash or slag or coal chitter

Should unexpected contaminated soils be identified during any future ground works, advice should be sought from a suitably qualified environmental consultant and any additional investigations/remediation be completed in general accordance with guidelines developed or endorsed by NSW EPA.

10. Limitations

This report has been prepared by GHD for Hunter Water Corporation (Hunter Water) and may only be used and relied on by Hunter Water for the purpose agreed between GHD and the Hunter Water as set out in Section 1.2 of this report.

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

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

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

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

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

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

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

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

11. References

AECOM, 2017a, Temporary Desalination Project Readiness Activities Stage 1 Belmont Conceptual Hydrogeological Model, Document Reference 60515293_Belmont CSM RPT_Rev 1.

AECOM, 2017b, Phase 1 Site Contamination Review. Potential Temporary Desalination Site, Belmont. Document reference 60515293. Rev B.

AECOM, 2017c, Preliminary Environmental Assessment, Lower Hunter Water Plan: Temporary Desalination Project. Document Reference 60281456. Rev 0.

Contaminated Land Management (CLM) Act 1997.

Department of Land and Water Conservation, NSW Soil Landscapes of Gosford – Lake Macquarie Special 1:100,000 Sheet 9131 and part 9231.

Department of Natural Resources, NSW. Acid Sulfate Soil Risk Map for Swansea.

Department of Mineral Resources, NSW. Newcastle 1:100,000 scale Coalfields Regional Geology, Geological Series Sheets 9231 and part of 9131, 9132 and 9232, Edition 1.

Geological Survey of New South Wales 1: 100,000 Gosford-Lake Macquarie Special, Geological Series Sheet 9131 and part 9231 (First Edition, 2015).

Geological Survey of New South Wales 1:25,000 scale Belmont – Swansea inset of the Newcastle – Hunter Area Coastal Quaternary Geology.

G-Tek 2018. UXO Desktop Assessment Report. Pipeline Works, Belmont NSW. G-Tek Australia Pty Ltd. 18019GHDA v1.01. 4 August 2018.

NSW EPA (1995). Contaminated sites: Sampling Design Guidelines.

NSW DEC (2017). Contaminated Land Management: Guidelines for NSW site Auditor Scheme, (3rd Edition), 2017.

NSW EPA (2015). Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997, 2015.

National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended by the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1), National Environment Protection Council, May 2013.

OEH (2011) Office of Environment and Heritage, Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.

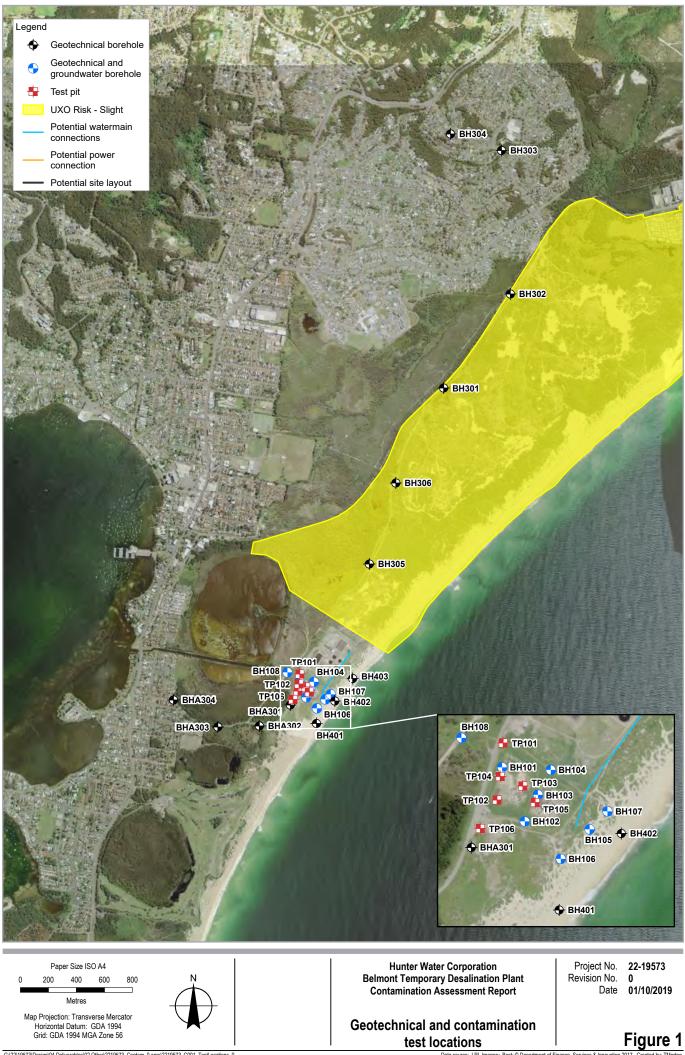
RCA, 2002, Upgrade of Belmont WWTW, Document Reference 566b-033/0.

SKM, 2012, Spoil Investigation Report, Document Reference EN03103-N-CL-RP-0002.

Appendices

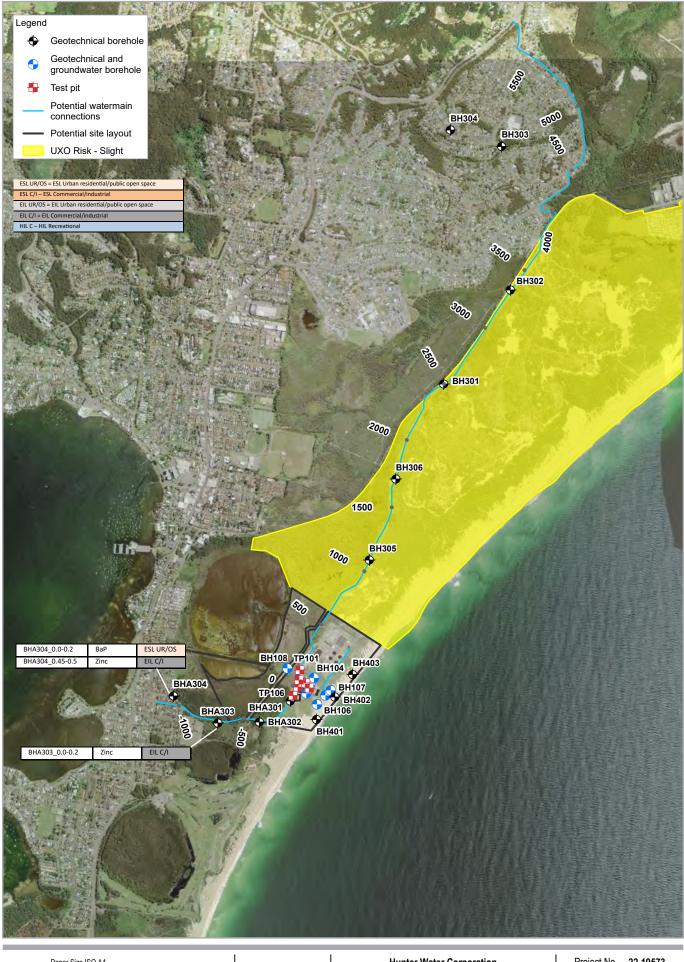
GHD | Report for Hunter Water Corporation – Belmont Temporary Desalination Plant Design, 22/19573

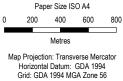
Appendix A – Figures



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Data source: LPI_Imagery_Best: © Department of Finance, Services & Innovation 2013







GHD

Hunter Water Corporation Belmont Temporary Desalination Plant Contamination Assessment Report Potable water pipeline area Test locations with results

Project No. 22-19573 Revision No. 0 Date 01/10/2019

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Appendix B – Borelogs

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		DRILL	ING					MATERIAL			Note: * indicates signatures on ori issue of log or last revision of lo
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
	A			Dx3 Dx2 Dx3 D	0.70		-	FILL, Silty SAND, dark grey, fine to coarse grained, with fine to coarse, sub-rounded to sub-angular gravel, trace coal fragments, (fill). 0.40m, becoming brown, gravel becoming fine to medium.	D D-M	-	
1				SPT 25 for 20mm N=ref Dx3 D SPT 11/14/14 N=28 D	0.70		SW	SAND, grey, fine to coarse grained, (marine/estuarine?).	D-M	VD	
2	AD/T	Nil	2.1m	D					w	10	
3	A			D SPT 2/4/7 N=11 D	2.70		SM	Silty SAND, dark brown, fine to coarse grained, (marine/estuarine?).	W	MD	
4				D D SPT 3/5/9 N=14 D	3.50		SW	SAND, grey, fine to coarse grained, trace of silt, (marine/estuarine?).	W	MD	
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SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
1 2 3	AD/T	Zi	2.45m	Dx3 Dx2 Dx3 D SPT 6/4/6 N=10 Dx2 D SPT 6/9/9 N=18 D D D SPT 3/3/4 N=7 D D D D D D D D D D D D D D D D D D D	0.20		- SW	 FILL, Sandy GRAVEL, brown, fine to coarse grained, sub-rounded to sub-angular, sand is fine to coarse grained, with silt, (fill). FILL, SAND, dark grey to black, fine to coarse grained, trace of fine to medium grained, sub-rounded to sub-angular gravel, trace of coal fragments, (fill). SAND, grey, fine to coarse grained, trace of dark brown clayey sand lenses (<10mm thick), (marine/estuarine?). 1.30m, becoming pale grey, no clayey sand lenses. 1.45m, becoming dark grey, trace of silt. 2.40m, becoming pale grey, no silt. 2.95m, becoming grey. 	D M M D-M	- D	
5 -	•			D SPT 2/3/4 N=7 D	4.10 <u>5.00</u>		CL	CLAY, dark grey, low plasticity, with fine to coarse grained sand, (estuarine). End of borehole at 5 metres. Target Depth	М	F	4.45m, PP on SPT sample = 40 - 100kPa
5											
7											
det	ails o	fabbre	heets f eviation criptior	ns 🤆	Ð	Level	3. GH	OTECHNICS D Tower, 24 Honeysuckle Drive, Newcastle 2300 Australia 9 9999 F: 61 2 4979 9988 E: ntlmail@ghd.com	J	ob N	No. 22-19573

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		DRILL	ING					MATERIAL			Note: * indicates signatures on orig issue of log or last revision of log
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Densitv Index	Comments/ Observations
	1			Dx3	0.20	$\times\!\!\times\!\!\times$	-	FILL, Sandy GRAVEL, brown, fine to coarse, sub-rounded to	D-M	-	
				Dx2	0.20		-	sub-angular, sand is fine to coarse grained, with silt, (fill).	М	-	
				Dx2		\bigotimes		(w>PL), (fill). 0.40m, becoming trace of fine to coarse grained sand.			0.5m, PP on SPT
·1				D SPT 4/4/4 N=8 Dx3 D SPT	0.70		-	FILL, CLAY, brown mottled orange brown and black, low plasticity, (w>PL), trace of fine to coarse grained, sub-rounded gravel, trace of fine to coarse grained sand, trace charcoal, (fill).	M		- Sample = 150 - 170 kPa
				3/4/3 N=7	1 90	\bigotimes					
2	/Т —			Dx2 D Dx2	1.80		CL	CLAY, dark grey, low plasticity, (w>PL), trace of fine, sub-rounded gravel, trace fine to coarse grained sand, (alluvium).	M	F-St	
3	AD/T	Nil		D D SPT 3/3/4				2.80-2.85m, Clayey SAND lens.			2.5m, PP on SPT Sample = 70-120 kP
4			⊻ 3.5m	N=7 D D SPT 3/3/3 N=6 D				3.50m, becoming trace of Sandy GRAVEL bands, with silt, generally less than 20mm thick, w>LL.	w	vs	4.0m, PP on SPT Sample = 10-20 kPa
5 -				D	5.00			End of borehole at 5 metres. Target Depth			
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5		DRILL	ING					MATERIAL			Note: * indicates signatures on original issue of log or last revision of log
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
	AD/V	Nil		Dx3 Dx2 Dx3 Dx3 SPT 16/15/25	0.90	0°0°	- SW	FILL, Silty SAND, grey, fine to coarse grained, (fill). FILL, Sandy GRAVEL, orange brown, fine to coarse grained, sub-rounded, with silt, sand is fine to coarse grained, trace coal fragments, (fill/disturbed). Gravelly SAND, orange brown, fine to coarse grained, gravel is fine to coarse grained, sub-rounded, with clay, (residual). Sandy GRAVEL, orange brown, fine to coarse, sub-rounded,	D D D	 VD	
	1 			16/15/25 for 145mm DB N=ref SPT 10 for				End of borehole at 1.65 metres.		VD	
	2			50mm DB 8 blows N=ref				Refusal			
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		DRILL	ING					MATERIAL			Note: * indicates signatures on ori issue of log or last revision of lo
SCALE (M)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
				Dx4 Dx3	0.40		-	FILL, Silty SAND, dark brown-black, fine to coarse grained, trace of fine to medium grained, sub-rounded gravel, (fill).	M	-	
1			0.60m	D SPT 5/5/7 N=12 D SPT 3/3/4	0.48	XXX	SW	SAND, pale yellow brown, fine to coarse grained, (aeolian).	MW	MD	
				N=7	1.70		ML	SILT, dark brown, low plasticity, abundant organics, strong organic odour, (peat).	M- W	S	
2				D	2.20		SW	SAND, grey, fine to coarse grained, trace of silt, (marine/estuarine?).	w	MD	
3	AD/T			D SPT 3/4/6 N=10 D D SPT 2/2/3 N=5 D				2.50m, becoming trace of shell fragments.		L- MD	
5	¥			D	5.00			End of borehole at 5 metres. Target Depth			
let	ails o	fabbre	heets f	ns 🧲	HD	Level T: 61	3, GH I 2 497	OTECHNICS D Tower, 24 Honeysuckle Drive, Newcastle 2300 Australia '9 9999 F: 61 2 4979 9988 E: ntlmail@ghd.com NG GEOTECHNICAL ENGINEERS AND GEOLOGISTS	J	ob N	lo. 22-19573

Pro Loc	ent : ject : ation	Beln : Beln	nont Te	ter Corpora emporary De WTP, NSW	esalinat	ion Pla	ant	HOLE N	-		306 T 1 OF 1
Rig	ition : Type e Star		lanjin [) N unting:			Surface RL: Angle from Horiz.: 90° Contractor: Total Drilling Pty Ltd Driller: npleted: 30/8/2018 Logged by : D. Cooper			Processed : HAL Checked : AWJ Date: 20/09/2018
		DRILL	ING					MATERIAL			Note: * indicates signatures on ori issue of log or last revision of lo
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
	•			Dx3 Dx2 Dx3 D SPT	0.20		- SW SW	FILL, Sandy GRAVEL, brown to dark grey, fine to coarse grained, sub-rounded to sub-angular, with silt, sand is fine to coarse grained, trace of coal fragments, (fill). SAND, dark grey, fine to coarse grained, trace of silt (topsoil). SAND, pale yellow brown, fine to coarse grained, (aeolian).	D D-M	- MD	
2				6/5/7 N=12 D SPT 4/4/5 N=9 D	1.00		SW	SAND, grey, fine to coarse grained, (marine/estuarine?).	D-M	MD	
3	AD/T	Ni	2.40m	D SPT 1/1/0 N=1	2.65 3.10		ML	Sandy SILT, dark brown, low plasticity, abundant organics, (estuarine). SAND, grey to dark grey, fine to coarse grained, with silt,	w w	VS- S	
4				D D D SPT 6/10/11 N=21 D				(marine/estuarine?). 4.30m, becoming grey, trace of silt.		MD- D	
5 -	¥			Ð	5.00			End of borehole at 5 metres. Target Depth			
det	ails o	dard s f abbre	eviatio	ons C	Ð	Level T: 61	3, GH 2 497	OTECHNICS D Tower, 24 Honeysuckle Drive, Newcastle 2300 Australia /9 9999 F: 61 2 4979 9988 E: ntlmail@ghd.com NG GEOTECHNICAL ENGINEERS AND GEOLOGISTS	J	ob N	lo. 22-19573

Proj Loc	ent: ject: ation	Belr : Belr	nont Te nont W	ter Corpora emporary D WTP, NSV	esalinat V	ion Pla	ant	HOLE N			et 1 OF 1
	ition : Type		548.0 E Hanjin D	6342393.0	DN unting:	Track		Surface RL: Angle from Horiz.: 90° Contractor: Total Drilling Pty Ltd Driller: M. Sawyer			Processed : HAL Checked : AWJ
-			4/8/20 ⁻	18		Dat	te Com	Logged by : D. Cooper			Date: 20/09/2018
		DRILL	ING					MATERIAL			Note: * indicates signatures on orig issue of log or last revision of lo
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
1				Dx3 Dx2 Dx3 D SPT 2/4/3 N=7	0.03		SW	FILL, Silty SAND, brown to pale grey, fine to coarse grained, trace fine to medium grained, sub-rounded gravel, trace coal chitter, (fill). SAND, pale grey to pale yellow brown, fine to coarse grained, trace rootlets, trace silt, (topsoil). SAND, pale yellow to brown, fine to coarse grained, (aeolian).	D D D-M	 - MD	
2				D D SPT 2/2/3 N=5 D	1.40		SW	SAND, grey, fine to coarse grained, with silt, (marine/estuarine?).	М	MD	
3	AD/T	Nil	2.40m	D SPT 2/3/3 N=6 D	3.50			2.20m, becoming brown, trace of silt.	w		
4				D D SPT 5/11/18 N=29 D			SW	SAND, pale grey, fine to coarse grained, trace of shells, (marine/estuarine?).	W	D- VD	
5 -				Đ	5.00			End of borehole at 5 metres. Target Depth			
5											
det	ails o	fabbr	heets eviatio	for ons ns	HD	GHI Level T: 61	D GE 3, GHI 1 2 497	OTECHNICS D Tower, 24 Honeysuckle Drive, Newcastle 2300 Australia 9 9999 F: 61 2 4979 9988 E: ntlmail@ghd.com	J	ob N	lo. 22-19573

	ent : ject :			er Corpora mporary D		ion Pla	ant	HOLE N			
	ation			WTP, NSV						SHEE	T 1 OF 1
	ition :			6342244.0		. .		Surface RL: Angle from Horiz. : 90°			Processed : HAL
-	Type		lanjin D		unting:			Contractor : Total Drilling Pty Ltd Driller : M. Sawyer			Checked : AWJ
Dat			0/8/201	8		Dat	e Con	Impleted: 30/8/2018 Logged by: D. Cooper			Date: 20/09/2018 Note: * indicates signatures on original
		DRILL	ING					MATERIAL			issue of log or last revision of lo
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests EX	OBDEpth / (RL) metres	Graphic Log	- USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	D Moisture Condition	Consistency / Density Index	Comments/ Observations
				Dx2			SW	grained, sub-rounded to sub-angular gravel, with silt,	М	MD	
			0.40m	Dx3	0.45		SW	SAND, brown, fine to coarse grained, with silt,	w	\vdash	
1 2 3 4	AD/T	Nil		D SPT 4/4/4 N=8 D SPT 2/3/3 N=6 D D D SPT 3/6/7 N=13 D D SPT 4/8/7 N=15 D				\(marine/estuarine?). SAND, grey to brown, fine to coarse grained, trace of silt, trace of fine grained, sub-rounded gravel, (marine/estuarine?). 1.90m, becoming grey.		MD- D	
5 -				Ð	5.00			End of borehole at 5 metres.			
6								Target Depth			
			heets f	ns 🤆	Ð	GHI Level T: 61	D GE 3, GH	OTECHNICS D Tower, 24 Honeysuckle Drive, Newcastle 2300 Australia '9 9999 F: 61 2 4979 9988 E: ntlmail@ghd.com	J	ob N	lo. 22-19573

	ion : ype : Starto I	375 ed : 3 DRILL	030.0 E Scout /9/2018	VTP, NSW 6342235.0 Mo u		Truck		Quefece DL Angle from Horiz - 008		SHEE	T 1 OF 1
Rig T	ype : Starte I	ed: 3 DRILL	Scout /9/2018			Truck					
Date	Start	ed : 3 DRILL	/9/2018	Μοι	unting:	Truck		Surface RL:Angle from Horiz. : 90°			Processed : MAG
		DRILL						Contractor : Total Drilling Pty Ltd Driller : M. Sawyer			Checked : AWJ
SCALE (m)	7		ING			Dat	e Com	pleted : 3/9/2018 Logged by : D. Cooper			Date: 20/09/2018 Note: * indicates signatures on or issue of log or last revision of
SCALE (m)	Method							MATERIAL			issue of log or last revision of
	Drilling	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
	1			Dx3		\otimes	-	FILL, Clayey SAND, brown, fine to coarse grained (fill). 0.10m, becoming with fine to coarse grained, sub-rounded to	М	-	
1 2 3 4	AD/T	Nil	0.5m	Dx2 Dx3 D SPT 4/3/4 N=7 D SPT 3/3/4 N=7 D D D D SPT 2/3/6 N=9 D D D D SPT 6/4/5 N=9	0.40		SW	 0.20-0.30m, concrete across entirety of hole. 0.20-0.30m, concrete across entirety of hole. SAND, grey, fine to coarse grained, trace of silt, (marine/estuarine?). 0.80m, becoming pale yellow brown to grey. 1.50m, becoming grey. 	M	MD	
5 —	•			D D	5.00			End of borehole at 5 metres. Target Depth			
6 7											
8		lor:-!	heets f			СП) GE4	OTECHNICS		ob N	0

Proj	ent : ject : ation	Belr	nont Te	er Corpora mporary D NTP, NSV	esalina	tion Pla	ant	HOLE N			A304 T 1 OF 1
Rig	ition : Type	: ŀ	713.0 E Hanjin D 0/8/201		DN unting:			Surface RL: Angle from Horiz.: 90° Contractor: Total Drilling Pty Ltd Driller: M. Sawyer npleted: 30/8/2018 Logged by : D. Cooper			Processed : MAG Checked : AWJ Date: 20/09/2018
Dat				0		Da		MATERIAL			Note: * indicates signatures on ori issue of log or last revision of lo
					(0						
SUALE (III)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
				Dx3 Dx2 Dx3	0.70		-	FILL,, Silty SAND, brown, fine to coarse grained, with fine to coarse grained, sub-rounded to sub-angular gravel, trace coal and concrete fragments, (fill).	D	-	
			 0.8m	D SPT	0.90		SM	Silty SAND, dark grey, fine to coarse grained, (marine/estuarine?).	M		
1			0.011	2/3/4 N=7 Dx3 D			SW	SAND, grey, fine to coarse grained, (marine/estuarine?).	W	MD	1
				SPT 3/3/2 N=5 D	1.40 1.80		ML	Sandy SILT, dark grey, low plasticity, sand is fine to coarse grained, abundant of organics, (estuarine).	W	VS- S	
3 4 5 –	AD/T TAD/T TAD/T TAD/T TAD/T TAD/T T_AD/T T	Ĩ		D SPT 1/1/1 N=2 D D D SPT 2/3/3 N=6 D D D D D D D D D D D D D D D D D D D	5.00			2.60m, becoming trace of silt.		MD	
5								Target Depth			
leta	ails of	abbr	heets eviatio	ns 🧲	HD	GHI Level T: 67	D GE 1 3, GH 1 2 497	OTECHNICS D Tower, 24 Honeysuckle Drive, Newcastle 2300 Australia '9 9999 F: 61 2 4979 9988 E: ntlmail@ghd.com	 J	ob N	lo. 22-19573

Pro	ent: ject:	Belr	nont Ter	er Corpora mporary D	esalina	tion Pla	ant				HOLE No.		101/BH101
	ation			WTP, NS 6342563.0				Surface RL:	Α	ngle f	rom Horiz. : 90°		Processed : MAG
Rig	Туре	: +	-lanjin D	&B Mo	unting:	Track		Contractor: Total Drilling Pty Lt			M. Sawyer		Checked : AWJ
Dat	e Star	ted : 2	9/8/201	8		Dat	te Con	npleted: 29/8/2018	L	oggeo	by: D. Cooper		Date: 20/09/2018
		DRILL	ING					MATERIAL	1			INC	te: * indicates signatures on ori issue of log or last revision of lo PIEZOMETER
SUALE (III)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
			V	Dx3 Dx2 Dx2 Dx2 D SPT	0.02		SW	SAND, dark grey, fine to coarse grained, with silt, (topsoil). SAND, pale yellow brown, fine to coarse grained, (aeolian). 0.49-0.50m, dark grey, silty sand layer. 0.50m, trace fine, sub-rounded gravel.	D- M M	<u>, - /</u> МD			✓ Monument cover, w
1			0.95m	2/3/4 N=7	1 20		SM	Silty SAND, dark grey, fine to	w	-			
2	AD/T	Nil		Dx2 D SPT 3/3/5 N=8 D	1.20		SW	coarse grained, (fill/alluvium). SAND, grey, fine to coarse grained, (marine?).	W	MD			
3				D SPT 3/4/6 N=10									u 50mm PVC casing
5				D SPT 6/9/12 N=21						D			 ← Bentonite ← 5 mm Specialised Sand Backfill
6				SPT 2/7/10 N=17									
7			1	D SPT 10/20/25 N=45						VD			
3						<u>letted</u>							-
	stan							OTECHNICS				Job No	

HOLE No. GW101/BH101

Position :		3.0 E 634256			Surface RL:		-	from Horiz. : 90°		Processed : MAG
Rig Type Date Star			lounting: Tra		Contractor : Total Drilling Pty mpleted : 29/8/2018			d by : D. Cooper		Checked : AWJ Date: 20/09/2018
Butto Otur	DRILLIN				MATERIAL	-	.0990		N	ote: * indicates signatures on ori issue of log or last revision of lo
SCALE (m) Drilling Method	Hole Support \ Casing	Water Samples & Tests	Depth / (RL) metres Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, min components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Q Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
9 10 11 12 13 14		SPT 8/15/25 fo 120mm N=re 5/12/21 N=33			SAND, as previous.	W	VD			5 mm Specialised Sand Backfill

Proj	ent : ect : ation	Beln	nont Te	iter Corpora emporary D VWTP, NS	esalina	tion Pla	ant				HOLE No.		/101/BH101 T 3 OF 3
os	ition : Type	: 3756		6342563.		Track		Surface RL: Contractor : Total Drilling Pty Lto		-	from Horiz. : 90° : M. Sawyer		Processed : MAG Checked : AWJ
Date	e Star	ted : 2		18		Dat	te Con	npleted: 29/8/2018	L	ogge	d by : D. Cooper		Date: 20/09/2018 Note: * indicates signatures on ori issue of log or last revision of log
		DRILL	ING	1				MATERIAL		1			issue of log or last revision of I PIEZOMETER
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
				D	16.30		SW	SAND, as previous.	W	VD			
7				D SPT 7/16/25 for 135mm N=ref			SW	SAND, grey, fine to coarse grained, trace clay, (estuarine/marine?).	W	VD			
8	Hollow Flight Auger			D SPT 8/16/25 for	17.50		SW	SAND, grey, fine to coarse grained, trace of fine grained, sub-rounded gravel, (marine/estuarine?).	W	VD			- 5 mm Specialised Sand Backfill
20-	_ _			125mm N=ref	20.00			End of borehole at 20 metres.					Base of piezo @ 20
2													
3													
4													
leta	ails o	dard s f abbre of desc	eviatio	ons 🤆	HD	Level T: 61	3, GH I 2 497	OTECHNICS D Tower, 24 Honeysuckle Drive, New 79 9999 F: 61 2 4979 9988 E: ntli NG GEOTECHNICAL ENGINEERS	mail(@ghd	0 Australia .com	Job No 2	o. 22-19573

-	ect : ation			mporary D WTP, NSV		tion Pla	ant				HOLE No. (1 OF 3
	ition :			6342448.0				Surface RL:	A	ngle f	rom Horiz. : 90°		Processed : MAG
-	Туре		lanjin D		unting:						M. Sawyer	(Checked : AWJ
Dat	e Star	ted: 1	5/8/201	8		Date Completed : 15/8/2018 Logged by : D. Cooper							Date: 20/09/2018
		DRILL	ING					MATERIAL				i	e: * indicates signatures on orig ssue of log or last revision of lo PIEZOMETER
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
				Dx3 Dx2 Dx2 Dx2 D	0.80		-	FILL, SAND, brown to grey, fine to coarse grained, with silt, abundant rootlets, trace plastic(band aid), (fill).	D	-			 Monument cover, w _→ cap @ 1.0 m agl Concrete Bentonite
1				SPT 2/3/4 N=7 D	1.30		SW	FILL, SAND, pale yellow brown, fine to coarse grained, trace wire, (fill).	D	-			
				D SPT 3/4/5			SW	SAND, pale yellow brown, fine to coarse, (aeolian).	D	MD			
2				N=9 Dx2	1.70		SW	SAND, brown to grey, fine to coarse grained, with silt (alluvium).	М	MD			
	AD/T	N.	2.3m		2.70				w				
3				SPT 3/3/4 N=7	2.70		SW	SAND, grey, fine to coarse grained, trace of shells (marine?).	W	MD			— 50mm PVC casing — Backfill
4				D SPT 3/5/7 N=12						MD- D			
5	ger			D SPT									
6	— Hollow Flight Auger			2/3/4 N=7									⊢ Bentonite ⊢ 5 mm Specialised Sand Backfill
7				D SPT 3/13/22 N=35						VD			Janu Daŭkini
B						ristick.		OTECHNICS				b No	

5 Pro	ject :			emporary D		ation Pla	ant				HULE NO.		
Loc	cation			WTP, NS								SHEET	2 OF 3
Pos	sition :			E 6342448.			Surface RL: Angle from Horiz.: 90° Track Contractor: Total Drilling Pty Ltd Driller: M. Sawyer						Processed : MAG
Rig	Type		Hanjin		ounting			Contractor : Total Drilling Pty Lte					Checked : AWJ
	te Star			δI							by: D. Cooper	N	Date: 20/09/2018 ote: * indicates signatures on origina issue of log or last revision of log
		DRILL	ING	1		MATERIAL							issue of log or last revision of log PIEZOMETER
Pros Pos Rig Dat SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
-10	Hollow Flight Auger			D SPT 5/13/20 N=33 D D SPT 5/20/25 for 110mm N=ref			SW	SAND, as previous.	W	VD			- 5 mm Specialised Sand Backfill
- 15													
- 16				· · · · ·	<u> </u>						1		
det	See standard sheets for details of abbreviations & basis of descriptions					Level T: 61	3, GH 1 2 497	OTECHNICS D Tower, 24 Honeysuckle Drive, New '9 9999 F: 61 2 4979 9988 E: ntl NG GEOTECHNICAL ENGINEERS			Australia com	ob No 2	o. 2-19573

Pro	ent: ject:	Beln	nont Te	emporary D	esalina	tion Pla	ant				HOLE No.		102/BH102
	ation			WTP, NSV 6342448.0				Surface RL:	A	ngle	from Horiz. : 90°	SHEET	Processed : MAG
Rig	Туре	: ⊦	lanjin l	D&B Mo	unting:	Track		Contractor: Total Drilling Pty Lto	d D	riller	: M. Sawyer		Checked : AWJ
Dat	e Star	ted: 1	5/8/20	18	Date Completed : 15/8/2018 Logged by : D. Cooper								Date: 20/09/2018
		DRILL	ING		MATERIAL								te: * indicates signatures on or issue of log or last revision of l PIEZOMETER
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
117 118 119 20	Hollow Flight Auger			D SPT 7/18/25 for 90mm N=ref D D D SPT 14/24/25 for 120mm N=ref	19.00		SW	SAND, as previous. SAND, pale grey, fine to coarse grained, trace fines (clay), (marine/estuarine?)	w	VD			← 5 mm Specialised Sand Backfill
22-					22.00			End of borehole at 22 metres. Target Depth					Hase of piezo @ 21.9m bgl
24													
See	e stan	dard s	heets	for	_	GH) GE	OTECHNICS D Tower, 24 Honeysuckle Drive, Newo '9 9999 F: 61 2 4979 9988 E: ntlr				Job No).

lient: roject:			ter Corpor emporary [ion Pla	ant				HOLE No.		/103/BH103
ocation :			WTP, NS				· · ·				SHEE	T 1 OF 6
osition :			6342505.		Tuesla		Surface RL:		-	rom Horiz. : 90°		Processed : MAC
ig Type :		Hanjin [ounting:			Contractor : Total Drilling Pty Lto			M. Sawyer		Checked : AWJ
ate Start			18		Dat	e Com	pleted: 16/8/2018	L	oggeo	by: D. Cooper	N	Date: 20/09/2018 lote: * indicates signatures on o issue of log or last revision of
	DRILL	ING					MATERIAL					issue of log or last revision of PIEZOMETER
Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
			Dx3 Dx2			SW	SAND, pale yellow brown, fine to coarse grained, (aeolian).	D	-			Monument cover, v cap @ 0.8m agl Concrete
Τ	AD/T Nil	 1.3m	Dx2 D SPT 2/1/3 N=4 Dx2	D PT /3 =4 x2 D		SM	Silty SAND, dark grey to brown, fine to coarse grained, organic odour, (alluvium). 0.70m, minor zones of sand, trace of silt.	Μ	MD			
AD	Ī	1.3m	D SPT 2/3/3 N=6					W				
			Dx2	1.80		SW	SAND, grey fine to coarse grained, (marine?).	W	MD			- Backfill 50mm PVC casing
			D SPT 3/5/6 N=11 D SPT 5/8/12 N=20						D			- Bentonite
- Mashboring -			D SPT 6/9/12 N=21				5.30-5.35m, trace of fine grained, sub-rounded to rounded gravel.					 ← 5 mm Specialised Sand Backfill
			SPT 7/11/17 N=28									
ee stand			N=28	HD	Level	3, GHI	DTECHNICS D Tower, 24 Honeysuckle Drive, Newo 9 9999 F: 61 2 4979 9988 E: ntlr	castle	e 2300) Australia	Job No	o. 22

Projec				emporary D		tion Pla	ant		SHEET 2 OF 6					
Locati Positio				WTP, NSV 6342505.0				Surface RL:	Α	nale	from Horiz. : 90°	JILL	Processed : MAG	
Rig Ty			njin E		ounting:	Track		Contractor : Total Drilling Pty Ltd		-			Checked : AWJ	
	Starte	ed: 16/	/8/201	18		Dat	te Con	npleted: 16/8/2018	Lo	oggeo	d by : D. Cooper		Date: 20/09/2018	
	C	RILLIN	IG			MATERIAL						N	ote: * indicates signatures on original issue of log or last revision of log PIEZOMETER	
SCALE (m)		Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components	
				D SPT 14/19/25 N=44			SW	SAND, as previous.	W	VD			 	
- 11 - 11 - 12 - 12 - 13 - 13 - 13				D SPT 13/21/25 for 145mm N=ref									← 5 mm Specialised Sand Backfill	
- 14 - 14 - 15 - 15 - 15 - 16				D SPT 19/25 for 120mm N=ref										
See st details	s of a	ard sh abbrev descr	/iatio	ns 🤅	HD	Level T: 61	3, GH I 2 497	OTECHNICS D Tower, 24 Honeysuckle Drive, New '9 9999 F: 61 2 4979 9988 E: ntli NG GEOTECHNICAL ENGINEERS	castle mail@ AND	e 230 Dghd. D GE(0 Australia com	Job No 2	o. 2-19573	

	oject : cation			emporary [/WTP, NS\		tion Pla	ant					SHEE	T 3 OF 6	
Po	sition :			E 6342505.				Surface RL:	Α	ngle	from Horiz. : 90°	Processed : MAG		
Rig	g Type		-lanjin I		ounting:	Track		Contractor: Total Drilling Pty Lto		-	: M. Sawyer		Checked : AWJ	
Da	te Star	ted: 1	6/8/20	18		Dat	te Con	npleted: 16/8/2018	Lo	ogge	d by : D. Cooper		Date: 20/09/2018	
		DRILL	ING					MATERIAL					Note: * indicates signatures on origin issue of log or last revision of log PIEZOMETER	
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Cor	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components	
- 17 - 18 - 19 - 20 - 21 - 22 - 23	Washboring			D SPT 24/25 for 110m N=ref			SW	SAND, as previous.	W	VD			 	
						~						Lak M		
de	e stan tails of basis c	fabbr	eviatio	ons 🤆	HD	Level T: 61	3, GH I 2 497	OTECHNICS D Tower, 24 Honeysuckle Drive, New 79 9999 F: 61 2 4979 9988 E: ntli NG GEOTECHNICAL ENGINEERS	mail@)ghd.	.com	Job N	^{o.} 2 2-19573	

			634250		- ·		Surface RL:		-	from Horiz. : 90°	Processed : MAG
Rig Type Date Sta		Hanjin I		Mounting:		0 Com	Contractor : Total Drilling Pty Ltd npleted : 16/8/2018			: M. Sawyer d by : D. Cooper	Checked : AWJ Date: 20/09/201
	DRILI		.0		Dat	5 501	MATERIAL		2996		Note: * indicates signatures on o issue of log or last revision of
Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Components
225 26 27 28 29 30 31				31.00		SW CI- CH	SAND, as previous.	W	VD		 ← 5 mm Specialised Sand Backfill ← Base of piezo @ 3 mbgl

	roject : ocation			emporary D		tion Pla	ant						5 OF 6
? —	ocation			/WTP, NSV E 6342505.0				Surface RL:	A	nale	from Horiz. : 90°		Processed : MAG
	ig Type		-lanjin I		unting:	Track		Contractor : Total Drilling Pty Ltd		-			Checked : AWJ
D	ate Star		6/8/20	18		Dat	e Con	npleted : 16/8/2018			d by : D. Cooper		Date: 20/09/2018
		DRILL	ING					MATERIAL				N	ote: * indicates signatures on origina issue of log or last revision of log
					(0								PIEZOMETER
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	DISC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Cor	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
				D SPT 8/12/15 N=27			Сŀ- СH	CLAY, as previous.	Μ	VSt VSt	PP on SPT sample =320-380 kPa		
- 35 - 35 - - - - - - -													-
- 36 - 36 - - - -	Washboring												
- 37 - 37 - - - -	7												
- 38 - 38 - - - -	3												
- 39 													
-40				· · · · · ·		<u></u>	. ~-						
d	ee stan etails of basis o	fabbr	eviatio	ons 🤆	HD	Level T: 61	3, GH 2 497	OTECHNICS D Tower, 24 Honeysuckle Drive, New 9 9999 F: 61 2 4979 9988 E: nth NG GEOTECHNICAL ENGINEERS			0 Australia .com	ob No 2	o. 2-19573

		E LO	g she	ET WITH S	STAND	PIPE PI	EZOM	ETER					
5	lient :			ater Corpor								GW	103/BH103
	roject :			emporary D		tion Pla	ant						
-	ocation			WTP, NS				Surface RL:	•		from Horiz - 00°	SHEE	F 6 OF 6
ς —	osition : tig Type		Hanjin	E 6342505.	ounting	Track		Contractor : Total Drilling Pty Lte		-	from Horiz. : 90°		Processed : MAG Checked : AWJ
	ate Star				unung			pleted : 16/8/2018			d by : D. Cooper		Date: 20/09/2018
		DRILL			MATERIAL								ote: * indicates signatures on original issue of log or last revision of log
5						<u>г</u>						_	PIEZOMETER
SCALE (m)	- Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	LSC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength		Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
	T Washboring				41.10		CI- CH	CLAY, as previous.	M	VSt VSt			
- 4	2							End of borehole at 41.1 metres. Target Depth					
-4 - - - - - - - - - - - - - - - - - -													
- - - - - - - - - - - -	5												
- -4 - - - - - - -	6												
- 4 - 4 - 4													
ls	ee stan	dard s	sheets	for	\sim	GHE) GE	OTECHNICS			J	lob No).

See standard sheets for details of abbreviations & basis of descriptions

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22-19573

Pro	ent : ject : cation	Beln	nont Ter	er Corpora mporary D NTP, NSV	esalina	tion Pla	ant				HOLE No.		104/BH104 1 OF 3
Pos	sition	: 3757	716.0 E	6342557.0	N			Surface RL:		-	rom Horiz. : 90°		Processed : SBO
-	Туре		lanjin D		unting:	Track		Contractor: Total Drilling Pty Lt					Checked : AWJ
Dat	e Star	ted: 3	1/8/201	8		Dat	te Cor	npleted: 31/8/2018	L	oggeo	I by : D. Cooper		Date: 20/09/2018
		DRILL	ING		MATERIAL							No	te: * indicates signatures on ori ssue of log or last revision of lo PIEZOMETER
SCALE (M)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
				Dx3 Dx2 Dx2	0.10			FILL, Silty SAND, dark grey, fine to coarse grained, (fill). FILL, SAND, brown, fine to coarse grained, trace of silt, (fill).	D	-			✓ Monument cover, w cap @ 1.1m agl Concrete
1				D SPT 3/4/6 N=10 Dx2	0.70		SW	SAND, pale yellow brown, fine to coarse grained, (aeolian).	D	MD- D			
			⊥.5m	D SPT									
			1.5m	5/5/5 N=10	1.70		<u></u>		W				
	 				0.00		SW	SAND, brown, fine to coarse grained, with silt,	W	MD- D			
3	AD/T	ĨŻ		D SPT 3/4/6 N=10	2.00		SW	(estuarine/marine?). SAND, grey, fine to coarse grained, trace of silt, trace of fine grained, sub-rounded gravel, (marine?).	W	MD- D			— 50mm PVC casing ⊫ Backfill
1 − 5				D SPT 4/5/7 N=12									← Bentonite
6	Hollow Flight Auger			D SPT 4/4/5 N=9									
7				D SPT 3/10/18 N=28									
8 L						<u></u>			•				
See	e stan	dard s	heets f	for Ins		GHI	JGE	OTECHNICS ID Tower, 24 Honeysuckle Drive, New 79 9999 F: 61 2 4979 9988 E: ntl				Job No	

Client : Project :	Belmont 1	ater Corpor emporary [Desalina	tion Pla	ant				HOLE No.		
ocation :		VWTP, NS E 6342557.				Surface RL:	•	nalo fi	om Horiz. : 90°	SHEE	F 2 OF 3 Processed : SBC
Rig Type :	Hanjin		ounting	Track		Contractor : Total Drilling Pty Lt		-	M. Sawyer		Checked : AW.
Date Starte	d: 31/8/2	018		Dat	te Con	npleted: 31/8/2018	L	ogged	by: D. Cooper		Date: 20/09/201
D	RILLING					MATERIAL					lote: * indicates signatures on issue of log or last revision of PIEZOMETER
Drilling Method	\ Casing Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
0 11 2 13 4		SPT 3/9/14 N=23 SPT 6/15/25 for 140mm N=ref			SW	SAND, as previous.	W	VD-			 5 mm Specialisec Sand Backfill 50mm PVC Scree Pipe

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See standard sheets for

details of abbreviations

& basis of descriptions

GHD

Job No.

22-19573

Pro Loc	ent : ject : ation	Beln : Beln	nont Te nont W	ater Corpora emporary D /WTP, NSV	esalina V	tion Pla	ant						/104/BH104 T 3 OF 3
	ition			6342557.0		Tuesla		Surface RL:		-	from Horiz. : 90°		Processed : SBO
	Type o Star	ted:3	lanjin l 1/8/20		unting:		e Con	Contractor : Total Drilling Pty Lto			: M. Sawyer d by : D. Cooper		Checked : AWJ Date: 20/09/2018
	e otai	DRILL										N	Note: * indicates signatures on or issue of log or last revision of l
_		DRILL	ING					MATERIAL					PIEZOMETER
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
8	Hollow Flight Auger			SPT 7/9/15 N=24 SPT 10/17/25 for 130mm N=ref			SW	SAND, as previous.	W	MD- D			- 5 mm Specialised Sand Backfill
20 21 22	<u> </u>				_20.00			End of borehole at 20 metres. Target Depth					Base of piezo @ 20.0m
		dard s		for ons	Ð	GHE Level T: 61) GE 3, GH 2 497	OTECHNICS D Tower, 24 Honeysuckle Drive, New '9 9999 F: 61 2 4979 9988 E: ntli	castl mail@	e 230		Job Ne	o. 22-19573

os	ation ation : Type	3757		VTP, NSV 6342432.0 &B Mo		Track		Surface RL: Contractor : Total Drilling Pty Lt		-	r om Horiz. : 90° M. Sawyer		1 OF 3 Processed : SBO Checked : AWJ
Dat	e Star	ted : 2	8/8/201	8		Dat	te Cor	npleted : 28/8/2018	L	ogged	by: D. Cooper		Date: 20/09/2018
		DRILL	ING					MATERIAL			te: * indicates signatures on ori issue of log or last revision of lo PIEZOMETER		
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
1				D SPT 4/5/5 N=10 D SPT 3/2/5 N=7			SW	SAND, pale yellow brown, fine to coarse grained, (aeolian).	M	MD			← Monument cover, w
3				D SPT 3/4/4 N=8									← Backfill — 50mm PVC casing
5	AD/T	Nil	4.1m	D SPT 2/3/3 N=6					w	L- MD			
6				D SPT 2/2/3 N=5									u – Bentonite
7				D SPT 2/2/4 N=6				SAND, grey, fine to coarse grained, trace of clayey sand lenses, (marine/estuarine?).					

	nt : ect :			ater Corpora emporary D		tion DI	ant				HOLE No.	GW	105/BH105
-	ation			/WTP, NSV			anı					SHEE	Г 2 OF 3
_	ition :			E 6342432.0				Surface RL:	Α	nglef	rom Horiz. : 90°		Processed : SBC
	Туре		lanjin		unting	: Track		Contractor: Total Drilling Pty Lto					Checked : AWJ
ate	e Star	ted : 2	8/8/20	18		Dat	te Con	npleted: 28/8/2018	L	oggeo	by: D. Cooper		Date: 20/09/201
		DRILL	ING					MATERIAL					ote: * indicates signatures on of issue of log or last revision of PIEZOMETER
	poq	t		Tests	.) metres	0	Ы	Description SOIL TYPE, colour, structure, minor components (origin),	ondition	y/ ex	Comments/ Observations	Log	Components
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index		Piezometer Log	
+							SW	SAND, as previous.	W				• •
													• • •
								8.5m, becoming dark grey, trace					:
				D				silt.					•
													•
								9.5m, becoming grey, no silt.					· ·
													 5 mm Specialised Sand Backfill
כ										VD			• • •
				D									, , ,
				SPT 7/17/25									:
				for 140mm									
				N=ref									
1													
													· ·
													• • •
2	AD/T-	Ī											
	<												· · ·
													· ·
													:
3													· • •
				SPT 10/19/25									: 50mm PVC Scree
				for 100mm									Pipe
				N=ref									
1													4 5 5
Ť													
													-
								14.5m, trace of fine grained,					 5 mm Specialised Sand Backfill
								sub-rounded to rounded gravel.					· · ·
5													• • •
													* *
													* * *
													-
		1		1	1	101051				1		i - Eli	1

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 22-19573

Loca	ect : ation	Beln : Beln	nont To nont W	ater Corpora emporary D /WTP, NSV	esalina V	tion Pla	ant					-	105/BH105 r 3 of 3
	tion :			6342432.0				Surface RL:		-	from Horiz. : 90°		Processed : SBO
	Type	: ⊦ ted:2	lanjin		unting:			Contractor : Total Drilling Pty Lto			: M. Sawyer J by : D. Cooper		Checked : AWJ Date: 20/09/2018
Date				10		Dat	e con	npleted : 28/8/2018		ogged	i by . D. Cooper	N	lote: * indicates signatures on origi issue of log or last revision of log
		DRILL	ING					MATERIAL					PIEZOMETER
SUALE (M)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
17	μ	_		SPT 9/20/25 for 110mm N=ref			SW	SAND, as previous.	W	VD			 − 5 mm Specialised Sand Backfill
19 20	AD/T	Ni		SPT 6/18/25 for 100mm N=ref	_20.50								Base of piezo @
21 22 23								End of borehole at 20.5 metres. Target Depth					20.5m
leta	ils o	dard s f abbre		ons C	HD	Level T: 61	3, GH 2 497	OTECHNICS D Tower, 24 Honeysuckle Drive, New 79 9999 F: 61 2 4979 9988 E: ntlr NG GEOTECHNICAL ENGINEERS	castl mail(e 230 @ghd.	0 Australia com	Job No 2	o. 22-19573

	37573 Ha	ont WWTF 37.0 E 634 anjin D&B		/							<u></u>	
Rig Type : Date Starte	Ha ed: 27,		.2369 0	N			Surface RL:	Δ	nale f	rom Horiz. : 90°	SHEE	T 1 OF 3 Processed : SBO
Date Starte	ed: 27			unting:	Track		Contractor : Total Drilling Pty Ltd		-	M. Sawyer		Checked : AWJ
		-				Comp	bleted : 27/8/2018			by : D. Cooper		Date: 20/09/2018
thod		IG					MATERIAL				N	ote: * indicates signatures on or issue of log or last revision of l
¥ ¥	Hole Support \ Casing	H	Samples & Lests	Depth / (RL) metres	c Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
Drilling Method	Hole S \ Casir	Water	Sample	Depth			ROCK TYPE, colour, grain size, structure, weathering, strength	Moistu	Consis Densit] Piezon	
AD/T	Ĩ		D SPT 3/3/3 N=6 D SPT 2/5/4 N=7 D SPT 3/4/5 N=9			SW	SAND, pale yellow brown, fine to coarse grained, (aeolian). SAND, grey, fine to coarse grained, (marine?).	M	MD			 Honument cover, v cap @ 1.0m agl Concrete Goncrete Backfill 50mm PVC casing
	4	1	D SPT I/1/2 N=3					w	L			
Hollow Flight Auger		3	D SPT 3/3/4 N=7				5.8m, trace silt/clay.		MD			- Bentonite
		4/	D SPT 7/10 I=17				7.0m, without fines.		D			

Clie Pro	ject :			iter Corpora emporary D		tion Pla	ant						106/BH106
	ation ition :			WTP, NSV 6342369.0				Surface RL:	Δ	nalo fr	om Horiz. : 90°	SHEE	F 2 OF 3 Processed : SBO
	Type		lanjin [unting:	Track		Contractor : Total Drilling Pty Lt		-	M. Sawyer		Checked : AWJ
Dat	e Star	ted : 27	7/8/20	18		Dat	e Con	npleted : 27/8/2018		ogged	by : D. Cooper		Date: 20/09/2018
		DRILLI	NG					MATERIAL				N	ote: * indicates signatures on o issue of log or last revision of PIEZOMETER
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
0 1 1 3 3 4	Hollow Flight Auger			D SPT 4/14/25 for 140mm N=ref			SW	SAND, as previous.	w	VD			 50mm PVC Screer Pipe 5 mm Specialised Sand Backfill
6													
	otan	dard s	hoote	for		GHI) GE	OTECHNICS ID Tower, 24 Honeysuckle Drive, New 79 9999 F: 61 2 4979 9988 E: nt			J	ob N	D.

Client Projec				emporary D		tion Pla	ant				HOLE NO.		106/BH106
∟ocat Positi				WTP, NSV 6342369.0				Surface RL:	Δ	nale	from Horiz. : 90°	SHEET	7 3 OF 3 Processed : SBO
Rig Ty			lanjin		unting:	Track		Contractor : Total Drilling Pty Lto			: M. Sawyer		Checked : AWJ
		ed: 2	-					npleted : 27/8/2018			d by : D. Cooper		Date: 20/09/2018
		DRILL	NG					MATERIAL				N	ote: * indicates signatures on or issue of log or last revision of l
					S						Commentel		PIEZOMETER
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
7 8 1 1 1				SPT 8/25 for 135mm N=ref			SW	SAND, as previous.	W	VD			<−5 mm Specialised Sand Backfill
0	•			19/25 for 100mm N=ref	20.40 20.50		CI- CH	CLAY, grey, medium to high plasticity, trace fine to medium grained sand, (estuarine?). End of borehole at 20.5 metres. Target Depth	M				Base of piezo @ 20.5m
23		dard s						OTECHNICS				Job No	

Pos Rig	ition : Type	3758 : ⊦						Surface RL: Contractor : Total Drilling Pty L npleted : 24/8/2018	td D	riller	rom Horiz. : 90° : M. Sawyer I by : D. Cooper		1 OF 3 Processed : SBO Checked : AWJ Date : 20/09/2018
		DRILL	ING					MATERIAL			- · ·	N	ote: * indicates signatures on orig issue of log or last revision of lo PIEZOMETER
ocale (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, mino components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
1				D SPT 3/5/7 N=12 D SPT 5/6/8 N=14			SW	SAND, yellow-brown, fine to coarse grained (aeolian).	D D-M	D			 Monument cover, w cap @ 0.9m agl Concrete
3	AD/T	Nii		D SPT 4/6/7 N=13	2.88		SW	SAND, grey, fine to coarse grained, trace of silt, (marine?).	M				← Backfill ← 50mm PVC casing
5	Α		4.3m	D SPT 3/5/4 N=9					w	MD			
6				D SPT 3/4/5 N=9				5.5m, trace of clayey sand zones, dark grey. 5.8m, becoming yellow brown, trace silt, trace coal/charcoal fragments.					 → Bentonite → 5 mm Specialised Sand Backfill
7	¥			D SPT 2/3/4 N=7				7.0m, becoming pale grey,					

details of abbreviations & basis of descriptions

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Client : Hunter Water Corporation

HOLE No. GW107/BH107

E Project				emporary D /WTP, NS\		ition Pi	ant				S	HEET	2 OF 3
Positi				6342470.				Surface RL:	A	ngle	from Horiz. : 90°		Processed : SBO
Positi Rig Ty	/pe :	F	lanjin [D&B Mo	ounting	: Track		Contractor: Total Drilling Pty Lto			: M. Sawyer		Checked : AWJ
- Duite C	Start	ed : 2	4/8/20	18		Da	te Con	npleted: 24/8/2018	L	ogge	d by : D. Cooper		Date: 20/09/2018
	[ORILL	ING					MATERIAL				N	ote: * indicates signatures on origina issue of log or last revision of log PIEZOMETER
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength		Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
-10				D SPT 1/8/19 N=27 B/16/25 for 130mm N=ref			SW	SAND, as previous.	M	VD			50mm PVC Screen Pipe 5 mm Specialised Sand Backfill
- 16					I				1	1	I I	r.H.	ή
See s detail & bas	s of	abbro		ons 🤅	HD	Leve T: 6	l 3, GH 1 2 497	OTECHNICS D Tower, 24 Honeysuckle Drive, New '9 9999 F: 61 2 4979 9988 E: ntli NG GEOTECHNICAL ENGINEERS	mail(@ghd	0 Australia com	b No 2	o. 2-19573

Proj .oc	ent : ject : ation ition :	Belm : Belm	nont Te nont W	iter Corpora emporary D /WTP, NSV 6342470.0	esalina V	tion Pla	ant	Surface RL:	A	ngle	HOLE No.	SHEET	107/BH107 3 OF 3 Processed : SBC
-	Type	: H ted: 24	lanjin [unting:			Contractor: Total Drilling Pty Lto			: M. Sawyer d by : D. Cooper		Checked : AWJ
Jac		DRILLI		10		Dat	e Con	npleted : 24/8/2018 MATERIAL		ogge	u by : D. Cooper		Date: 20/09/2018 te: * indicates signatures on of issue of log or last revision of
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	PIEZOMETER Components
7	Auger			D SPT 7/15/25 for 130mm N=ref			SW	SAND, as previous.	M	VD			
9	Hollow Flight Auger			SPT 3/10/21 N=31									
01	_				20.10			End of borehole at 20.1 metres. Target Depth					Base of piezo @ 20.5m bgl
2													
3													
		dard s f abbre		for ons	HD) GE 3, GH	OTECHNICS D Tower, 24 Honeysuckle Drive, New 9 9999 F: 61 2 4979 9988 E: ntli	castl	e 230	0 Australia	Job No	2-19573

Pro	ent: ject: ation	Beln	nont Te	er Corpora mporary D NTP, NSV	esalina	tion Pla	ant				HOLE No.		V108/BH108 et 1 of 3
Rig	ition : Type	: +	lanjin D		0 N unting :			Surface RL: Contractor : Total Drilling Pty Lt	d D	riller :			Processed : SBO Checked : AWJ
Dat	e Star		2/8/201 ING	0		Dai	le Cor	npleted : 22/8/2018 MATERIAL		oggea	by : D. Cooper		Date: 20/09/2018 Note: * indicates signatures on ori issue of log or last revision of k
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer I od	Components
				Dx3 Dx2	0.70		-	FILL, Sandy GRAVEL, brown, fine to coarse grained, sub-rounded to sub-angular, sand is fine to to coarse grained, with silt, trace of slag (fill).	D M	-			 Monument cover, v cap @ 0.8m agl Concrete
1	AD/T	Nil	0. [⊉] 0.8m	D SPT 5/6/6 N=12 D	1.20		SM	SAND, brown, fine to coarse grained, with silt (estuarine?). SAND, grey, fine to coarse	M W W	MD			Backfill
2	.			SPT 5/6/8 N=14			300	grained (marine?).	vv	MD			50mm PVC casing
3				D SPT 2/3/3 N=6									Bentonite 5 mm Specialised Sand Backfill
5	Hollow Flight Auger			D SPT 3/4/5 N=9									
6				D SPT 3/4/7 N=11									
7				D SPT 4/11/16 N=27				7.0m, becoming trace of brown zones, trace silt.		D			
			heets eviatio		HD	GHI Level	D GE 3, GF	OTECHNICS ID Tower, 24 Honeysuckle Drive, New 79 9999 F: 61 2 4979 9988 E: ntl	rcastl mail@	e 2300	Australia	Job N	lo. 22-19573

Cliei Proje		Belm	nont Te	iter Corpora emporary D /WTP, NSV	esalinat	ion Pla	ant						108/BH108
	tion :			E 6342625.0				Surface RL:	A	ngle f	rom Horiz. : 90°		Processed : SBO
Rig 1	Гуре	: н	lanjin I	D&B Mo	unting:	Track		Contractor: Total Drilling Pty Ltd		-	M. Sawyer		Checked : AWJ
Date	Star	ted: 2	2/8/20	18		Dat	e Con	npleted: 22/8/2018	L	ogged	by : D. Cooper		Date: 20/09/2018
		DRILLI	NG					MATERIAL				No	ote: * indicates signatures on or issue of log or last revision of l
			-									_	PIEZOMETER
SUALE (M)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
))							SW	SAND, as previous.	W	D			
10	uger			D SPT 8/13 20 N=33	10.20		SW	SAND, brown, fine to coarse grained, trace of silt (marine).	W	D			— 50mm PVC Screen
12	Hollow Flight Auger				11.90		SW	SAND, grey, fine to coarse grained, (marine).	W	D			Pipe
13				D SPT 6/13/21 N=34									
14													
6													
See	stan	dard s	heets	for		GHI) GE	OTECHNICS ID Tower, 24 Honeysuckle Drive, New 79 9999 F: 61 2 4979 9988 E: ntli			J	ob No).

Proj	ent: ject:	Belm	nont Te	ter Corpora emporary D	esalina	tion Pla	ant				HOLE No.		108/BH108
	ation			WTP, NSV 6342625.0				Surface RL:	A	ngle f	rom Horiz. : 90°	SHEE	Processed : SBO
	Туре		lanjin I	D&B Mo	unting:	Track		Contractor : Total Drilling Pty Ltd			: M. Sawyer		Checked : AWJ
Dat	e Star	ted: 2	2/8/20	18		Dat	e Con	npleted : 22/8/2018	L	oggeo	I by : D. Cooper		Date: 20/09/2018
		DRILLI	ING					MATERIAL				1	Note: * indicates signatures on or issue of log or last revision of l PIEZOMETER
	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Piezometer Log	Components
17	Hollow Flight Auger			D SPT 9/22/25 for 105mm N=ref D SPT 20/25 for 130mm N=ref	19.23		SW	SAND, as previous. 16.4m, trace of orange-brown clayey sand bands. SAND, grey with black speckles, fine to medium grained, trace of clay, (marine/estuarine?).	w	VD			
20 21 22 23					20.50			End of borehole at 20.5 metres. Target Depth					Base of piezo @ 20.5m
		dard s			HD	GHI Level	D GE 3, GH	OTECHNICS D Tower, 24 Honeysuckle Drive, New '9 9999 F: 61 2 4979 9988 E: ntl	castl	e 230) Australia	Job N	o. 22-19573

	ient: oject:			orporation rary Desali	nation P	lant		HOLE	No	. TF	2101 °	
			t WWTP	-					SHE	ET	1 OF 1	
	osition		.20 E 6	342614.00	N		Surface RL:				Processed	d: RC
Me	ethod	of Explora	ation:	5T Exc	avator w	ith 450mm bucket	Hole Size:	4.0 m x 0.45m			Checked:	AWJ
Da	ate:	06/09/18	3				Logged by:	D. Cooper			Date: 20	/09/2018
						Materia	I Description			N	Note: * indicates signa issue of log or last r	atures on originatures on originatures on of lo
Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	[COBBLES / BOULD SOIL NAME: plasticity / prir secondary and minor c ROCK NAME: Grain size, c or minor compon	ERS / FILL / TOPSO nary particle charact omponents, zoning (eristics, colour, origin) and ture, inclusions	Moisture Condition	Consistency / Density Index	Comm Observa	
		Dx2			-	FILL, Silty SAND, brown, fine to coarse grained, su gravel, trace fibro (possik	b-rounded to sub-	angular	D	-		
		Dx2	0.20	KXXXX	SP	SAND, yellow brown, fine	, .		D	VL- L		
		В							м			
		Dx2								MD		
1	GNE											
		D	1.40		SP	SAND, dark grey, fine to (marine?).	coarse grained, w	ith silt	M	VL- L		
		В	1.60		SP	SAND, grey, fine to coars	e grained (marine	?).	M	L- MD		
2			2.00			End of test pit at 2 metre Collapsing to 1.50m.	S.					
3												
_		daud -1- (.		CUD	GEOTECHNICS					No	
		dard sheets abbreviatio		GHD	GHD Level 3	GEOTECHNICS , GHD Tower, 24 Honeysuckle 2 4979 9999 F: 61 2 4979 9	Drive, Newcastle 2	300 Australia		Job	No.	







CLIENTS PEOPLE PERFORMANCE

Hunter Water Corporation Belmont Temporary Desalination Plant GEOTECHNICAL INVESTIGATION **TESTPIT PHOTOGRAPHS – TP101** job no 22/19573 file ref scale N/A date 06/09/18

GEOT

	ient:		Water C	•	nation D	HOL	E No). TI	P102	
	oject: catio		t Tempo t WWTF	rary Desali	nation P	ant	SHE	FT	1 OF 1	
	osition			342493.34	N	Surface RL:			Processe	d: RC
		of Explora				th 450mm bucket Hole Size: 4.0 m x 0.4	5m		Checked:	-
	ate:	06/09/18				Logged by: D. Cooper	5111		Date: 20	
			-						Note: * indicates sign issue of log or last	
Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description [COBBLES / BOULDERS / FILL / TOPSOIL] then SOIL NAME: plasticity / primary particle characteristics, colou secondary and minor components, zoning (origin) and ROCK NAME: Grain size, colour, fabric and texture, inclusion or minor components, durability, strength, weathering / alteration, defects	k, Moisture Condition	Consistency / Density Index	Comm Observa	ents
		Dx2			-	FILL, SAND, brown to grey, fine to coarse grained, with silt (fill/disturbed).	М	-		
		Dx2	0.20		-	FILL, CLAY, brown, low to medium plasticity, with fine to coarse grained sand, abundant rootlets (fill/disturbed).	D M	-		
			0.40		SW	SAND, grey, fine to coarse grained, trace of silt, organic odour (marine?).	C M W	VL- L		
		B D				0.60m, pale grey, becoming trace of silt.	vv			
	 0.8m					0.90m, becoming grey.		L- MD		
1		D								
		D				1.50m, becoming brown to grey.				
2-		D	2.00			End of test pit at 2 metres.				
						Hole collapsing.				
3										
Se	e stan	dard sheets	for ons	GHD	GHD	GEOTECHNICS GHD Tower, 24 Honeysuckle Drive, Newcastle 2300 Australia 4979 9999 F: 61 2 4979 9988 E: ntlmail@ghd.com		Job	No.	







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Hunter Water Corporation Belmont Temporary Desalination Plant GEOTECHNICAL INVESTIGATION **TESTPIT PHOTOGRAPHS – TP102** job no 22/19573 file ref scale N/A date 06/09/18

	ient: oject:		Water Co nt Tempor	•	ination D	HOLE	No	. тр	P103	
	oject.		nt WWTP	-		lan	SHE	ET	1 OF 1	
	sitior		7.00 E 63) N	Surface RL:	_			RC
		of Explor				th 450mm bucket Hole Size: 4.0 m x 0.45m			Checked: AV	NJ
	ate:	06/09/18				Logged by: D. Cooper			Date: 20/09/2	2018
								N	Note: * indicates signatures o issue of log or last revisior	n ori of k
ocale (III)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description [COBBLES / BOULDERS / FILL / TOPSOIL] then SOIL NAME: plasticity / primary particle characteristics, colour, secondary and minor components, zoning (origin) and ROCK NAME: Grain size, colour, fabric and texture, inclusions or minor components, durability, strength, weathering / alteration, defects	Moisture Condition	Consistency / Density Index	Comments Observatior	5
		Dx2			SW	SAND, pale yellow brown, fine to coarse grained (aeolian).	D	VL		
		Dx2					M			
			0.50				M- W			
		Dx2			SW	SAND, dark grey to black, fine to coarse grained, with silt, trace clay (estuarine?)	M- W	VL		
			0.70		SW	SAND, grey to dark grey, fine to coarse grained, trace of silt.	M- W	VL		
1	 1.2m	Dx2						L		
		D	1.90							
2						End of test pit at 1.9 metres. Hole caving in to 0.50m.				
3										
		dard sheets abbreviati	s for	GHD	Level 3	GEOTECHNICS , GHD Tower, 24 Honeysuckle Drive, Newcastle 2300 Australia 2 4979 9999 F: 61 2 4979 9988 E: ntlmail@ghd.com		Job	No.	







CLIENTS PEOPLE PERFORMANCE

Hunter Water Corporation Belmont Temporary Desalination Plant GEOTECHNICAL INVESTIGATION **TESTPIT PHOTOGRAPHS – TP103** job no 22/19573 file ref scale N/A date 06/09/18

				orporation		HOLE	No	. TF	P104
	oject			•	ination P	lant	SHE		1 OF 1
	ocatio sitio		t WWTP, 0.00 E 63			Surface RL:	SHE		Processed: RC
		of Explora				ith 450mm bucket Hole Size: 4.0 m x 0.45m			Checked: AWJ
	ate:	06/09/18		JIEA	avalui w	Logged by: D. Cooper			Date: 20/09/2018
	110.	00/03/10	,					N	lote: * indicates signatures on ori issue of log or last revision of k
Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description [COBBLES / BOULDERS / FILL / TOPSOIL] then SOIL NAME: plasticity / primary particle characteristics, colour, secondary and minor components, zoning (origin) and ROCK NAME: Grain size, colour, fabric and texture, inclusions or minor components, durability, strength, weathering / alteration, defects	Moisture Condition	Consistency / Density Index	Comments Observations
			0.02	~~~~~	SM SW	FILL, Silty SAND, dark grey, fine to coarse grained	D	-	
		Dx3 Dx2			500	(fill/topsoil). SAND, pale yellow brown, fine to coarse grained (aeolian).	D	UL- L	
		В	0.55						
		D B			SW	SAND, grey, fine to coarse grained, trace silt, (marine?).	M W	VL- L	
1	GNE	D						L- MD	
		D						MD	
2		В							
			2.20	<u></u>		End of test pit at 2.2 metres. Hole collapsed to 1.20m.			
3									
		dard sheets f abbreviati	for	GHD	GHD	GEOTECHNICS 3, GHD Tower, 24 Honeysuckle Drive, Newcastle 2300 Australia 2 4979 9999 F: 61 2 4979 9988 E: ntlmail@ghd.com		Job	No.







Hunter Water Corporation Belmont Temporary Desalination Plant GEOTECHNICAL INVESTIGATION **TESTPIT PHOTOGRAPHS – TP104** job no 22/19573 file ref scale N/A date 06/09/18

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Client		Water Co	•		HOLE	No.	. TF	P105	
Proje		nt Tempora		ination Pl	ant				
Locat Positi		t WWTP,			Surface RL:	SHEE	- 1	1 OF 1	
		3.00 E 63						Processed: Checked: A	RC
Date:	od of Explor 06/09/18		JIEXU		th 450mm bucket Hole Size: 4.0 m x 0.45m Logged by: D. Cooper			Date: 20/09/	
	00/03/10	0					N	Note: * indicates signatures issue of log or last revision	
ocale (m) Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	Material Description [COBBLES / BOULDERS / FILL / TOPSOIL] then SOIL NAME: plasticity / primary particle characteristics, colour, secondary and minor components, zoning (origin) and ROCK NAME: Grain size, colour, fabric and texture, inclusions or minor components, durability, strength, weathering / alteration, defects	Moisture Condition		Comment Observatio	ts
	Dx3 Dx2 B			SW	SAND, pale yellow brown, fine to coarse grained (aeolian).	D M	VL		
					0.45m, becoming grey.	w			
	Dx2	0.60		SW	SAND, dark grey to black, fine to coarse grained, with silt, trace clay (marine/estuarine?).	W	VL		
		0.80		SW	SAND, grey, fine to coarse grained (marine?).	w	VL		
1	Dx2						L		
. <u>↓</u> 1.3m	В						L- MD		
		1.60			End of test pit at 1.6 metres. Hole collapsing.		MD		
2									
3									
details	andard sheets of abbreviati	ons 🕻	GHD	Level 3 T: 61 2	GEOTECHNICS , GHD Tower, 24 Honeysuckle Drive, Newcastle 2300 Australia 2 4979 9999 F: 61 2 4979 9988 E: ntlmail@ghd.com JLTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS		Job	No. 22-19573	







CLIENTS PEOPLE PERFORMANCE

Hunter Water Corporation Belmont Temporary Desalination Plant GEOTECHNICAL INVESTIGATION **TESTPIT PHOTOGRAPHS – TP105** job no 22/19573 file ref scale N/A date 06/09/18

	ient:			orporation	5			HOLE	No	. TF	P106	
	oject: catio		t Tempo t WWTF	rary Desal	Ination P	lant			SHE	FT	1 OF 1	
	osition			342433.00) N		Surface RL:				Processe	d: RC
		of Explora				ith 450mm bucket	Hole Size:	4.0 m x 0.45m			Checked:	
	ate:	06/09/18		01 2/4			Logged by:	D. Cooper			Date: 20	
_			-			BI		- 1		N	lote: * indicates sigr issue of log or last	atures on orig
Scale (m)	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	[COBBLES / BOUL SOIL NAME: plasticity / p secondary and minor ROCK NAME: Grain size, or minor compo	components, zoning (eristics, colour, origin) and ture, inclusions	Moisture	Consistency / Density Index	Comm Observe	ients
		Dx3 Dx2 D	0.20		-	FILL, Silty SAND, dark fine to coarse grained, s gravel (gravel comprise bricks and rock) (fill). FILL, CLAY, mottled or plasticity, with fine to co gravel (fill).	sub-rounded to sub s fragments of aspl	-angular nalt, concrete, 	D	-		
		Dx2	0.60		-	FILL, SAND, grey to bro fine to coarse, sub-rour cobbles up to 180mm c	ded to sub-angular	grained, with gravel, trace	D	-		
·1		D D B			SW	SAND, pale yellow brov coarse grained, trace o	n, with brown striat	ions, fine to	D- M	VL- L -		
		D				1.10m, becoming grey. 1.25m, becoming yellov	v brown.		М	L		
		B	1.80			1.50-1.65m, becoming End of test pit at 1.8 me				MD		
2						Hole collapsing.						
3												
					CUP	GEOTEOLINICO					No	
		dard sheets f abbreviatio	for	GHD	Level 3	GEOTECHNICS 6, GHD Tower, 24 Honeysuck 2 4979 9999 F: 61 2 4979	le Drive, Newcastle 2	300 Australia		Job	^{NO.} 22-195	







Hunter Water Corporation Belmont Temporary Desalination Plant GEOTECHNICAL INVESTIGATION **TESTPIT PHOTOGRAPHS – TP106** job no 22/19573 file ref scale N/A date 06/09/18

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Appendix C – Field and laboratory QA/QC program

Overview

QA and QC practices were applied to data gathering and subsequent sample handling procedures. These were designed to provide control over both field and laboratory operations. Additionally, the analytical laboratories completed their own internal QA procedures (as required by NATA registration) during the analysis of samples. Details of the QA/QC program are described below.

Field QC sampling

All fieldwork was conducted in general accordance with the GHD SOP. The SOP ensures that all samples are collected by a set of uniform and systematic methods.

The SOP describes field activities including:

- Implemented decontamination procedures
- Sample identification procedures
- Information requirements for soil logs
- Chain of Custody information requirements
- Sample duplicate frequency

Field Investigation QA/QC results- Soil

Field QA/QC

Field QA/QC procedures used during the proposal comprised:

• **Blind duplicates:** These are prepared in the field by duplicating the original sample and placing two equivalent portions into two separate containers. The duplicate samples are analysed for the identical set of parameters requested for the corresponding original sample. For the blind duplicate sample pairs, relative percentage differences (RPD) are calculated. Blind duplicates provide an indication of the analytical precision of the proposal laboratory, but may also be affected by factors such as sampling methodology, inherent heterogeneity of the sample medium and different laboratory analytical techniques.

Field QC assessment procedure

Assessment of field QC duplicate samples was undertaken by calculating the Relative Percent Difference (RPD) of duplicate samples. For the purposes of this investigation, an RPD value of 30% for inorganics and 50% for organics has been considered appropriate for the assessment of QC results. A result exceeding this value does not necessarily mean the data is invalid, but rather the impact on the data may need to be assessed.

During soil sampling two intra-laboratory duplicates were analysed by ALS which is NATA accredited for the analysis requested. Duplicates and their primary sample pairs are listed below in Table C-1.

Table C-1 Primary and duplicate sample pairs - Soils

Duplicate type	Primary sample	Duplicate	Parameters
Intra laboratory duplicate	TP106_0.0-0.2	FD20	TRH, BTEX, PAH, heavy metals
Intra-laboratory duplicate	BH202_0.02-0.2	FD15	TRH, BTEX, PAH, heavy metals

RPDs were calculated for intra-laboratory duplicate samples as part of the QA/QC program. RPDs are presented in Table A, Appendix D. Generally, RPDs were within GHDs nominal rate with the exception of arsenic, cadmium, lead and zinc (RPDs ranging between 32% to 45%) for duplicate pair BH202_0.02-0.2 and FD15. This sample was collected from sandy gravelly fill materials and is considered to be the result of heterogeneity within the fill. The higher results have been used for data interpretation.

Based on the RPDs calculated for the field blind duplicates, the results and precision of the data is considered to be of an acceptable quality upon which to draw conclusions as part of this assessment.

Laboratory QA/QC control

Laboratory QA

The analytical laboratories undertook the analyses utilising their own internal procedures and test methods (for which they are NATA accredited) and in accordance with their own quality assurance system which forms part of their NATA accreditation.

Laboratory QC procedures

Laboratory QC procedures typically included analysis of the following:

- **Laboratory duplicate samples**: The analytical laboratory collects duplicate sub-samples from one sample submitted for analytical testing at a rate equivalent to 1 in 20 samples per analytical batch, or one sample per batch if less than twenty samples are analysed in a batch. A laboratory duplicate provides data on analytical batch and the analytical precision (repeatability) of the test result.
- **Spiked samples**: An authentic field sample is spiked by adding an aliquot of known concentration of the target analyte(s) prior to sample extraction and analysis. A spike documents the effect of the sample matrix on the extraction and analytical techniques.
- **Certified reference standards**: A reference standard of known (certified) concentration is analysed along with a batch of samples. The Certified Reference Standard provides an indication of the analytical accuracy of the test method.
- **Surrogate standard/spikes**: These are organic compounds which are similar to the analyte of interest in terms of chemical composition, extractability, and chromatographic conditions (retention time), but which are not normally found in environmental samples. These surrogate compounds are spiked into blanks, standards and samples submitted for organic analyses by gas-chromatographic techniques prior to sample extraction. They provide a means of checking that no gross errors have occurred during any stage of the test method leading to significant analyte loss.
- **Laboratory blank**: Usually an organic or aqueous solution that is as free as possible of analyte of interest to which is added all the reagents, in the same volume, as used in the preparation and subsequent analysis of the samples. The reagent blank is carried through the complete sample preparation procedure and contains the same reagent concentrations in the final solution as in the sample solution used for analysis. The reagent blank is used to correct for possible contamination resulting from the preparation or processing of the sample.

Laboratory QC results are presented in Appendix E.

Methodology used to assess QC results

The results of the field and laboratory QC samples were assessed to determine:

- The quality of the data generated
- Whether the data meets the objectives of the study
- Whether the data is acceptable for the intended use

Laboratory QC assessment procedure

The individual laboratories undertake assessment of laboratory QC internally. Duplicates are assessed by calculating the RPD. Percent Recovery (PR) is used to assess spiked samples and surrogate standards. Acceptable values for RPD and PR can vary depending on the type of analyte tested, concentrations of analytes, and sample matrix.

Certified Reference Standards and Materials are analysed by comparing the test result to the certified concentration plus or minus a certified tolerance. Certified tolerances vary depending on the type of analyte tested and the certified concentration of the analyte.

Laboratory QA/QC results- Soil

The NATA certified laboratory results sheets, as presented in Appendix E, refer to a quality control program comprising the analysis of spikes, blanks and duplicate samples. Generally, the results reported indicate that the laboratory was achieving levels of performance within their recommended control limits during the period when the samples from this program were analysed. The laboratory QA/QC outliers are listed in Table D-2.

Batch	Analyte/sample	Issue	Comment
EB1826927 ES1823856 ES1825384		No outliers identified	
ES1824374	Zinc in anonymous sample (lab ID ES1824297-002)	Matrix spike recovery not determined as background level was greater than or equal to 4x spike level	Zinc present in sample at elevated concentrations more than 4x LOR. This single outlier not considered to be significant.
ES1825728	PAHs for lab duplicate of BH304_0.0-0.2	RPD exceeding LOR based limits (40.4%)	All analytical results for total PAHs below the laboratory limit of reporting or relevant criteria. Exceedence not considered significant.
	PAH, TPH, TRH and BTEXN in BH104_0.0-0.2 and BH104_0.2-0.3	Extraction and analysis undertaken 22-23 days after due date.	Based on laboratory preservation methods, holding time exceedance is not considered significant
	Total recoverable mercury in BH104_0.0-0.2 and BH104_0.2-0.3	Extraction and analysis undertaken 9-10 days after due date.	Based on laboratory preservation methods, holding time exceedance is not considered significant

Table C-2 Laboratory QA/QC Exceedance Summary - Soils

Batch	Analyte/sample	Issue	Comment
ES1826044	PAHs for lab duplicate of BH201_0.0-0.2	RPD exceeding LOR based limits (54.5%)	All analytical results for total PAHs below the laboratory limit of reporting or relevant criteria. Exceedence not considered significant.
	pH extraction/preparation for BH201_0.0-0.2 and BH303_0.0-0.2	Extraction undertaken 8 days after due date.	Exceedence not considered significant.
	TPH, TRH and BTEXN in BHA303_0.0-0.2, BH201_0.0-0.2, BH202_0.02-0.2, FD15, BH304_0.45- 0.5, BHA303_0.45- 0.5, BH201_0.45-0.5, BH202_0.45-0.5, BH202_0.45-0.5, BH304_0.0-0.2, BH303_0.0-0.2	Analysis undertaken 1 day after due date.	All analytical results for were below the laboratory limit of reporting or relevant criteria. Exceedence not considered significant.
ES1826547	pH extraction/ preparation for TP101_0.0-0.2, TP101_0.5-0.6, TP105_0.0-0.2, TP105_0.6-0.7	Extraction undertaken 6 days after due date.	Exceedence not considered significant.
ES1826738 Amendment 1	pH extraction/ preparation for BH303 2.5-2.95M, BH304 0.5-0.95M, BH201 4.0-4.45M	Extraction undertaken 2 days after due date.	Exceedence not considered significant.
	pH extraction/ preparation for BH302 4.0-4.45M, BHA302 1.0-1.45M	Extraction undertaken 6 days after due date.	Exceedence not considered significant.
	Conductivity extraction/ preparation for BH303 2.5-2.95M, BH304 0.5-0.95M, BH201 4.0-4.45M	Extraction undertaken 2 days after due date.	Exceedence not considered significant.
	Conductivity extraction/ preparation for BH302 4.0-4.45M, BHA302 1.0-1.45M	Extraction undertaken 6 days after due date.	Exceedence not considered significant.
ES1827112 Amendment 1	pH extraction/ preparation for BH202_2.5-2.95M	Extraction undertaken 9 days after due date.	Exceedence not considered significant.
	Conductivity extraction/ preparation for BH202_2.5-2.95M	Extraction undertaken 9 days after due date.	Exceedence not considered significant.

Based on a review of the laboratory QA/QC data, it is considered that the analytical results are reasonably representative of site conditions at the time of this assessment. Where outliers were noted above, they were considered to be attributed to soil sample heterogeneity.

Appendix D – Analytical results tables



Appendix D Table A Soil Analytical Results

																																														· · · · ·	
					Asbestos			Me	tals				BTEXN	_	TF	H - NEPM 2013								PAHs						÷								OC Pesti	.ficides	<u> </u>							PCBs
															(e															10 LOR																	
															phthale			-											ote	(C) (zer								e e									
				5										BTEX	le Val	(ing	(ing	Total)				e e	2 2				ana		-Lat	aP TE								Lab C		-	_						
				e Cak	(age age		ĺ∑±							ninus	6 min	action 4 Frac	0 Fac	e a	ę	acene	ŝ	- Gang	entre entre				c,d)py		of total	(as B		듣		â	â			- 00		(alpha	(b eta)	+		(eu	pooide	anzen	
			(%) a	deabl	os (Tra		E 5						nzene	C t0 r	Pract 0-C1	16 Fe	34-C4	hthen	httpde	anthr	und (iii	ni(i+o	a hu)p	e 3	an a	atene	1.2.3	three	E R	PAHs .		Dield		8 8	5) 24)			÷.	lfar	ten 1	Ifan I	1	alde-	hbr hbr	hbr eg	ychior	Total)
			distur	xchan z	sb esk sb esk	Senio	hromi.	opper	pe	ercur) cikel	2	nezen	hytbe	fene 1 (C6-	8-C10	3(>C10-C	4 (>C)	010-C	deuado	nthrac)ozue	t)ozue		hyse	Loran	aph fri	deno(renar	vrene MHs (3	th Cal	8FC - 00	drin +	율	Norda Norda	Norda	4 DDI	4 DD.	DT+D eldrin	ndosu	nsopu	nsopu	di.	ndrin j	BHC	eptad	ethor	CBs (
			≥ % pH	a. w Jnits meq/100g F	a a a g	≷ mg/kg	mg/kg mg/k	kg mg/kg	mg/kg mg	≥ z g/kg mg/kg	g mg/kg	då ⊢ mg/kg mg/k	g mg/kg	× ⊥ mg/kg mg/kg	mg/kg mg/kj	g mg/kg mg/k	kg mg/kg	X ₹ mg/kg mg/kj	g mg/kg	< d mg/kg mg/	kg mg/kg	då d mg/kg mg	a a ykg mg/kg	ig mg/kg mg	kg mg/kg	g mg/kg mg/	kg mg/kg	mg/kg mg	1. <u>n</u> ykg mg/kg	rig/kg mg	e' ni yikg mg/kg	a a mgikg mgikg	g mg/kg	mg/kg mg/kg	g mg/kg	ng/kg mg/k	kg mg/kg	mg/kg mg/k	/kg mg/kg	j mg/kg mr	a a Ig/kg mg/kg	ill i mg/kg mg	j ⊡ j/kg mg/kg	o ⊥ mg/kg mg/kg	j mg/kg mg	<u>r</u> ≥ .g/kg mg/kg	ng/kg
EQL NEPM 2013 EIL/A	CL-Urban Residential- Public Op	pen Space 0-2m	0.1 0	.1 0.1	5 0.1	100	1 2	5 0 95	5 0	30	230	0.2 0.5	0.5	0.5 10	10 50	50 100	0 100	50 0.5	0.5	0.5 0.5	5 0.5	0.5 0	1.5 0.5	0.5 0	5 0.5	0.5 0.5	5 0.5	0.5 0	.5 0.5	0.5 0.	05 0.05	0.05 0.05	5 0.05	0.05 0.05	0.05	0.05 0.0	5 0.2	0.05 0.05	/5 0.05	0.05 0.0	.05 0.05	0.05 0.	15 0.05	<u> </u>	0.05 0.0	.05 0.2	0.1
NEPM 2013 EIL/A NEPM 2013 Table	CL-Commerical/industrial 0-2m 1B(6) ESL Urban residential/ope															300	2800				0.7																										
NEPM 2013 Table NEPM 2013 Table	1B(6) ESL Commercial/industrial	al (coarse)					90 300					75 135	165	180 215	170	170	0 3300				1.4																	400						10			
NEPM 2013 Table	1A(1) HIL D Comm/Ind					3 000	900 3.60	240 000	1 500 73	30 6.000	400 000																		4,000	3 40		10 45		70 530					340 2,000			20 100		50	8	10 400 80 2,500	7
	Direct Contact HSL C Rec/open Direct Contact HSL D Commercia											120 18,00 430 99,00	10 5,300 10 27,000	15,000 81,000	5,100 26,000	3,800 5,30	0 7,400 00 38,000						_			1,900																					
	Field ID	Sample Type																																													
Plant Site and in		Gample 13pe																																													
29/08/2018		Normal	<1.0		No No	<5	<1 <2	<5	<5 <0	0.1 <2	32		<0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5	-				-	-	-			-		-					-
29/08/2018 17/08/2018	BH101_0.45-0.5 BH102_0.0-0.2	Normal	4.6			<5	<1 <2	<	<5 < 36 0	0.1 <2	16		< < 0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <0	5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5			-							+ + + +			<u> </u>	<u> </u>	+++-		<u> </u>
17/08/2018	BH102_0.0-0.2 BH102_0.5-0.6		9.8			<5								<0.5 <10		<50 420		130 <0.5		<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	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															+		
17/08/2018	BH103_0.0-0.2	Normal	1.3		No No		<1 <2	. <5	<5 <0	0.1 <2	19	<0.2 <0.5	6 <0.5	<0.5 <10		<50 <10	0 <100	<50 <0.5	<0.5					5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5					-		-					-					-
17/08/2018	BH103_0.5-0.6		25.2			<5			<5 <0					<0.5 <10	<10 <50	<50 <10		<50 <0.5		<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5					-		-		-	-		-					-
31/07/2018	BH104_0.0-0.2 BH104_0.2-0.3	Normal	3.9 6.2		No No									<0.5 <10 <0.5 <10	<10 <50			490 <0.5 800 <0.5		<0.5 <0.	_		0.5 <0.5	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			-	-					+-	+ + + + +				<u> </u>	+++-	++-	
22/08/2018	BH104_0.2-0.3 BH108_0.0-0.2	Normal	-		No No																	-			3.5					-												-			+		-
6/09/2018	TP101_0.0-0.2	Normal	3			<5	<1 <2	6	6 <	0.1 <2	36	<0.2 <0.5	5 <0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5			-		-		-		-	-		-					-
6/09/2018	TP101_0.5-0.6 TP102_0.0-0.2	Normal	- 6	.5 0.4	-	- <5			16 0		-						-		-		-		· ·					-							-		-							<u> </u>			-
6/09/2018	TP102_0.0-0.2 TP103_0.0-0.2	Normal	5.9			<5	<1 4	61 <5	16 U <5 <0	0.1 <2	-5	<0.2 <0.5	s <0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<0 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5					-		-					-					-
6/09/2018	TP104_0.0-0.2	Normal	<1.0			<5	<1 <2	10	<5 <0	0.1 <2	29	<0.2 <0.5	6 <0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5			-		-		-			-		-					-
6/09/2018	TP105_0.0-0.2	Normal		.6 0.8		<5	<1 <2	<5	<5 <0	0.1 <2	21	<0.2 <0.5	6 <0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5			-		-		-		-	-		-					-
6/09/2018	TP103 0.5-0.6M TP105_0.6-0.7	Normal	28.4 6	.7 8.4		-		-					-						-																-												-
6/09/2018	TP103 1.0-1.1M	Normal	14.6 5					-			-						-		-		-														-					-							-
6/09/2018	TP106_0.0-0.2	Normal	14.9		No No		<1 5	194	246 <	0.1 <2*	3,130	<0.2 <0.5	6 <0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5			-		-		-		-			-					-
6/09/2018	FD20 RPD	Field Duplicate	13.8 8			20	<1 5	206	287 <		3,740 <i>18</i>	<0.2 <0.5	5 <0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5												-				· ·	-
	COMP 1 (BH102_0.0-0.2,	Composite (2						0	10		10																										<u> </u>	<u> </u>	<u> </u>	+	<u> </u>		+-+	<u> </u>			-
17/08/2018	BH103_0.0-0.2) COMP 2 (BH101_0.0-0.2,	Samples) Composite (2	5.2					-	-		-																	-		- <	.05 <0.05	<0.05 0.06	s <0.05	<0.05 <0.05	6 <0.05	<0.05 <0.0	J5 <0.2	<0.05 0.06	J6 <0.05	<0.05 <0	0.05 <0.05	i <0.05 <0	.05 <0.05	<0.05 <0.05	<0.05 <0.	J.05 <0.2	<0.1
30/08/2018	BH104_0.0-0.2)	Samples)	2.8			-		-			-										-							-		. <	-0.05	<0.05 <0.05	6 <0.05	<0.05 <0.05	6 <0.05	<0.05 <0.0	J5 <0.2	<0.05 <0.0	.05 <0.05	<0.05 <0	0.05 <0.05	<0.05 <0	/.05 <0.05	<0.05 <0.05	<0.05 <0	0.05 <0.2	<0.1
Water Connectle 30/08/2018	BH301 0.0-0.2	Normal	6.3			<5	<1 2	7	8 <	0.1 2	22	<12 <13	<0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<15 <	0.5 <0.5	5 415 4	5 0.5	<15 <1	5 <0.5	1 <	0.5 1.5	<0.5																	1
30/08/2018	BH301_0.45-0.5	Normal	9.2			9			18 <						<10 <50	<50 100	0 <100	100 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <0	5 0.7	<0.5 <0.	5 <0.5	1.3 <	0.5 2	<0.5			-		-		-			-		-					-
30/08/2018	BH302_0.0-0.2	Normal	9.5			6			9 <			<0.2 <0.5	6 <0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.		0.6 <	0.5 0.6	<0.5			-		-		-		-	-		-					-
30/08/2018	BH302_0.2-0.3 BH302 4.0-4.45M		5.6 32.6 5	6 .		<5		10	11 <		52	<0.2 <0.5	5 <0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	0.6 <	0.5 0.6	<0.5			-														-
4/09/2018	BH303_0.0-0.2			6 14		8	<1 6	12	34 <				5 <0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5			-		-		-			-					-		-
3/09/2018	BH303 2.5-2.95M	Normal	18.8 6	2 -		-		-	-		-		-	-			-	-	-	-	-			-			-	-	-	-			-	-	-		-		-	-							-
4/09/2018	BH304_0.0-0.2 BH304_0.45-0.5	Normal	10.4 9.7			<5	1 4	6			92	<0.2 <0.5	<0.5	<0.5 <10	<10 <50	<50 100	1 <100	100 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	s <0.5 <0 5 <0.5 <0	5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5									+-	+ + + + +					+++-	++-	-
3/09/2018	BH304 0.5-0.95M	Normal	7.8 5	.6 .		-		-				0.1	-			10	-		-		-						-								-		+++					-			+		-
14/08/2018	BH305_0.0-0.2	Normal	6.4		No No	<5	<1 3	<5	7 <	0.1 3	11	<0.2 <0.5	s <0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5				-	-		-		-	-		-					-
14/08/2018 30/08/2018	BH305_0.9-1.0 BH306_0.0-0.2	Normal	16.1 5.6			<5	<1 <2	<5	<5 <0	0.1 <2	<5	<0.2 <0.5	5 <0.5	<0.5 <10 <0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <0 5 <0.5 <0	5 <0.5	<0.5 <0.	5 <0.5 5 <0.5	<0.5 <	0.5 <0.5	<0.5			-						+-						+-+-	++-	-
30/08/2018	BH306_0.2-0.3		13.6			<5	<1 6	<5	<5 <0	0.1 <2	<5	<0.2 <0.5	5 <0.5	<0.5 <10	<10 <50	<50 <10		<50 <0.5		<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5												-			+		-
	COMP 3 (BH301_0.0-0.2, BH302_0.0-0.2, BH306_0.0-	Composite (3																																					-								
31/08/2018	0.2)	Samples)	6										-				-										-			. <	<0.05 <0.05	<0.05 <0.05	6 <0.05	<0.05 <0.05	< 0.05	<0.05 <0.0	15 <0.2	<0.05 <0.0	.05 <0.05	<0.05 <0	0.05 <0.05	<0.05 <0	/.05 <0.05	<0.05 <0.05	<0.05 <0	0.05 <0.2	<0.1
14/08/2018 14/08/2018	BHA301_0.0-0.2 BHA301_0.5-0.7	Normal	<1.0			<5	<1 <2	<5	8 <	0.1 <2	30	<0.2 <0.5	<0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5		<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	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			-		-				-	+ + + + +					+++-		-
30/08/2018	BHA301_0.5-0.7 BHA302_0.0-0.2		7.3			<>			23 <					<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <0	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5							-			+++							-
30/08/2018	BHA302_0.2-0.3	Normal	-					-			-											-		-			-			-			-		-		-	-				-					-
30/08/2018	BHA302_0.45-0.5		24.7		-	6		<5		_	-	<0.2 <0.5	<0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5			-		1 - 1				-	+		-		<u> </u>	+	<u>- - </u>	<u> </u>
30/08/2018 4/09/2018	BHA302 1.0-1.45M BHA303_0.0-0.2	Normal	18.1 4 26.8			9		39	 54 <		289	<0.2 <0.5	- <0.5	<0.5 <10	<10 <50	<50 <10	· 0 <100	<50 <0.5	<0.5	<0.5 <0	- 5 <0.5	<0.5 <	0.5 <0.5	- 5 <0.5 <	5 <0.5	<0.5 <0	5 <0.5	<0.5 <	0.5 <0.5	<0.5					-		-					-			+		-
4/09/2018	BHA303_0.45-0.5		21.3			<5	<1 2	<5	<5 <6	0.1 <2	7	<0.2 <0.5	6 <0.5	<0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	5 <0.5 <	.5 <0.5	<0.5 <0.	5 <0.5	<0.5 <	0.5 <0.5	<0.5					-		-			-		-					-
30/08/2018	BHA304_0.0-0.2		6.8		No No		<1 8	16	100 <	0.1 6	144	<0.2 <0.5	5 <0.5	<0.5 <10 <0.5 <10	<10 <50	<50 <10	0 <100	<50 <0.5	<0.5	<0.5 0.5	5 0.8	1 <	0.5 0.8	0.6 <	.5 1.7	<0.5 <0.			.6 8.1			-					-		-	-		-					-
30/08/2018	BHA304_0.45-0.5 COMP 4 (TP101_0.0-0.2,	-	6.2			15	<1 6	33	148 <	0.1 5	282	<0.2 <0.5	5 <0.5	<0.5 <10	<10 <50	<50 170	0 150	320 <0.5	<0.5	<0.5 <0.	5 0.6	0.6 <	0.5 0.5	0.5 <	5 1.2	<0.5 <0.	5 <0.5	0.8 1	.3 5.5	0.7			-		-					+					+	<u></u>	
18/09/2018	TP103_0.0-0.2, TP105_0.0-0.2	2, Composite (4 Samples)	5.3			-															-									- <0	<0.05	<0.05 <0.05	6 <0.05	<0.05 <0.05	<0.05	<0.05 <0.0	J5 <0.2	<0.05 <0.0	.05 <0.05	<0.05 <0	0.05 <0.05	<0.05 <0	.05 <0.05	<0.05 <0.05	<0.05 <0	0.05 <0.2	<0.1
	TP106_0.0-0.2) COMP 5 (TP101_0.5-0.6,	0	$\left - \right $			-			\vdash		+		+		+	+ $+$			+		-	+		+ $+$		+ $+$	+					\vdash			+		+	-+	+-	++	+-	+ $+$	\rightarrow	-+-	+ + -	+	+-+
18/09/2018	TP103_0.5-0.6, TP105_0.6-0.7 TP106_0.6-0.7)	7, Composite (4 Samples)	15.1			-															-						-	-	· ·	. <	-0.05	<0.05 <0.05	6 <0.05	<0.05 <0.05	< 0.05	<0.05 <0.0	/5 <0.2	<0.05 <0.0	05 <0.05	<0.05 <0	0.05 <0.05	<0.05 <0	.05 <0.05	<0.05 <0.05	<0.05 <0.	1.05 <0.2	<0.1
I		1	II	- 1 - 1		-		1				1					_(]	1	1 1					1 1										1								1 1			<u> </u>		L]

 Abditistic
 R50 % >00% inorganics or >50% organics

 V
 Where one result is before the LOR + abuse been used to calculate the RPC0.

 Note
 Samples were collected and analysed from locations BPG01 and BPG02 but were not reported as part of this project as they are calcide the project area.

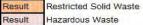
Hunter Water Corporation **Belmont Temporary Desalination Plant Design** 2219573

Table B Indicative Waste Classification

Appendix D

								Indica	ative W	aste C	assific	ation							трц					
				1	1			Mai	hala						DTC	-				- NEPM			000	DOD
							1	Me	tais	1					BTE				1	999		Hs	OCP	PCBs
			Moisture (%)	Asbestos Present	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	C6-C9 Fraction	C10-C36 (Sum of Total)	Benzo(a) pyrene	PAHs (Sum of total) - Lab calc	Endosulfan	PCBs (Total)
			%	Yes/ No	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	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	5	5	1	2	5	5	0.1	2	5	0.2	0.5	0.5	0.5	0.5	0.5	10	50	0.5	0.5	0.05	0.1
		al Solid Waste CT1			100	20	100		100	4	40		10	288	600			1,000	650	10,000	0.8	200	60	50
NSW EPA	A (2014) Restri	cted Solid Waste CT2			400	80	400		400	16	160		40	1,152	2,400			4,000	2,600	40,000	3.2	800	240	50
Location																								
Code	Date	Field ID																						
BH101	29/08/2018	BH101_0.0-0.2	<1.0	No	<5	<1	<2	<5	<5	<0.1	<2	32	<0.2	< 0.5	<0.5	< 0.5	<0.5	<0.5	<10	<50	<0.5	<0.5	-	-
BH101	29/08/2018	BH101_0.45-0.5	4.6	-	<5	<1	<2	<5	<5	<0.1	<2	16	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<50	<0.5	<0.5	-	-
BH102	17/08/2018	BH102_0.0-0.2	14.2	-	<5	<1	7	86	36	0.6	<2	106	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<10	500	<0.5	<0.5	-	-
BH102	17/08/2018	BH102_0.5-0.6	9.8	-	<5	<1	2	24	7	0.1	<2	43	<0.2	<0.5	<0.5	< 0.5	<0.5	<0.5	<10	<50	<0.5	<0.5	-	-
BH103	17/08/2018	BH103_0.0-0.2	1.3	No	<5	<1	<2	<5	<5	<0.1	<2	19	<0.2	<0.5	<0.5	< 0.5	<0.5	<0.5	<10	<50	<0.5	<0.5	-	-
BH103	17/08/2018	BH103_0.5-0.6	25.2	-	<5	<1	2	11	<5	<0.1	<2	16	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<50	<0.5	<0.5	-	-
BH104	31/07/2018	BH104_0.0-0.2	3.9	No	<5	<1	5	72	25	0.4	<2	108	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<10	420	<0.5	<0.5	-	-
BH104	31/07/2018	BH104_0.2-0.3	6.2	-	<5	1	7	120	36	0.6	2	166	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<10	710	<0.5	<0.5	-	-
BH108	22/08/2018	BH108_0.0-0.2	-	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH301	14/08/2018	BHA301_0.0-0.2	<1.0	-	<5	<1	<2	<5	8	<0.1	<2	30	<0.2	<0.5	< 0.5	< 0.5	<0.5	<0.5	<10	<50	< 0.5	<0.5	-	-
BH301	14/08/2018	BHA301_0.5-0.7	2.4	-	<5	<1	<2	<5	<5	<0.1	<2	<5	< 0.2	<0.5	<0.5	< 0.5	<0.5	<0.5	<10	<50	<0.5	<0.5	-	-
BH301	30/08/2018	BH301 0.0-0.2	6.3	-	<5	<1	2	7	8	<0.1	2	22	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	1.5	-	-
BH301	30/08/2018	BH301 0.45-0.5	9.2	-	9	<1	5	13	18	<0.1	6	21	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	2.0	-	-
BH302	30/08/2018	BH302 0.0-0.2	9.5	-	6	<1	3	14	9	< 0.1	4	29	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	0.6	-	-
BH302	30/08/2018	BH302 0.2-0.3	5.6	-	<5	<1	5	10	11	< 0.1	4	52	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	0.6	-	-
BH303	4/09/2018	BH303 0.0-0.2	12.6	-	8	<1	6	12	34	< 0.1	3	125	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	< 0.5	-	-
BH304	4/09/2018	BH304 0.0-0.2	10.4	-	<5	1	4	6	87	< 0.1	3	92	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	< 0.5	-	-
BH304	4/09/2018	BH304 0.45-0.5	9.7	-	6	2	4	<5	63	< 0.1	<2	103	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	< 0.5	-	-
BH305	14/08/2018	BH305 0.0-0.2	6.4	No	<5	<1	3	<5	7	< 0.1	3	11	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	< 0.5	-	-
BH305	14/08/2018	BH305 0.9-1.0	16.1	-	<5	<1	<2	<5	<5	< 0.1	<2	<5	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	< 0.5	-	-
BH306	30/08/2018	BH306 0.0-0.2	5.6	-	7	<1	16	16	20	< 0.1	13	69	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	0.6	-	-
BH306	30/08/2018	BH306 0.2-0.3	13.6	-	<5	<1	6	<5	<5	< 0.1	<2	<5	<0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	<0.5	-	-
BHA302	30/08/2018	BHA302 0.0-0.2	7.3	-	6	<1	4	18	23	< 0.1	<2	168	<0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	<0.5	-	-
BHA302	30/08/2018	BHA302 0.45-0.5	24.7	-	6	<1	9	<5	<5	<0.1	3	<5	<0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	<0.5	<0.5	-	-
BHA303	4/09/2018	BHA303 0.0-0.2	26.8	-	9	<1	8	39	54	<0.1	8	289	<0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	<0.5	-	-
BHA303	4/09/2018	BHA303 0.45-0.5	21.3	-	<5	<1	2	<5	<5	<0.1	<2	7	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	<0.5	-	-
BHA304	30/08/2018	BHA304 0.0-0.2	6.8	No	7	<1	8	16	100	<0.1	6	144	<0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	0.8	8.1	-	-
BHA304	30/08/2018	BHA304 0.45-0.5	6.2	-	15	<1	6	33	148	<0.1	5	282	<0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	160	0.6	5.5	_	-
TP101	6/09/2018	TP101 0.0-0.2	3.0	-	<5	<1	<2	6	6	<0.1	<2	36	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	<0.5	-	
TP102	6/09/2018	TP102 0.0-0.2	11.0	-	<5	<1	4	61	16	0.3	<2	38	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	<0.5	-	-
TP102	6/09/2018	TP102_0.0-0.2	5.9	-	<5	<1	<2	<5	<5	<0.3	<2	<5	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	<0.5	< 0.5	-	-
TP103	6/09/2018	TP104_0.0-0.2	<1.0	-	<5	<1	<2	10	<5	<0.1	<2	29	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	< 0.5	-	-
TP104 TP105	6/09/2018	TP104_0.0-0.2 TP105_0.0-0.2	<1.0	-	<5	<1	<2	<5	<5	< 0.1	<2	29	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	< 0.5	-	-
TP105	6/09/2018	FD20 (TP106 0.0-0.2)	13.8	-	20	<1	2<br 5	206	287	< 0.1	_<_ 3	3,740	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<10	<50	< 0.5	< 0.5	-	-
111100		COMP 1		-	- 20	-	5	206	287	<0.1	3	3,740	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	< 10	<00	<0.5	<0.5		
	17/08/2018		5.2				-		-		-	_				-	-						< 0.05	< 0.1
Comp.	30/08/2018	COMP 2	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	< 0.1
samples	31/08/2018	COMP 3	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	< 0.1
· ·	18/09/2018	COMP 4	5.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	< 0.1
	18/09/2018	COMP 5	15.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	<0.1





Appendix E – Laboratory certificates



CERTIFICATE OF ANALYSIS

Work Order	EB1826927	Page	: 1 of 3
Client	: GHD PTY LTD	Laboratory	Environmental Division Brisbane
Contact	: MS ALISON MONKLEY	Contact	: Caroline Hill
Address	: PO BOX 5403	Address	2 Byth Street Stafford QLD Australia 4053
	NEWCASTLE WEST NSW, AUSTRALIA 2302		
Telephone	:	Telephone	: +61 7 3552 8662
Project	: 2219573	Date Samples Received	: 07-Nov-2018 10:46
Order number	:	Date Analysis Commenced	: 13-Nov-2018
C-O-C number	:	ssue Date	: 13-Nov-2018 16:21
Sampler	: JULIAN FOWLER		II-NOV-2018 16:21
Site	:		
Quote number	: EN/005/18		The Couldthe American and
No. of samples received	: 4		Accreditation No. 825 Accredited for compliance with
No. of samples analysed	: 4		ISO/IEC 17025 - Testing

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	Position	Accreditation Category
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

Page	2 of 3
Work Order	EB1826927
Client	: GHD PTY LTD
Project	2219573



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society. LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- The samples in this work order have been re-batched from ES1826044
- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and
 poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.

Page	3 of 3
Work Order	EB1826927
Client	: GHD PTY LTD
Project	2219573



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH201_3.0-3.1	BH201_4.9-5.0	BH202_2.45-2.5	BH202_3.9-4.0	
	C	lient sampli	ing date / time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00	
Compound	CAS Number	LOR	Unit	EB1826927-001	EB1826927-002	EB1826927-003	EB1826927-004	
				Result	Result	Result	Result	
EA033-A: Actual Acidity								
рН КСІ (23А)		0.1	pH Unit	4.8	5.2	4.7	6.2	
Titratable Actual Acidity (23F)		2	mole H+/t	21	9	26	<2	
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.03	<0.02	0.04	<0.02	
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.005	% S	0.032	0.017	0.191	0.046	
acidity - Chromium Reducible Sulfur		10	mole H+ / t	20	11	119	29	
(a-22B)								
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5	-	1.5	1.5	1.5	1.5	
Net Acidity (sulfur units)		0.02	% S	0.06	0.03	0.23	0.05	
Net Acidity (acidity units)		10	mole H+ / t	41	20	145	29	
Liming Rate		1	kg CaCO3/t	3	1	11	2	
Net Acidity excluding ANC (sulfur units)		0.02	% S	0.06	0.03	0.23	0.05	
Net Acidity excluding ANC (acidity units)		10	mole H+ / t	41	20	145	29	
Liming Rate excluding ANC		1	kg CaCO3/t	3	1	11	2	



QUALITY CONTROL REPORT

	QONEN		
Work Order	: EB1826927	Page	: 1 of 3
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS ALISON MONKLEY	Contact	: Caroline Hill
Address	: PO BOX 5403	Address	: 2 Byth Street Stafford QLD Australia 4053
	NEWCASTLE WEST NSW, AUSTRALIA 2302		
Telephone		Telephone	: +61 7 3552 8662
Project	: 2219573	Date Samples Received	: 07-Nov-2018
Order number	:	Date Analysis Commenced	: 13-Nov-2018
C-O-C number	:	Issue Date	13-Nov-2018
Sampler	; JULIAN FOWLER		HIGHNOV-2018 HAC-MRA NATA
Site	:		
Quote number	: EN/005/18		The Color
No. of samples received	: 4		Accreditation No. 825 Accredited for compliance with
No. of samples analysed	: 4		ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full. This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

Page	: 2 of 3
Work Order	EB1826927
Client	: GHD PTY LTD
Project	2219573



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL			Laboratory Duplicate (DUP) Report								
Laboratory sample ID	Client sample ID	Method: Compound CAS Num		LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)		
EA033-A: Actual Aci	dity (QC Lot: 2032130)										
EB1826927-001 BH201_3.0-3.1 EA033: sulfidic - Titratable Actual Acidity (s-23F)		EA033: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.03	0.03	0.00	No Limit		
		EA033: Titratable Actual Acidity (23F)		2	mole H+ / t	21	21	0.00	0% - 50%		
		EA033: pH KCI (23A)		0.1	pH Unit	4.8	4.8	0.00	0% - 20%		
EA033-B: Potential A	Acidity (QC Lot: 2032130)										
EB1826927-001	BH201_3.0-3.1	EA033: Chromium Reducible Sulfur (22B)		0.005	% S	0.032	0.033	0.00	No Limit		
		EA033: acidity - Chromium Reducible Sulfur		10	mole H+ / t	20	20	0.00	No Limit		
		(a-22B)									



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

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

Sub-Matrix: SOIL				Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Recovery Limits (%)		
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EA033-A: Actual Acidity (QCLot: 2032130)									
EA033: pH KCI (23A)			pH Unit		4.6 pH Unit	95.6	70	130	
EA033: Titratable Actual Acidity (23F)		2	mole H+ / t	<2	17.7 mole H+ / t	108	70	130	
EA033: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02					
EA033-B: Potential Acidity (QCLot: 2032130)									
EA033: Chromium Reducible Sulfur (22B)		0.005	% S	<0.005	0.25483 % S	93.5	70	130	
EA033: acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10					

Matrix Spike (MS) Report

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

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



QA/QC Compliance Assessment to assist with Quality Review						
Work Order	: EB1826927	Page	: 1 of 4			
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane			
Contact	: MS ALISON MONKLEY	Telephone	: +61 7 3552 8662			
Project	: 2219573	Date Samples Received	: 07 -N ov-2018			
Site	:	Issue Date	: 13 -Nov-2018			
Sampler	: JULIAN FOWLER	No. of samples received	: 4			
Order number	:	No. of samples analysed	: 4			

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

• <u>NO</u> Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

• NO Quality Control Sample Frequency Outliers exist.

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Work Order	EB1826927
Client	: GHD PTY LTD
Project	2219573



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.

Evaluation:	× = Holding	time breach : 🗸	$= W_{ithin}$	holding time

Matrix: SOIL					Evaluation	n: 😕 = Holding time	e breach ; ✓ = Withi	n holding time
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
80* dried soil (EA033)								
BH201_3.0-3.1,	BH201_4.9-5.0,	04-Sep-2018	13-Nov-2018	04-Sep-2019	✓	13-Nov-2018	11-Feb-2019	✓
BH202_2.45-2.5,	BH202_3.9-4.0							
EA033-B: Potential Acidity								
80* dried soil (EA033)								
BH201_3.0-3.1,	BH201_4.9-5.0,	04-Sep-2018	13-Nov-2018	04-Sep-2019	1	13-Nov-2018	11-Feb-2019	✓
BH202_2.45-2.5,	BH202_3.9-4.0							
EA033-C: Acid Neutralising Capacity								
80* dried soil (EA033)								
BH201_3.0-3.1,	BH201_4.9-5.0,	04-Sep-2018	13-Nov-2018	04-Sep-2019	1	13-Nov-2018	11-Feb-2019	✓
BH202_2.45-2.5,	BH202_3.9-4.0							
EA033-D: Retained Acidity								
80* dried soil (EA033)								
BH201_3.0-3.1,	BH201_4.9-5.0,	04-Sep-2018	13-Nov-2018	04-Sep-2019	1	13-Nov-2018	11-Feb-2019	✓
BH202_2.45-2.5,	BH202_3.9-4.0							
EA033-E: Acid Base Accounting								
80* dried soil (EA033)								
BH201_3.0-3.1,	BH201_4.9-5.0,	04-Sep-2018	13-Nov-2018	04-Sep-2019	✓	13-Nov-2018	11-Feb-2019	✓
BH202_2.45-2.5,	BH202_3.9-4.0							

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Work Order	EB1826927
Client	: GHD PTY LTD
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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		Co	ount		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	1	6	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	6	16.67	5.00	~	NEPM 2013 B3 & ALS QC Standard

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Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Daniel Bradley

Cc: Helen Simpson <<u>helen.simpson@alsglobal.com</u>>; Tyler Cachia <<u>tyler.cachia@ALSGlobal.com</u>> Subject: RE: ALS Workorder ES1826044, Client GHDSER, Project 2219573 Sent: Wednesday, 7 November 2018 9:46 AM To: ALSEnviro Brisbane <<u>ALSEnviro.Brisbane@alsglobal.com</u>> From: Julian Fowler [mailto:Julian.Fowler@ghd.com]

Thanks everyone for helping out,

this time. Because our second batch (the one I'm asking for now) didn't come through until much later (more than 1 month) I have learnt now that its 2 months from receipt of samples not results when the soil samples get thrown out.

I would like to get the following samples done for "Chromium Suite --Complete" EA033;

BH201_3.0-3.1 BH201_4.9-5.0 BH202_2.45-2.5 BH202_3.9-4.0

Thanks

Regards

Julian Fowler Environmental Technician

GHD

T: 61 2 4979 9999 | D: -Level 3, GHD Tower, 24 61 2 4979 9910 | V: 229910 | M1: 0466 049 181 | M2: Honeysuckle Drive, Newcastle, NSW, 2300 | PO Box 54 1 | M2: 0423 163 493 | F Box 5403 HRMC, NSW, 2 2310, 6124979 4979 9988 | E: j<u>ulian.fowler@qt</u> Australia | <u>www.qhd.com</u>

Daniel Bradley

Sample Receipt Officer - Enviromental Brisbane



Environmental Division Brisbane Work Order Reference EB1826927

Stafford QLD 4053

AUSTRALIA

daniel.bradley@al:

2 Byth Street (cnr S

61-7-3243 7222

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CERTIFICATE OF ANALYSIS

Work Order	ES1823856	Page	: 1 of 12
Client	: GHD PTY LTD	Laboratory	Environmental Division Sydney
Contact	: MS ALISON MONKLEY	Contact	Brenda Hong
Address	: PO BOX 5403	Address	277-289 Woodpark Road Smithfield NSW Australia 2164
	NEWCASTLE WEST NSW, AUSTRALIA 2302		
Telephone		Telephone	: (02) 8784 8504
Project	: 2219573	Date Samples Received	: 14-Aug-2018 16:51
Order number	:	Date Analysis Commenced	: 15-Aug-2018
C-O-C number	:	Issue Date	20-Aug-2018 21:22
Sampler	: JULIAN FOWLER		120-Aug-2018 21:22
Site	:		
Quote number	: EN/005/18		The Country
No. of samples received	: 25		Accreditation No. 82 Accredited for compliance with
No. of samples analysed	: 21		ISO/IEC 17025 - Testin

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

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

Signatories

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

Signatories	Position	Accreditation Category	
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD	
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW	
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW	
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW	
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW	

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Client	: GHD PTY LTD
Project	2219573



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

- Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society. LOR = Limit of reporting

 - * = This result is computed from individual analyte detections at or above the level of reporting
 - ø = ALS is not NATA accredited for these tests.
 - \sim = Indicates an estimated value.
- ASS: EA003 (NATA Field and F(ox) screening): pH F(ox) Reaction Rate: 1 Slight; 2 Moderate; 3 Strong; 4 Extreme
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) 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.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

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Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ient sample ID	BHA301_0.0-0.2	BHA301_0.5-0.7	BHA301_1.0-1.1	BHA301_1.4-1.5	BHA301_2.0-2.1
	CI	ient sampl	ing date / time	14-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1823856-001	ES1823856-003	ES1823856-004	ES1823856-005	ES1823856-006
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
pH (F)		0.1	pH Unit		7.3	8.0	8.1	6.5
pH (Fox)		0.1	pH Unit		4.6	5.4	4.9	1.4
Reaction Rate		1	Reaction Unit		2	2	3	3
EA055: Moisture Content (Dried	1 @ 105-110°C)							
Moisture Content		1.0	%	<1.0	2.4			
EG005T: Total Metals by ICP-AI								
Arsenic	7440-38-2	5	mg/kg	<5	<5			
Cadmium	7440-38-2	1	mg/kg	<1	<1			
Chromium	7440-43-3	2	mg/kg	<2	<2			
Copper	7440-47-3	5	mg/kg	<5	<5			
Lead	7440-50-6	5	mg/kg	8	<5			
Nickel	7440-02-0	2	mg/kg	<2	<2			
Zinc	7440-66-6	5	mg/kg	30	<5			
		J	mg/ng					
EG035T: Total Recoverable Me Mercury		0.1	mg/kg	<0.1	<0.1			
	7439-97-6	0.1	ilig/kg	<u>\</u> 0.1	~0.1			
EP075(SIM)B: Polynuclear Aror		0.5		.o. r	.0.5			
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			
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 hydro	ocarbons	0.5	mg/kg	<0.5	<0.5			
^ Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5	<0.5			

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Client	: GHD PTY LTD
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Cli	:						
01		Client sampling date / time		14-Aug-2018 00:00	14-Aug-2018 00:00	14-Aug-2018 00:00	14-Aug-2018 00:00
CAS Number	LOR	Unit	14-Aug-2018 00:00 ES1823856-001	ES1823856-003	ES1823856-004	ES1823856-005	ES1823856-006
CAS Number	LOIN	-					Result
			Result	Result	Result	Result	Result
		malka	0.6	0.6			
	0.5	ilig/kg	1.2	1.2			
	40		-10	140			
	50	mg/kg	<50	<50			
oons - NEPM 201	3 Fraction	าร					
C6_C10	10	mg/kg	<10	<10			
C6_C10-BTEX	10	mg/kg	<10	<10			
	50	mg/kg	<50	<50			
	100	mg/kg	<100	<100			
	100	mg/kg	<100	<100			
	50	mg/kg	<50	<50			
	50	mg/kg	<50	<50			
71-43-2	0.2	mg/kg	<0.2	<0.2			
			<0.5	<0.5			
				<0.5			
				<0.5			
			<0.2	<0.2			
			<0.5	<0.5			
91-20-3	1		<1	<1			
_	05	%	75.9	74.5			
110-79-0							1
201 60 0	0.5	0/2	89.6	89.0			
	ns 	0.5 ns 10 50 100 100 100 50 50 50 50 50 50 50	0.5 mg/kg 0.5 mg/kg ns 10 mg/kg 50 mg/kg 100 mg/kg 100 mg/kg 100 mg/kg 100 mg/kg 50 mg/kg 0ons - NEPM 2013 Fractions C6_C10 10 C6_C10-BTEX 10 mg/kg C6_C10-BTEX 100 mg/kg 50 mg/kg 100-41-4 0.5 mg/kg 04-38-3 0.5 mg/kg 95-47-6 0.5 mg/kg	0.5 mg/kg 0.6 0.5 mg/kg 1.2 ns 50 mg/kg <10	rocarbons - Continued 0.5 mg/kg 0.6 0.6 0.5 mg/kg 1.2 1.2 ns 10 mg/kg <50	rocarbons - Continued 0.5 mg/kg 0.6 0.6 0.5 mg/kg 1.2 ns 10 mg/kg <10	Procarbons - Continued mg/kg 0.6 0.6

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BHA301_0.0-0.2	BHA301_0.5-0.7	BHA301_1.0-1.1	BHA301_1.4-1.5	BHA301_2.0-2.1
	Cli	ent sampli	ng date / time	14-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1823856-001	ES1823856-003	ES1823856-004	ES1823856-005	ES1823856-006
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
4-Terphenyl-d14	1718-51-0	0.5	%	73.3	72.8			
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	92.4	100			
Toluene-D8	2037-26-5	0.2	%	94.4	95.1			
4-Bromofluorobenzene	460-00-4	0.2	%	78.5	95.9			

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	BHA301_2.4-2.5	BHA301_3.0-3.1	BHA301_3.5-3.6	BHA301_3.9-4.0	BHA301_4.5-4.6
	Cl	ient sampli	ing date / time	14-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1823856-007	ES1823856-008	ES1823856-009	ES1823856-010	ES1823856-011
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
рН (F)		0.1	pH Unit	6.8	6.9	7.0	7.0	6.8
pH (Fox)		0.1	pH Unit	2.5	2.3	2.3	2.3	2.2
Reaction Rate		1	Reaction Unit	3	4	4	4	4

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Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			BHA301_4.9-5.0	BH305_0.0-0.2	BH305_0.9-1.0	BH305_1.5-1.6	BH305_2.0-2.1
	Cli	ient sampl	ing date / time	14-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1823856-012	ES1823856-013	ES1823856-016	ES1823856-017	ES1823856-018
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
pH (F)		0.1	pH Unit	7.0	6.6	6.2	6.7	6.9
pH (Fox)		0.1	pH Unit	2.2	2.4	2.5	2.4	1.3
Reaction Rate		1	Reaction Unit	4	3	3	3	4
A055: Moisture Content (Dried	@ 105-110°C)							
Moisture Content		1.0	%		6.4	16.1		
A200: AS 4964 - 2004 Identifica	ation of Asbestos in Soils							
Asbestos Detected	1332-21-4	0.1	g/kg		No			
Asbestos (Trace)	1332-21-4	5	Fibres		No			
Asbestos Type	1332-21-4	-			· ·			
Sample weight (dry)		0.01	g		163			
APPROVED IDENTIFIER:		-			S.SPOONER			
EG005T: Total Metals by ICP-AE	ES							
Arsenic	7440-38-2	5	mg/kg		<5	<5		
Cadmium	7440-43-9	1	mg/kg		<1	<1		
Chromium	7440-47-3	2	mg/kg		3	<2		
Copper	7440-50-8	5	mg/kg		<5	<5		
Lead	7439-92-1	5	mg/kg		7	<5		
Nickel	7440-02-0	2	mg/kg		3	<2		
Zinc	7440-66-6	5	mg/kg		11	<5		
G035T: Total Recoverable Me	rcurv by FIMS							
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1		
EP075(SIM)B: Polynuclear Aron								
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		
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		

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Work Order	ES1823856
Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BHA301_4.9-5.0	BH305_0.0-0.2	BH305_0.9-1.0	BH305_1.5-1.6	BH305_2.0-2.1
	Cl	ient sampli	ng date / time	14-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1823856-012	ES1823856-013	ES1823856-016	ES1823856-017	ES1823856-018
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hy	drocarbons - Cont	inued						
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 Hydrocarb	ons							
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 Hydroca	rbons - NEPM 201	3 Fractio	ns					
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10		
C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg		<10	<10		
(F1)	_							
>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		50	mg/kg		<50	<50		
(F2)								
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		
	91-20-3	1	mg/kg		<1	<1		

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BHA301_4.9-5.0	BH305_0.0-0.2	BH305_0.9-1.0	BH305_1.5-1.6	BH305_2.0-2.1
	Cli	ent sampli	ng date / time	14-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1823856-012	ES1823856-013	ES1823856-016	ES1823856-017	ES1823856-018
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Sur	rogates - Continued							
Phenol-d6	13127-88-3	0.5	%		73.5	72.7		
2-Chlorophenol-D4	93951-73-6	0.5	%		76.4	76.0		
2.4.6-Tribromophenol	118-79-6	0.5	%		68.7	64.6		
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%		87.4	87.6		
Anthracene-d10	1719-06-8	0.5	%		80.8	80.1		
4-Terphenyl-d14	1718-51-0	0.5	%		71.5	70.9		
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%		92.6	93.2		
Toluene-D8	2037-26-5	0.2	%		81.4	88.5		
4-Bromofluorobenzene	460-00-4	0.2	%		81.6	84.4		

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	BH305_2.4-2.5	BH305_3.0-3.1	BH305_3.5-3.6	BH305_4.0-4.1	BH305_4.5-4.6
	Cl	ient sampl	ing date / time	14-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1823856-019	ES1823856-020	ES1823856-021	ES1823856-022	ES1823856-023
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
рН (F)		0.1	pH Unit	6.7	6.6	6.6	6.3	5.6
pH (Fox)		0.1	pH Unit	2.0	2.2	3.2	2.3	2.2
Reaction Rate		1	Reaction Unit	4	4	4	4	4

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Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			BH305_4.9-5.0	 	
Client sampling date / time			14-Aug-2018 00:00	 	 	
Compound	CAS Number	LOR	Unit	ES1823856-024	 	
				Result	 	
EA003 :pH (field/fox)						
рН (F)		0.1	pH Unit	5.7	 	
pH (Fox)		0.1	pH Unit	2.3	 	
Reaction Rate		1	Reaction Unit	4	 	

Analytical Results

Descriptive Results

Sub-Matrix: SOIL

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos	in Soils	
EA200: Description	BH305_0.0-0.2 - 14-Aug-2018 00:00	Mid brown sandy soil.

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Surrogate Control Limits

Sub-Matrix: SOIL		Recovery	Limits (%)
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130



QUALITY CONTROL REPORT

Work Order	: ES1823856	Page	: 1 of 7
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MS ALISON MONKLEY	Contact	Brenda Hong
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	:	Telephone	: (02) 8784 8504
Project	: 2219573	Date Samples Received	14-Aug-2018
Order number	:	Date Analysis Commenced	: 15-Aug-2018
C-O-C number	:	ssue Date	20-Aug-2018
Sampler	: JULIAN FOWLER		Hac-MRA NAT
Site	:		
Quote number	: EN/005/18		The Column
No. of samples received	: 25		Accreditation N Accredited for compliance
No. of samples analysed	: 21		ISO/IEC 17025 - Te

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full. This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW

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General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL						Laboratory	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA003 :pH (field/fox	(QC Lot: 1881358)								
EB1819927-005	Anonymous	EA003: pH (F)		0.1	pH Unit	6.6	6.7	1.50	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	6.7	6.8	1.48	0% - 20%
ES1823856-006	BHA301_2.0-2.1	EA003: pH (F)		0.1	pH Unit	6.5	6.6	1.53	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	1.4	1.4	0.00	0% - 50%
A003 :pH (field/fox	x) (QC Lot: 1881359)								
ES1823856-019	BH305_2.4-2.5	EA003: pH (F)		0.1	pH Unit	6.7	6.7	0.00	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	2.0	1.9	5.13	0% - 20%
EA055: Moisture Co	ontent (Dried @ 105-110	°C) (QC Lot: 1878025)							
EM1813001-004	Anonymous	EA055: Moisture Content		0.1	%	2.8	2.9	0.00	0% - 20%
ES1823871-002	Anonymous	EA055: Moisture Content		0.1	%	8.2	9.0	9.83	No Limit
EG005T: Total Meta	Is by ICP-AES (QC Lot:	1881150)							
ES1823667-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	78	87	10.1	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	2	3	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	18	21	11.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	18	18	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.00	No Limit
ES1823954-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	6	2	85.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	21	14	40.9	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	7	6	26.7	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	120	106	12.1	0% - 20%
		EG005T: Copper	7440-50-8	5	mg/kg	472	510	7.73	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	895	794	12.0	0% - 20%

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Sub-Matrix: SOIL						Laboratory I	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Meta	s by ICP-AES (QC Lot:								
ES1823954-002	Anonymous	EG005T: Zinc	7440-66-6	5	mg/kg	785	708	10.3	0% - 20%
EG035T: Total Rec	overable Mercury by FIM	IS (QC Lot: 1881149)							
ES1823667-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1823954-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polyr	uclear Aromatic Hydroc	arbons (QC Lot: 1873517)							
ES1823657-010	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	6.3	6.4	0.00	0% - 50%
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	0.6	0.6	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	0.9	0.8	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic		0.5	mg/kg	7.8	7.8	0.00	0% - 50%
		hydrocarbons							
		EP075(SIM): Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Pe	troleum Hydrocarbons	(QC Lot: 1873426)							
ES1823667-001	Anonymous	EP080: C6 - C9 Fraction		10	mg/kg	<10	<10	0.00	No Limit
ES1823856-001	BHA301_0.0-0.2	EP080: C6 - C9 Fraction		10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Pe	troleum Hydrocarbons	(QC Lot: 1873518)							
ES1823657-010	Anonymous	EP071: C15 - C28 Fraction		100	mg/kg	330	310	5.82	No Limit
		EP071: C29 - C36 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction		50	mg/kg	550	540	0.00	0% - 50%
EP080/07 <u>1: Total Re</u>	ecoverable Hydrocarbon	s - NEPM 2013 Fractions (QC Lot: 1873426)							
ES1823667-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1823856-001	BHA301_0.0-0.2	EP080: C6 - C10 Fraction	 C6C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/07 <u>1: Total Re</u>	coverable Hydrocarbon	s - NEPM 2013 Fractions (QC Lot: 1873518)							
ES1823657-010	Anonymous	EP071: >C16 - C34 Fraction		100	mg/kg	160	160	0.00	No Limit
		EP071: >C34 - C40 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction		50	mg/kg	670	650	2.68	0% - 50%

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Sub-Matrix: SOIL						Laboratory I	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC	Lot: 1873426)								
ES1823667-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1823856-001	BHA301_0.0-0.2	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit



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

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

Sub-Matrix: SOIL			Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 188115	0)							
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	102	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	101	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	120	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	102	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	102	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	111	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	114	80	122
EG035T: Total Recoverable Mercury by FIMS (QC	Lot: 1881149)							
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	72.5	70	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	s (QCLot: 1873517)							
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	108	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	106	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	106	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	107	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	107	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	107	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	111	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	112	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	97.5	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	96.8	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	90.5	68	116
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	104	74	126
EP075(S I M): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	100	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	95.5	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	94.4	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	96.6	63	121
EP080/071: Total Petroleum Hydrocarbons(QCLo	t: 1873426)							
EP080: C6 - C9 Fraction		10	mg/kg	<10	26 mg/kg	93.0	68	128
EP080/071: Total Petroleum Hydrocarbons(QCLo	t: 1873518)							
EP071: C10 - C14 Fraction		50	mg/kg	<50	300 mg/kg	117	75	129
		100	mg/kg	<100	450 mg/kg	114	77	131
EP071: C15 - C28 Fraction								

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Sub-Matrix: SOIL			Method Blank (MB)	Laboratory Control Spike (LCS) Report					
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EP080/071: Total Recoverable Hydrocarbons - N	EPM 2013 Fractions (QCL	ot: 1873426) <i>-</i> co	ntinued						
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	101	68	128	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1873518)									
EP071: >C10 - C16 Fraction		50	mg/kg	<50	375 mg/kg	114	77	125	
EP071: >C16 - C34 Fraction		100	mg/kg	<100	525 mg/kg	113	74	138	
EP071: >C34 - C40 Fraction		100	mg/kg	<100	225 mg/kg	81.3	63	131	
EP080: BTEXN (QCLot: 1873426)									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	92.8	62	116	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	93.2	67	121	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	91.0	65	117	
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	91.4	66	118	
	106-42-3								
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	93.6	68	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	95.3	63	119	

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	SpikeRecovery(%)	Recovery	Limits (%)	
aboratory sample ID.	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
EG005T: Total Me	tals by ICP-AES (QCLot: 1881150)							
ES1823667-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	106	70	130	
		EG005T: Cadmium	7440-43-9	50 mg/kg	105	70	130	
		EG005T: Chromium	7440-47-3	50 mg/kg	120	70	130	
		EG005T: Copper	7440-50-8	250 mg/kg	108	70	130	
		EG005T: Lead	7439-92-1	250 mg/kg	105	70	130	
		EG005T: Nickel	7440-02-0	50 mg/kg	107	70	130	
	EG005T: Zinc	7440-66-6	250 mg/kg	110	70	130		
EG035T: Total Re	ecoverable Mercury by FIMS (QCLot: 1881149)							
ES1823667-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	89.6	70	130	
EP075(SIM)B: Pol	ynuclear Aromatic Hydrocarbons (QCLot: 1873517)							
ES1823657-010	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	100	70	130	
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	116	70	130	
EP080/071: Total I	Petroleum Hydrocarbons (QCLot: 1873426)							
ES1823667-001	Anonymous	EP080: C6 - C9 Fraction		32.5 mg/kg	119	70	130	
EP080/071: TotaLI	Petroleum Hydrocarbons (QCLot: 1873518)							

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Sub-Matrix: SOIL		Matrix Spike (MS) Report					
					SpikeRecovery(%)	Recovery L	_imits (%)
aboratory sample ID.	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total F	Petroleum Hydrocarbons (QCLot: 1873518) - continue	d					
ES1823657-010	Anonymous	EP071: C10 - C14 Fraction		523 mg/kg	90.4	73	137
		EP071: C15 - C28 Fraction		2319 mg/kg	116	53	131
		EP071: C29 - C36 Fraction		1714 mg/kg	125	52	132
EP080/071: Total F	Recoverable Hydrocarbons - NEPM 2013 Fractions(Q	CLot: 1873426)					
ES1823667-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	121	70	130
P080/071: Total F	Recoverable Hydrocarbons - NEPM 2013 Fractions(Q	CLot: 1873518)					
ES1823657-010 Anonymous	Anonymous	EP071: >C10 - C16 Fraction		860 mg/kg	90.3	73	137
		EP071: >C16 - C34 Fraction		3223 mg/kg	118	53	131
		EP071: >C34 - C40 Fraction		1058 mg/kg	116	52	132
P080: BTEXN (Q	QCLot: 1873426)						
ES1823667-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	96.8	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	97.4	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	97.5	70	130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	96.7	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	98.9	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	98.5	70	130



	QA/QC Compliance Assessment to assist with Quality Review						
Work Order	: ES1823856	Page	: 1 of 5				
Client		Laboratory	: Environmental Division Sydney				
Contact	MS ALISON MONKLEY	Telephone	: (02) 8784 8504				
Project	: 2219573	Date Samples Received	: 14-Aug-2018				
Site	:	Issue Date	: 20-Aug-2018				
Sampler	: JULIAN FOWLER	No. of samples received	: 25				
Order number	:	No. of samples analysed	: 21				

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.

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

Outliers : Analysis Holding Time Compliance

• <u>NO</u> Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

• <u>NO</u> Quality Control Sample Frequency Outliers exist.

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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 <u>VOC in soils</u> 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	n: 🗴 = Holding time	e breach ; ✓ = Withi	n holding tin
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA003 :pH (field/fox)								
Snap Lock Bag - frozen on receipt at ALS (EA003	3)							
BHA301_0.5-0.7,	BHA301_1.0-1.1,	14-Aug-2018	20-Aug-2018	09-May-2021	1	20-Aug-2018	18-Nov-2018	 ✓
BHA301_1.4-1.5,	BHA301_2.0-2.1,							
BHA301_2.4-2.5,	BHA301_3.0-3.1,							
BHA301_3.5-3.6,	BHA301_3.9-4.0,							
BHA301_4.5-4.6,	BHA301_4.9-5.0,							
BH305_0.0-0.2,	BH305_0.9-1.0,							
BH305 1.5-1.6,	BH305 2.0-2.1,							
BH305 2.4-2.5,	BH305 3.0-3.1,							
BH305 3.5-3.6,	BH305 4.0-4.1,							
BH305_4.5-4.6,	BH305_4.9-5.0							
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BHA301_0.0-0.2,	BHA301_0.5-0.7,	14-Aug-2018				16-Aug-2018	28-Aug-2018	✓
BH305_0.0-0.2,	BH305_0.9-1.0							
EA200: AS 4964 - 2004 Identification of Asbesto	s in Soils							
Snap Lock Bag: Separate bag received (EA200)								
BH305_0.0-0.2		14-Aug-2018				15-Aug-2018	10-Feb-2019	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BHA301_0.0-0.2,	BHA301_0.5-0.7,	14-Aug-2018	17-Aug-2018	10-Feb-2019	1	17-Aug-2018	10-Feb-2019	 ✓
BH305_0.0-0.2,	BH305_0.9-1.0							
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BHA301_0.0-0.2,	BHA301_0.5-0.7,	14-Aug-2018	17-Aug-2018	11-Sep-2018	✓	20-Aug-2018	11-Sep-2018	 ✓
BH305_0.0-0.2,	BH305_0.9-1.0							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbo	ons							
Soil Glass Jar - Unpreserved (EP075(SIM))								
BHA301_0.0-0.2,	BHA301_0.5-0.7,	14-Aug-2018	15-Aug-2018	28-Aug-2018	1	16-Aug-2018	24-Sep-2018	✓
BH305_0.0-0.2,	BH305_0.9-1.0							

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Matrix: SOIL					Evaluation	: × = Holding time	breach ; 🗸 = Withi	n holding time
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbon	s							
Soil Glass Jar - Unpreserved (EP080)								
BHA301_0.0-0.2,	BHA301_0.5-0.7,	14-Aug-2018	15-Aug-2018	28-Aug-2018	✓	16-Aug-2018	28-Aug-2018	✓
BH305_0.0-0.2,	BH305_0.9-1.0							
EP080/071: Total Recoverable Hydrocarbo	ons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)								
BHA301_0.0-0.2,	BHA301_0.5-0.7,	14-Aug-2018	15-Aug-2018	28-Aug-2018	1	16-Aug-2018	28-Aug-2018	✓
BH305_0.0-0.2,	BH305_0.9-1.0							
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
BHA301_0.0-0.2,	BHA301_0.5-0.7,	14-Aug-2018	15-Aug-2018	28-Aug-2018	1	16-Aug-2018	28-Aug-2018	✓
BH305_0.0-0.2,	BH305_0.9-1.0							

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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	n: 🗴 = Quality Co	ntrol frequency	not within specification ; \checkmark = Quality Control frequency within specification
Quality Control Sample Type		Сс	ount		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH field/fox	EA003	3	26	11.54	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	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)							
PAH/Phenols (SIM)	EP075(S I M)	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

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Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH field/fox	EA003	SOIL	In house: Referenced to Ahern et al 1998 - determined on a 1:5 soil/water extract designed to simulate field measured pH and pH after the extract has been oxidised with peroxide.
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 (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
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 (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. 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 (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
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.

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LABID	SAMPLE	E ID	DATE / TIME	MATRIX	TYPE & PRESERVATIN (refer to codes below,		PAH & WEAR	Astactis	AS Screen				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	B4A 301.	0.0-6.2	14/8/18	S		3			- Hiller				
2	BHA 301_	0-2-0.3											· · · · · · · · · · · · · · · · · · ·
3	BHA 301	0.5-0.7				3		1	\sim	-	1		
				+ { +		<u>در</u>	_ 6	<u> </u>					
4	BUA 301-	1.0-1.1											
5	BHA 301_	14-15							\sim		ļ	l.	
6	BUA 301_	2.0-2.1							\mathbf{X}				
<u> </u>	F							+	\sim				
7	BHA 301-	24-2.5						<u> </u>	$ \leq > $		<u> </u>		
8	SHIP 301_	3.0-3.1	<u> </u>										
9	BUA 301_	3.5-3.6			-			ļ	\sim			ļ	Environmental Division
10	RUNA 301	3-9-4.0											Sydney
	R14 7-1			┤╂┥			┨	+	- KA				Sydney Work Order Reference ES1823856
11		4.5-4.6		+				<u> </u>					ES1823856
12	BHA301_	49-50				`	V ()			_			
13	84305	0.0-0.2				3	\rightarrow	\mathbb{V}					
	84305	6 1 3				3	-	1 .			1 1		
14	BH 305 _ BH 305 _	0.2-0.7				3					+	-	
15	54 505 -	0.2-00			<u> </u>						<u> </u>		
16	BH 303 J	0.9-10).			3	\times		\mathbf{X}				Fetephone : - 61-2-8784 6655
17	BH 305_ BH 305_ BH 305_	1.5-1.6							\times				- IN ST WARD
18	NUST	2.0-2.1		1		1	5		\times	_		1 1	:
						TOTAL		-					
V = VOA Via	al HCI Preserved; VB = VOA \	/ial Sodium Bisulphate Pre	eserved; VS ≃ VOA Vial Su	ífutíc Preserve	RC: SH = Sodium Hydroxide/Cd Pres d; AV = Airfreight Unpreserved Vial SG cid Sulphate Soils: B = Unpreserved B	G = Sulfuric Preserved #	oxide Preserved F mber Glass; H =	Plastic; AG = , = HCI preserv	Amber Glass Unpreserve ed Plastic; HS = HCl pre	d; AP - Airfreight Ui served Speciation b	npreserved Plastic ottle; SP = Sulfuric Preserved	ved Plastic; F = F	ormaldehyde Preserved Glass;

	conmencat	CUSTODY ALS Laboratory: please tick →		□BRISBAN Ph: 07 3243	E 32 Shand Stre 7222 E: sampler	w∑ałsglobal zom × Stefford QLD 4053 , briebane@alsglobal.com dah Drive Clinton QLD 4680 ne@alsglobal.com	□MACKAY 78 Harbour Ph: 07 4944 0177 E: ma □MELBOURNE 2-4 We Ph: 03 8549 9600 E: sar □MUDGEE 27 Sydney Ph: 02 6376 F: m	stall Road Spi nples.melbour	ringvale VIC 317 ne@alsglobal.co	71 om	⊡NOWRA Ph: 024423	500 E: samples.newca 1/13 Geary Place Norti 2063 E: nowra@alsgle Hod Way Malaga WA 7655 E: samples.perth		ВТО) Ph: 07 ВМС	WNSVILLE 14-15 7 4796 0600 E: to DLLONGONG 99	(oodpark Road Smithfield NSW 2164 amplessydney@alsglobal.com Desma Court Bohle QLD 4818 awystilkaanivenmental@alsglobal.com Kenny Street Wollongong NSW 2500 ortkembla@alsglobal.com
IENT: (GHD				TURNAR	OUND REQUIREMENTS :	Standard TA	ſ (List due	date}:				EORI	AUORATORYU	SECONDA (
FICE: N	Newcastle				(Standard T Ultra Trace	AT may be longer for some tests e.g Ordanics)	Non Standard	i or urgent	TAT (List du	ue date):			GUEIDS	Scaline com		
OJECT:	2219573				ALS QUO					0	COC SEQUENC	ENUMBER (Cir	cle)	Digenteelbrick	presentaronite	
DER NU	MBER:									coc:	1 🖉 3	4 5	6 7 Pardo	n sali da Terrição		
OJECT N	ANAGER: Alison Mor	nkley	C	CONTACT	PH: 4979999	9		*		OF:	1 🙆 3	4 5	6 7 Other	sometic days		
MPLER:	Julian Fowler	· · · ·		SAMPLER	MCBILE: 04	66049181	RELINQUISHED	3Y:		RECEIV	/ED BY:		RELINQUIS	IED BY:		RECEIVED BY:
emaile	ed to ALS? (YES / NO		E	DD FORM	AT (or defau	lit): Esdat	Julan	્ર હિ	ملن	1.1	HAU	-				MC
ail Repor	rts to (will default to PM i	if no other addresses	are listed): A	lison, ghdla	b reports, ntl	.car				DATE/T	IME: 818	<u> </u>	DATE/TIME:			DATE/TIME:
ail Invoid	ce to (will default to PM if	f no other addresses a	are listed): ap	-fss@ghd.c	com		DATE/TIME:	8	1650	14	18/18	- 16:5	5			DATE/TIME: 14/8/8 7:30pm
AMENTS	S/SPECIAL HANDLING/S		ISAI ·				1 <u>(</u>									
LS ISE		SAMPLE DETA ATRIX: SOLID (S) W				CONTAINER INFO	RMATION	Wh	ANALYSIS ere Metals are	S REQUIRE e required, s	D including SU pecify Total (un	TES (NB. Suite Co ittered bottle require	ides must be listed to ed) or Dissolved (fi	o attract suite price) Id filtered bottle re-	quired).	Additional Information
BID	SAMPLE	EID	DATE	/ TIME	MATRIX	TYPE & PRESERVATIV (refer to codes below)	TOTAL	CONTAINERS TRU MEXN		sung sis	155 Scileniu				Сотг	ents on likely contaminant levels, s, or samples requiring specific QC is etc.
	<u>B4305</u>	2.4-2.5	14 /8/	B	S		1				\geq					
2	BH 305 -	2.4-2.5 3.0-3-1 3.5-3-6			1			,		<	\leq					
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2	BH305 -	4.0-41	1								\times					
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7	<u>Chi or J</u>	4-5-4.6														
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							TOTAL		1	1						



CERTIFICATE OF ANALYSIS

Work Order	ES1824374	Page	: 1 of 6
Client	: GHD PTY LTD	Laboratory	Environmental Division Sydney
Contact	: MS ALISON MONKLEY	Contact	Brenda Hong
Address	: PO BOX 5403	Address	277-289 Woodpark Road Smithfield NSW Australia 2164
	NEWCASTLE WEST NSW, AUSTRALIA 2302		
Telephone		Telephone	: (02) 8784 8504
Project	: 2219573	Date Samples Received	: 17-Aug-2018 16:53
Order number	:	Date Analysis Commenced	20-Aug-2018
C-O-C number	:	ssue Date	23-Aug-2018 15:47
Sampler	: JULIAN FOWLER		123-Aug-2018 15:47
Site	:		
Quote number	: EN/005/18		The Country of the second
No. of samples received	: 12		Accredited for compliance with
No. of samples analysed	: 4		ISO/IEC 17025 - Testing

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

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

Signatories

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

Signatories	Position	Accreditation Category
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW

Page	2 of 6
Work Order	ES1824374
Client	: GHD PTY LTD
Project	2219573



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- ø = ALS is not NATA accredited for these tests.
- \sim = Indicates an estimated value.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) 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.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

Page	3 of 6
Work Order	ES1824374
Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH102_0.0-0.2	BH102_0.5-0.6	BH103_0.0-0.2	BH103_0.5-0.6	
Client sampling date / time			17-Aug-2018 00:00	17-Aug-2018 00:00	17-Aug-2018 00:00	17-Aug-2018 00:00		
Compound	CAS Number	LOR	Unit	ES1824374-001	ES1824374-003	ES1824374-007	ES1824374-009	
Compound	OFIC Wallber			Result	Result	Result	Result	
EA055: Moisture Content (Dried (ଇ 105 110°C)				rtoodit	rtooun	, tooun	
Moisture Content		1.0	%	14.2	9,8	1.3	25.2	
EA200: AS 4964 - 2004 Identificat								
Asbestos Detected	1332-21-4	0.1	g/kg			No		
Asbestos (Trace)	1332-21-4	5	Fibres			No		
Asbestos Type	1332-21-4	-				-		
Sample weight (dry)	1332-21-4	0.01	g			355		
APPROVED IDENTIFIER:		-				S.SPOONER		
		-				J.JF OUNEIX		
EG005T: Total Metals by ICP-AES		E	no a llea		-F	< <u>-</u>	< <u>5</u>	
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	
Chromium	7440-47-3	2	mg/kg	7	2	<2	2	
Copper	7440-50-8	5	mg/kg	86	24	<5	11	
Lead	7439-92-1	5	mg/kg	36	7	<5	<5	
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	<2	
Zinc	7440-66-6	5	mg/kg	106	43	19	16	
EG035T: Total Recoverable Merc	cury by FIMS							
Mercury	7439-97-6	0.1	mg/kg	0.6	0.1	<0.1	<0.1	
EP075(SIM)B: Polynuclear Aroma	atic Hydrocarbons							
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	

Page	: 4 of 6
Work Order	ES1824374
Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH102_0.0-0.2	BH102_0.5-0.6	BH103_0.0-0.2	BH103_0.5-0.6	
	Cli	ient samplii	ng date / time	17-Aug-2018 00:00	17-Aug-2018 00:00	17-Aug-2018 00:00	17-Aug-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1824374-001	ES1824374-003	ES1824374-007	ES1824374-009	
			-	Result	Result	Result	Result	
EP075(SIM)B: Polynuclear Aromatic Hy	drocarbons - Cont	inued						
Sum of polycyclic aromatic hydrocarbons		0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (half LOR)		0.5	mg/kg	0.6	0.6	0.6	0.6	
^ Benzo(a)pyrene TEQ (LOR)		0.5	mg/kg	1.2	1.2	1.2	1.2	
EP080/071: Total Petroleum Hydrocarbo	ons							
C6 - C9 Fraction		10	mg/kg	<10	<10	<10	<10	
C10 - C14 Fraction		50	mg/kg	<50	<50	<50	<50	
C15 - C28 Fraction		100	mg/kg	240	<100	<100	<100	
C29 - C36 Fraction		100	mg/kg	260	<100	<100	<100	
^ C10 - C36 Fraction (sum)		50	mg/kg	500	<50	<50	<50	
EP080/071: Total Recoverable Hydrocar	bons - NEPM 201	3 Fractio	ns					
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	
C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	
(F1)								
>C10 - C16 Fraction		50	mg/kg	<50	<50	<50	<50	
>C16 - C34 Fraction		100	mg/kg	420	130	<100	<100	
>C34 - C40 Fraction		100	mg/kg	180	<100	<100	<100	
>C10 - C40 Fraction (sum)		50	mg/kg	600	130	<50	<50	
^ >C10 - C16 Fraction minus Naphthalene		50	mg/kg	<50	<50	<50	<50	
(F2)								
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Sum of BTEX		0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	
∖ Total Xylenes		0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	
EP075(SIM)S: Phenolic Compound Surr	ogates							
Phenol-d6	13127-88-3	0.5	%	92.2	93.3	101	103	
2-Chlorophenol-D4	93951-73-6	0.5	%	83.1	83.5	81.5	81.2	
2.4.6-Tribromophenol	118-79-6	0.5	%	75.2	71.0	63.7	70.7	

Page	5 of 6
Work Order	ES1824374
Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH102_0.0-0.2	BH102_0.5-0.6	BH103_0.0-0.2	BH103_0.5-0.6	
	Cli	ent samplii	ng date / time	17-Aug-2018 00:00	17-Aug-2018 00:00	17-Aug-2018 00:00	17-Aug-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1824374-001	ES1824374-003	ES1824374-007	ES1824374-009	
				Result	Result	Result	Result	
EP075(SIM)T: PAH Surrogates - Continue	d							
2-Fluorobiphenyl	321-60-8	0.5	%	85.1	85.3	87.4	85.8	
Anthracene-d10	1719-06-8	0.5	%	84.3	85.6	86.8	85.0	
4-Terphenyl-d14	1718-51-0	0.5	%	84.4	88.0	81.1	92.8	
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	92.6	88.0	95.4	88.0	
Toluene-D8	2037-26-5	0.2	%	83.7	79.2	80.5	80.5	
4-Bromofluorobenzene	460-00-4	0.2	%	88.5	82.9	84.8	84.7	

Analytical Results

Descriptive Results

Sub-Matrix: SOIL

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos	in Soils	
EA200: Description	BH103_0.0-0.2 - 17-Aug-2018 00:00	Mid brown sandy soil.

Page	6 of 6
Work Order	ES1824374
Client	: GHD PTY LTD
Project	2219573



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery	Limits (%)
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130



QUALITY CONTROL REPORT

Work Order	: ES1824374	Page	: 1 of 7
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MS ALISON MONKLEY	Contact	: Brenda Hong
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	:	Telephone	: (02) 8784 8504
Project	: 2219573	Date Samples Received	17-Aug-2018
Order number	:	Date Analysis Commenced	: 20-Aug-2018
C-O-C number	:	Issue Date	23-Aug-2018
Sampler	; JULIAN FOWLER		AC-MRA NAT
Site	:		
Quote number	: EN/005/18		Accreditation No. 8
No. of samples received	: 12		Accredited for compliance w
No. of samples analysed	: 4		ISO/IEC 17025 - Testi

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full. This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW

Page	: 2 of 7
Work Order	ES1824374
Client	: GHD PTY LTD
Project	2219573



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL						Laboratory	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Co	ontent (Dried @ 105-110	°C) (QC Lot: 1887041)							
ES1824372-007	Anonymous	EA055: Moisture Content		0.1	%	48.2	51.4	6.34	0% - 20%
ES1824413-003	Anonymous	EA055: Moisture Content		0.1	%	7.6	7.3	4.79	No Limit
EG005T: Total Meta	Is by ICP-AES (QC Lot:	: 1889224)							
ES1824297-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	18	22	20.4	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	10	10	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	10	12	18.4	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	35	32	6.98	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	38	39	0.00	No Limit
EG	EG005T: Zinc	7440-66-6	5	mg/kg	1150	1200	4.19	0% - 20%	
ES1824321-008 Anonymous	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	56	55	1.95	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	13	14	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	8	17.9	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	16	18	7.11	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	15	16	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	34	34	0.00	No Limit
EG035T: Total Reco	overable Mercury by FI	MS (QC Lot: 1889225)							
ES1824297-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1824321-008	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polyr	nuclear Aromatic Hydro	carbons (QC Lot: 1883707)							
ES1824321-003	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

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Sub-Matrix: SOIL						Laboratory	Duplicate (DUP) Report	t	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polyr	nuclear Aromatic Hydro	ocarbons (QC Lot: 1883707) - continued							
ES1824321-003	Anonymous	EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons		0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	< 0.5	<0.5	0.00	No Limit
EP080/071: Total Pe	troleum Hydrocarbon								
ES1824258-001	Anonymous	EP080: C6 - C9 Fraction		10	mg/kg	<10	<10	0.00	No Limit
ES1824443-001	Anonymous	EP080: C6 - C9 Fraction		10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Pe	etroleum Hydrocarbons				0.0				
ES1824321-003	Anonymous	EP071: C15 - C28 Fraction		100	mg/kg	<100	<100	0.00	No Limit
201024021 000	, alonymous	EP071: C29 - C36 Fraction		100	mg/kg	120	<100	17.2	No Limit
		EP071: C10 - C14 Fraction		50	mg/kg	<50	<50	0.00	No Limit
ED020/071, Total D					inging			0.00	
ES1824258-001		ons - NEPM 2013 Fractions (QC Lot: 1883260)	CC C10	10	ma di ca	<10	<10	0.00	No Limit
ES1824443-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10 C6 C10	10 10	mg/kg	<10	<10	0.00	No Limit No Limit
	Anonymous	EP080: C6 - C10 Fraction	0_010	10	mg/kg	<10	<10	0.00	NO LIMIL
		ons - NEPM 2013 Fractions (QC Lot: 1883706)							
ES1824321-003	Anonymous	EP071: >C16 - C34 Fraction		100	mg/kg	130	<100	27.5	No Limit
		EP071: >C34 - C40 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction		50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC	Lot: 1883260)								
ES1824258-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

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Sub-Matrix: SOIL			Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 1883260) - continued									
ES1824443-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit



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

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

Sub-Matrix: SOIL			Method Blank (MB)		Laboratory Control Spike (LCS) Report			
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 188922	4)							
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	104	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	99.0	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	101	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	103	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	98.5	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	106	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	111	80	122
EG035T: Total Recoverable Mercury by FIMS (QC	Lot: 1889225)							
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	79.3	70	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	s (QCLot: 1883707)							
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	93.7	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	94.8	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	95.0	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	95.0	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	98.2	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	91.5	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	97.6	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	92.7	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	98.2	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	93.4	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	97.1	68	116
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	94.0	74	126
EP075(S I M): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	90.5	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	83.7	61	121
EP075(S I M): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	92.3	62	118
EP075(S I M): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	88.9	63	121
EP080/071: Total Petroleum Hydrocarbons(QCLo	t: 1883260)							
EP080: C6 - C9 Fraction		10	mg/kg	<10	26 mg/kg	83.7	68	128
EP080/071: Total Petroleum Hydrocarbons(QCLo	t: 1883706)							
EP071: C10 - C14 Fraction		50	mg/kg	<50	300 mg/kg	114	75	129
EP071: C15 - C28 Fraction		100	mg/kg	<100	450 mg/kg	116	77	131
EP071: C29 - C36 Fraction		100	mg/kg	<100	300 mg/kg	102	71	129
EP080/071: Total Recoverable Hydrocarbons - NEI	M 2012 Erections (OCL	4. 4002260)						

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Sub-Matrix: SOIL			Method Blank (MB)	Laboratory Control Spike (LCS) Report				
	Report		Report	Spike	Spike Recovery (%)	Recovery	Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NE	EPM 2013 Fractions (QCL	.ot: 1883260) <i>-</i> co	ntinued					
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	88.3	68	128
EP080/071: Total Recoverable Hydrocarbons - NE	EPM 2013 Fractions (QCL	.ot: 1883706)						
EP071: >C10 - C16 Fraction		50	mg/kg	<50	375 mg/kg	115	77	125
EP071: >C16 - C34 Fraction		100	mg/kg	<100	525 mg/kg	111	74	138
EP071: >C34 - C40 Fraction		100	mg/kg	<100	225 mg/kg	120	63	131
EP080: BTEXN (QCLot: 1883260)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	90.8	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	85.2	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	84 <u>.</u> 1	65	117
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	84 <u>.</u> 1	66	118
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	88.2	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	92.3	63	119

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	b-Matrix: SOIL		Matrix Spike (MS) Report				
				Spike	SpikeRecovery(%)	Recovery	Limits (%)
aboratory sample ID.	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Met	tals by ICP-AES (QCLot: 1889224)						
ES1824297-002	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	106	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	106	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	108	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	108	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	112	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	108	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	# Not	70	130
					Determined		
EG035T: Total Re	coverable Mercury by FIMS (QCLot: 188922	5)					
ES1824297-002	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	90.6	70	130
EP075(SIM)B: Poly	nuclear Aromatic Hydrocarbons (QCLot: 18	83707)					
ES1824321-003	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	91.8	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	91.8	70	130
EP080/071: Total F	Petroleum Hydrocarbons (QCLot: 1883260)						
ES1824258-001	Anonymous	EP080: C6 - C9 Fraction		32.5 mg/kg	80.1	70	130

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Sub-Matrix: SOIL				Matrix Spike (MS) Report				
				Spike	SpikeRecovery(%)	Recovery L	.imits (%)	
aboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
EP080/071: Total F	Petroleum Hydrocarbons (QCLot: 1883706)							
ES1824321-003	Anonymous	EP071: C10 - C14 Fraction		523 mg/kg	111	73	137	
		EP071: C15 - C28 Fraction		2319 mg/kg	124	53	131	
		EP071: C29 - C36 Fraction		1714 mg/kg	82.9	52	132	
EP080/071: Total F	Recoverable Hydrocarbons - NEPM 2013 Fractions(QCLot: 1883260)						
ES1824258-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	80.8	70	130	
EP080/071: Total F	Recoverable Hydrocarbons - NEPM 2013 Fractions(QCLot: 1883706)						
ES1824321-003	Anonymous	EP071: >C10 - C16 Fraction		860 mg/kg	115	73	137	
		EP071: >C16 - C34 Fraction		3223 mg/kg	104	53	131	
		EP071: >C34 - C40 Fraction		1058 mg/kg	73.1	52	132	
EP080: BTEXN (Q	CLot: 1883260)							
ES1824258-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	76.1	70	130	
		EP080: Toluene	108-88-3	2.5 mg/kg	75.4	70	130	
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	77.1	70	130	
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	75.6	70	130	
			106-42-3					
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	79.5	70	130	
		EP080: Naphthalene	91-20-3	2.5 mg/kg	81.3	70	130	



	QA/QC Compliance Assessment to assist with Quality Review							
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Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney					
Contact	MS ALISON MONKLEY	Telephone	: (02) 8784 8504					
Project	: 2219573	Date Samples Received	: 17-Aug-2018					
Site	:	Issue Date	: 23-Aug-2018					
Sampler	: JULIAN FOWLER	No. of samples received	: 12					
Order number	:	No. of samples analysed	: 4					

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- <u>NO</u> Method Blank value outliers occur.
- <u>NO</u> Duplicate outliers occur.
- <u>NO</u> Laboratory Control outliers occur.
- Matrix Spike outliers exist please see following pages for full details.
- For all regular sample matrices, <u>NO</u> surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

• NO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

• <u>NO</u> Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: SOIL

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG005T: Total Metals by ICP-AES	ES1824297002	Anonymous	Zinc	7440-66-6	Not		MS recovery not determined,
					Determined		background level greater than or
							equal to 4x spike level.

Analysis Holding Time Compliance

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

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

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

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; 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.

Evaluation: * = Holding time breach ; < = Withing time breach ; < = Wi	holding time.
---	---------------

Matrix: SOIL					Evaluation	n: × = Holding time	breach ; 🗸 = With	n holding time
Method		Sample Date	Ex	traction / 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)								
BH102_0.0-0.2,	BH102_0.5-0.6,	17-Aug-2018				21-Aug-2018	31-Aug-2018	 ✓
BH103_0.0-0.2,	BH103_0.5-0.6							
EA200: AS 4964 - 2004 Identification of Asbest	os in Soils							
Snap Lock Bag: Separate bag received (EA200)								
BH103_0.0-0.2		17-Aug-2018				20-Aug-2018	13-Feb-2019	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH102_0.0-0.2,	BH102_0.5-0.6,	17-Aug-2018	22-Aug-2018	13-Feb-2019	✓	22-Aug-2018	13-Feb-2019	 ✓
BH103_0.0-0.2,	BH103_0.5-0.6							
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH102_0.0-0.2,	BH102_0.5-0.6,	17-Aug-2018	22-Aug-2018	14-Sep-2018	✓	22-Aug-2018	14-Sep-2018	 ✓
BH103_0.0-0.2,	BH103_0.5-0.6							
EP075(SIM)B: Polynuclear Aromatic Hydrocart	oons							
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH102_0.0-0.2,	BH102_0.5-0.6,	17-Aug-2018	20-Aug-2018	31-Aug-2018	✓	21-Aug-2018	29-Sep-2018	 ✓
BH103_0.0-0.2,	BH103_0.5-0.6							

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Matrix: SOIL					Evaluation	: × = Holding time	breach ; ✓ = Withi	n holding time
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071)								
BH102_0.0-0.2,	BH102_0.5-0.6,	17-Aug-2018	20-Aug-2018	31-Aug-2018	✓	21-Aug-2018	29-Sep-2018	✓
BH103_0.0-0.2,	BH103_0.5-0.6							
Soil Glass Jar - Unpreserved (EP080)								
BH102_0.0-0.2,	BH102_0.5-0.6,	17-Aug-2018	20-Aug-2018	31-Aug-2018	✓	22-Aug-2018	31-Aug-2018	✓
BH103_0.0-0.2,	BH103_0.5-0.6							
EP080/071: Total Recoverable Hydrocarbo	ns - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP071)								
BH102_0.0-0.2,	BH102_0.5-0.6,	17-Aug-2018	20-Aug-2018	31-Aug-2018	1	21-Aug-2018	29-Sep-2018	✓
BH103_0.0-0.2,	BH103_0.5-0.6							
Soil Glass Jar - Unpreserved (EP080)								
BH102_0.0-0.2,	BH102_0.5-0.6,	17-Aug-2018	20-Aug-2018	31-Aug-2018	1	22-Aug-2018	31-Aug-2018	✓
BH103_0.0-0.2,	BH103_0.5-0.6							
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
BH102_0.0-0.2,	BH102_0.5-0.6,	17-Aug-2018	20-Aug-2018	31-Aug-2018	1	22-Aug-2018	31-Aug-2018	✓
BH103_0.0-0.2,	BH103_0.5-0.6							

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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				Evaluatio	n: 🗴 = Quality Co	ntrol frequency	not within specification ; \checkmark = Quality Control frequency within specification
Quality Control Sample Type		Сс	ount		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	6.67	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	 Image: A start of the start of	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	6.67	5.00	1	NEPM 2013 B3 & ALS QC Standard

Page	: 5 of 5
Work Order	ES1824374
Client	: GHD PTY LTD
Project	2219573



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 (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples
			Analysis by Polarised Light Microscopy including dispersion staining
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 (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS)
			FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an
			appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then
			purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This
			method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and
			quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. 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 (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS.
			Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM
			amended 2013.
Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and
sediments and sludges			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 (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior
and Trap			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.

£ nu		NOF Ph: 08 ODY DBR/S Ph: 07 DBR/S ODY Ph: 07 Observations ORGAN		a@alsglobal.com et Stafford OLD 4053 : brisbane@alsglobat.com dab. Drive Clinton Qi D 4680	DMACKAY 78 Harbour Roa Ph: 07 4944 0177 E: maokay DMELBOURNE 2-4 Westall Ph: 03 8549 9500 E: sample: DMUD GEE 27 Sydney Ro Ph: 02 6372 6735 E: mudg	@alsgiobal.com Road Springvale VIC 3 .melbourne@alsglobal.	Ph: 02 4014 250 71 ENOWRA 4/1 50m Ph: 024423 20 CIPERTH 10 Ho	5565 Maltland Rd Mayfield West NS D E: samples.newcastle@alsglobal.co 3 Geary Pizca North Nowra NSW 25- 63 E: rowra@alsglobal.com at Way Malaga WA 6030 55 E: samples perth@alsglobal.com	m Ph: 02 8764 8 11	7-289 Woodpark Read Smithfield NSW 2164 555 E: samples sydney@alsglobal.com E1415 Desma Court Bohle QUI D418 500 E: townstills anvironmental@alsglobal.com NG 99 Kenny Street Wollengeng NSW 2260 126 E: pertkembla@alsglobal.com	
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	vewcastle		Ultra Trace		Non Standard or	urgent TAT (List c			Service Constanting of the Service Ser		
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	ANAGER: Alison Monkley	CONTA	CT PH: 4979999				$- \begin{array}{c} \cos(2 + 1) & 2 & 3 \\ \cos(2 + 1) & 2 & 3 \\ \cos(2 + 1) & 2 & 3 \end{array}$	4 5 6 7 Ma 4 5 6 7 Q	ndom sam de painte alsos po		
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Email Invoi	e to (will default to PM if no other a	dresses are listed): ap-fss@g	hd.com		17/08/	18 1650	17-8-18	(71	8114 17:	00 17/8/68 7:30pm	
COMMENT	S/SPECIAL HANDLING/STORAGE	OR DISPOSAL:					Cd cr, (n, H	4 Ni Ph Z			
ALS USE	SAMP MATRIX SO	LE (DETAILS) 410 (STWATERIW)		CONTAINER INFO	RMATION	ANALYS Where Metals a	IS REQUIRED including SUIT	ES (NB. Suite Codes must be lis ered bottle required) or Dissolve	ted to attract suite price)	Additional Information	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIN (refer to codes below)		TPH, BTEX	HSperies			Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.	
1	SH 102_0.0	-0+2	5		2	\mathbf{X}					
2	SH 102 _ D.2.	0-3			2						1
	BH 102 _ 0.5-				2		\sim				4
3. 4	0/1/02 0.5-	0.6			2						1
	BH 102-1.0.										1
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6	FD2										{
7	BH103 - 00-				2	\times	\times			E-MAIL	E
8	GH103 0.2.	2.2			2						
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										Telephone : + 61-2-8784 855	i5
					TOTAL						

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CERTIFICATE OF ANALYSIS

Work Order	ES1825384	Page	: 1 of 5
Client	: GHD PTY LTD	Laboratory	Environmental Division Sydney
Contact	: MS ALISON MONKLEY	Contact	Brenda Hong
Address	: PO BOX 5403	Address	277-289 Woodpark Road Smithfield NSW Australia 2164
	NEWCASTLE WEST NSW, AUSTRALIA 2302		
Telephone	:	Telephone	: (02) 8784 8504
Project	: 2219573	Date Samples Received	: 28-Aug-2018 10:00
Order number	:	Date Analysis Commenced	: 30-Aug-2018
C-O-C number	:	ssue Date	03-Sep-2018 13:27
Sampler	: JULIAN FOWLER		NATA
Site	:		
Quote number	: EN/005/18		The Addition
No. of samples received	: 3		Accredited for compliance with
No. of samples analysed	: 1		ISO/IEC 17025 - Testing

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	Position	Accreditation Category
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

Page	2 of 5
Work Order	ES1825384
Client	: GHD PTY LTD
Project	2219573



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society. LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

• EP068: Positive result has been confirmed by re-extraction and re-analysis.

Page	3 of 5
Work Order	ES1825384
Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	COMP 1	 	
	Client sampling date / time		[17-Aug-2018]	 	 	
Compound	CAS Number	LOR	Unit	ES1825384-001	 	
Compound	CAS Number	2011		Result	 	
EA055: Moisture Content (Dried @ 1	05-110°C)			Roour		
Moisture Content		1.0	%	5.2	 	
EP066: Polychlorinated Biphenyls (F	PCB)					
Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	 	
EP068A: Organochlorine Pesticides	(0C)					
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	 	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	 	
beta-BHC	319-85-7	0.05	mg/kg	<0.05	 	
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	 	
delta-BHC	319-86-8	0.05	mg/kg	<0.05	 	
Heptachlor	76-44-8	0.05	mg/kg	<0.05	 	
Aldrin	309-00-2	0.05	mg/kg	<0.05	 	
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	 	
^ Total Chlordane (sum)		0.05	mg/kg	<0.05	 	
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	 	
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	 	
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	 	
Dieldrin	60-57-1	0.05	mg/kg	0.06	 	
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	 	
Endrin	72-20-8	0.05	mg/kg	<0.05	 	
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	 	
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	 	
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	 	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	 	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	 	
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	 	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	 	
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	 	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	0.06	 	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.05	mg/kg	<0.05	 	
EP066S: PCB Surrogate						
Decachlorobiphenyl	2051-24-3	0.1	%	96.0	 	
EP068S: Organochlorine Pesticide S						
Dibromo-DDE	21655-73-2	0.05	%	97.6	 	

Page	: 4 of 5
Work Order	ES1825384
Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			COMP 1	 	
Client sampling date / time				[17-Aug-2018]	 	
Compound	CAS Number	LOR	Unit	ES1825384-001	 	
				Result	 	
EP068T: Organophosphorus Pest	ticide Surrogate					
DEF	78-48-8	0.05	%	96.8	 	

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Work Order	ES1825384
Client	: GHD PTY LTD
Project	2219573



Surrogate Control Limits

Sub-Matrix: SOIL	Recovery Limits (%)			
Compound	CAS Number	Low	High	
EP066S: PCB Surrogate				
Decachlorobiphenyl	2051-24-3	39	149	
EP068S: Organochlorine Pesticide Surrogate				
Dibromo-DDE	21655-73-2	49	147	
EP068T: Organophosphorus Pesticide Surrogate				
DEF	78-48-8	35	143	



QUALITY CONTROL REPORT

Work Order	: ES1825384	Page	: 1 of 5
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MS ALISON MONKLEY	Contact	Brenda Hong
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	:	Telephone	: (02) 8784 8504
Project	: 2219573	Date Samples Received	: 28-Aug-2018
Order number	:	Date Analysis Commenced	: 30-Aug-2018
C-O-C number	:	Issue Date	03-Sep-2018
Sampler	JULIAN FOWLER		Hac-MRA NAT
Site	:		
Quote number	: EN/005/18		Accreditation No. 8
No. of samples received	: 3		Accredited for compliance w
No. of samples analysed	: 1		ISO/IEC 17025 - Testi

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full. This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

Page	2 of 5
Work Order	ES1825384
Client	: GHD PTY LTD
Project	2219573



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL						Laboratory I	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Co	ontent (Dried @ 105-110°C	;) (QC Lot: 1906689)							
ES1825334-007	Anonymous	EA055: Moisture Content		0.1	%	47.0	46.3	1.54	0% - 20%
ES1825343-011	Anonymous	EA055: Moisture Content		0.1	%	11.7	11.3	3.32	0% - 20%
EP066: Polychlorina	ated Biphenyls (PCB)(QC	C Lot: 1904951)							
ES1825384-001	COMP 1	EP066: Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organoch	orine Pesticides (OC) (Q	C Lot: 1904950)							
ES1825384-001	COMP 1	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	0.06	0.07	25.5	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit

Page Work Order Client Project	3 of 5 ES1825384 GHD PTY LTD 2219573								ALS
Sub-Matrix: SOIL]			Laboratory L	Duplicate (DUP) Report	t	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 1904950) - continued									
ES1825384-001	COMP 1	EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit



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

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

Sub-Matrix: SOIL			Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP066: Polychlorinated Biphenyls (PCB) (QCLo	t: 1904951)							
EP066: Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	1 mg/kg	97.0	62	126
EP068A: Organochlorine Pesticides (OC) (QCLc	ot: 1904950)							
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	99.6	69	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	98.5	65	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	101	67	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	100	68	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	101	65	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	97.5	67	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	102	69	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	103	62	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	103	63	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	101	66	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	103	64	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	102	66	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	102	67	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	94.8	67	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	104	69	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	108	69	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	102	56	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	98.6	62	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	90.3	66	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	101	64	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	84.7	54	130

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	SpikeRecovery(%)	Recovery L	imits (%)
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP066: Polychlorin	ated Biphenyls (PCB) (QCLot: 1904951)						
ES1825384-001	COMP 1	EP066: Total Polychlorinated biphenyls		1 mg/kg	106	70	130
EP068A: Organoch	Iorine Pesticides (OC) (QCLot: 1904950)						

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ub-Matrix: SOIL				Ma	Matrix Spike (MS) Report				
		Spike	SpikeRecovery(%)	Recovery L	imits (%)				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High		
EP068A: Organoch	lorine Pesticides (OC) (QCLot: 1904950) - continued								
ES1825384-001	COMP 1	EP068: gamma-BHC	58-89-9	0.5 mg/kg	94.9	70	130		
		EP068: Heptachlor	76-44-8	0.5 mg/kg	89.4	70	130		
		EP068: Aldrin	309-00-2	0.5 mg/kg	91.4	70	130		
		EP068: Dieldrin	60-57-1	0.5 mg/kg	107	70	130		
		EP068: Endrin	72-20-8	2 mg/kg	89.3	70	130		
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	81.1	70	130		



	QA/QC Complianc	e Assessment to assist with	h Quality Review	
Work Order	ES1825384	Page	: 1 of 4	
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney	
Contact	: MS ALISON MONKLEY	Telephone	: (02) 8784 8504	
Project	: 2219573	Date Samples Received	: 28-Aug-2018	
Site	:	Issue Date	: 03-Sep-2018	
Sampler	: JULIAN FOWLER	No. of samples received	: 3	
Order number	:	No. of samples analysed	: 1	

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

• <u>NO</u> Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

• <u>NO</u> Quality Control Sample Frequency Outliers exist.

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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 ; 🗸 = Withi	n holding time.
Method	Sample Date	Ex	traction / Preparation				
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) COMP 1	17-Aug-2018				30-Aug-2018	31-Aug-2018	~
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066) COMP 1	17-Aug-2018	30-Aug-2018	31-Aug-2018	~	31-Aug-2018	09-Oct-2018	~
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068) COMP 1	17-Aug-2018	30-Aug-2018	31-Aug-2018	1	31-Aug-2018	09-Oct-2018	1

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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	QC Regular Actual Expected Evaluation				
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	19	10.53	10.00	\checkmark	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Pesticides by GCMS	EP068	1	1	100.00	5.00	\checkmark	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Pesticides by GCMS	EP068	1	1	100.00	5.00	\checkmark	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Pesticides by GCMS	EP068	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

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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 (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
Preparation Methods	Method	Matrix	Method Descriptions
Sample Compositing	* EN020	SOIL	Equal weights of each original soil are taken, then mixed and homogenised. The combined mixture is labelled as a new sample.
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.

Fadi Soro

From: Sent: To: Subject: Julian Fowler <Julian.Fowler@ghd.com> Tuesday, 28 August 2018 9:37 AM Samples Sydney additional analysis for ES1824374



Good morning,

For work order ES1824374, I would like to request an analysis of a composite of 2 samples:

⁷ BH102_0.0-0.2

3 BH103_0.0-0.2 For OCP's and PCB

1. Comp 7

Let me know if there will be any issues.

Thanks

Regards

Julian Fowler Environmental Technician

GHD

T: 61 2 4979 9999 | D: 61 2 4979 9910 | V: 229910 | M1: 0466 049 181 | M2: 0423 163 493 | F 61 2 4979 9988 | E: <u>julian.fowler@ghd.com</u> Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle, NSW, 2300 | PO Box 5403 HRMC, NSW, 2310, Australia | <u>www.ghd.com</u>

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

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CERTIFICATE OF ANALYSIS

Work Order	ES1825728	Page	: 1 of 31
Client	: GHD PTY LTD	Laboratory	Environmental Division Sydney
Contact	: MS ALISON MONKLEY	Contact	Brenda Hong
Address	: PO BOX 5403	Address	277-289 Woodpark Road Smithfield NSW Australia 2164
	NEWCASTLE WEST NSW, AUSTRALIA 2302		
Telephone	·	Telephone	: (02) 8784 8504
Project	: 2219573	Date Samples Received	: 31-Aug-2018 13:08
Order number		Date Analysis Commenced	: 05-Sep-2018
C-O-C number	:	ssue Date	10-Sep-2018 17:07
Sampler	: JULIAN FOWLER		NATA
Site	:		
Quote number	: EN/005/18		The Couldt
No. of samples received	: 80		Accredited for compliance with
No. of samples analysed	: 60		ISO/IEC 17025 - Testing

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

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

Signatories

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

Signatories	Position	Accreditation Category	
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD	
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW	
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW	
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW	
Gerrad Morgan	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW	

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General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

- Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 - LOR = Limit of reporting
 - ^ = This result is computed from individual analyte detections at or above the level of reporting
 - ø = ALS is not NATA accredited for these tests.
 - \sim = Indicates an estimated value.
- ASS: EA003 (NATA Field and F(ox) screening): pH F(ox) Reaction Rate: 1 Slight; 2 Moderate; 3 Strong; 4 Extreme
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) 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.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

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Sub-Matrix: COMPOSITE (Matrix: SOIL)		Clie	ent sample ID	COMP 2	COMP 3			
(Cl	ient sampliı	ng date / time	30-Aug-2018 00:00	31-Aug-2018 00:00			
Compound	CAS Number	LOR	Unit	ES1825728-079	ES1825728-080			
				Result	Result			
EA055: Moisture Content (Dried @ 1	05-110°C)							
Moisture Content		1.0	%	2.8	6.0			
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	<0.1			
EP068A: Organochlorine Pesticides	(OC)							
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05			
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05			
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05			
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05			
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05			
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05			
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05			
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05			
^ Total Chlordane (sum)		0.05	mg/kg	<0.05	<0.05			
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05			
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05			
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05			
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05			
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05			
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05			
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05			
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05			
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05			
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05			
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05			
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2			
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05			
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2			
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05			
[^] Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.05	mg/kg	<0.05	<0.05			
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	75.3	113			
EP068S: Organochlorine Pesticide S	urrogate							
Dibromo-DDE	21655-73-2	0.05	%	106	134			

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Sub-Matrix: COMPOSITE (Matrix: SOIL)	Client sample ID		COMP 2	COMP 3	 		
	Client	t sampling	date / time	30-Aug-2018 00:00	31-Aug-2018 00:00	 	
Compound	CAS Number	LOR	Unit	ES1825728-079	ES1825728-080	 	
				Result	Result	 	
EP068T: Organophosphorus Pesticio	de Surrogate						
DEF	78-48-8	0.05	%	97.7	107	 	

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH108_0.0-0.2	BH101_0.0-0.2	BH101_0.45-0.5	BH301_0.0-0.2	BH301_0.45-0.5
	Client sampling date / time			22-Aug-2018 00:00	29-Aug-2018 00:00	29-Aug-2018 00:00	30-Aug-2018 00:00	30-Aug-2018 00:00
Compound	CAS Number	LOR	Unit	ES1825728-001	ES1825728-004	ES1825728-006	ES1825728-010	ES1825728-012
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried	@ 105-110°C)							
Moisture Content		1.0	%		<1.0	4.6	6.3	9.2
EA200: AS 4964 - 2004 Identifica	tion of Asbestos in Soils							
Asbestos Detected	1332-21-4	0.1	g/kg	No	No			
Asbestos (Trace)	1332-21-4	5	Fibres	No	No			
Asbestos Type	1332-21-4	-		-	-			
Sample weight (dry)		0.01	g	373	406			
APPROVED IDENTIFIER:		-		G.MORGAN	G.MORGAN			
EG005T: Total Metals by ICP-AE	S							
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	9
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		<2	<2	2	5
Copper	7440-50-8	5	mg/kg		<5	<5	7	13
Lead	7439-92-1	5	mg/kg		<5	<5	8	18
Nickel	7440-02-0	2	mg/kg		<2	<2	2	6
Zinc	7440-66-6	5	mg/kg		32	16	22	21
EG035T: Total Recoverable Mer	curv by FIMS							
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Arom	atic Hydrocarbons							
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	1.0	1.3
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	0.5	0.7
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5

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Client	: GHD PTY LTD
Project	2219573



Lumber LC s - Continued 0.: 0.: 0.: 0.: 10: 10: 50: 50: PM 2013 Fra :6_C10 10: D-BTEX 10: 50: 50: 10: 50: 10: 50: 10: 50: 10: 50: 10: 50: 50: 10: 50: 10: 50: 10: 	5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 0 mg/kg	22-Aug-2018 00:00 ES1825728-001 Result <tr td=""> </tr>	29-Aug-2018 00:00 ES1825728-004 Result	29-Aug-2018 00:00 ES1825728-006 Result 	30-Aug-2018 00:00 ES1825728-010 Result 1.5 <0.5 0.6 1.2 	30-Aug-2018 00:00 ES1825728-012 Result 2.0 <0.5 0.6 1.2
Lumber LC s - Continued 0.: 0.: 0.: 0.: 10: 10: 50: 50: PM 2013 Fra :6_C10 10: D-BTEX 10: 50: 50: 10: 50: 10: 50: 10: 50: 10: 50: 10: 50: 50: 10: 50: 10: 50: 10: 	DR Unit 5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 0 mg/kg 00 mg/kg	ES1825728-001 Result	ES1825728-004 Result <0.5	ES1825728-006 Result 	ES1825728-010 Result 1.5 <0.5 0.6 1.2 	ES1825728-012 Result 2.0 <0.5 0.6 1.2 <10 <100 <50 <100 <100 <50 <100 <50 <100 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50 <50
s - Continued 0. 0. 0. 0. 0. 10 50 10 50 PM 2013 Fra :6_C10 10 D-BTEX 10 50 50 10 10	5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 0 mg/kg	Result I <td>Result <0.5</td> <0.5	Result <0.5	Result <0.5	Result 1.5 <0.5	Result 2.0 <0.5
0. 0. 0. 0. 10 10 10 50 PM 2013 Fra 36_C10 10 50 50 10 10 10	5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 0 mg/kg		 <0.5 <0.5 0.6 1.2 <10 <50 <100 <50 <100 <100 <50 <10 <50 <10 <50 <10 <50 <10 <50 <10 <50 <10 <50 <50 <50 <50 <50 <50 <50 <50 <50 	<0.5 <0.5 0.6 1.2 <10 <50 <100 <100 <50 <100 <50	1.5 <0.5 0.6 1.2 <10 <50 <100 <50 <100 <100 <100 <50 <10 <50 <10 <50 <10 <10 <50	2.0 <0.5 0.6 1.2 <10 <50 <100 <50 <100 <50
0. 0. 0. 0. 10 10 10 50 PM 2013 Fra 36_C10 10 50 50 10 10 10	5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 0 mg/kg	Image: state	 <0.5 0.6 1.2 <10 <50 <100 <100 <50 <100 <50 <10 <50 <10 <50 	<0.5 0.6 1.2 <10 <50 <100 <100 <50 <10	<0.5 0.6 1.2 <10 <50 <100 <100 <50 <10 <50	<0.5 0.6 1.2 <10 <50 <100 <50 <100 <50
0. 0. 0. 10 10 50 PM 2013 Fra 36_C10 10 50 50 10 10	5 mg/kg 5 mg/kg 5 mg/kg 5 mg/kg 0 mg/kg	Image: state	 <0.5 0.6 1.2 <10 <50 <100 <100 <50 <100 <50 <10 <50 <10 <50 	<0.5 0.6 1.2 <10 <50 <100 <100 <50 <10	<0.5 0.6 1.2 <10 <50 <100 <100 <50 <10 <50	<0.5 0.6 1.2 <10 <50 <100 <50 <100 <50
0. 0. 10 10 10 50 PM 2013 Fra 36_C10 10 50 50 10	5 mg/kg 5 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg	Image: state	0.6 1.2 <10	0.6 1.2 <10 <50 <100 <100 <50	0.6 1.2 <10 <50 <100 <100 <50 	0.6 1.2 <10 <50 <100 <50 <100 <50
0. 10 10 10 50 PM 2013 Fra 36_C10 10 10 50 10 10	5 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg 0 mg/kg	Image: state	1.2 <10	1.2 <10 <50 <100 <100 <50 <10 <10 <50	1.2 <10 <50 <100 <100 <50 <10 <10 <50	1.2 <10 <50 <100 <50 <100 <50 <10 <50 <50
10 50 10 50 50 50 50 10 10	0 mg/kg 0 mg/kg 0 mg/kg 00 mg/kg		<pre></pre> <10 <50 <100 <100 <50 <10 <10 <10 <50	<10 <50 <100 <100 <50 <10 <10 <50	<10 <50 <100 <100 <50 <10 <10 <10 <50	<10 <50 <100 <100 <50 <10 <10 <10 <50
50 10 50 PM 2013 Fra 50 26_C10 10 0-BTEX 10 50 50 10 10 50 10	D mg/kg 10 mg/kg		<50 <100 <100 <50 <10 <10 <50	<50 <100 <100 <50 <10 <10 <50	<50 <100 <100 <50 <10 <10 <50	<50 <100 <100 <50 <10 <10 <50
50 10 50 PM 2013 Fra 50 26_C10 10 0-BTEX 10 50 50 10 10 50 10	D mg/kg 10 mg/kg		<50 <100 <100 <50 <10 <10 <50	<50 <100 <100 <50 <10 <10 <50	<50 <100 <100 <50 <10 <10 <50	<50 <100 <100 <50 <10 <10 <50
10 50 PM 2013 Fra 36_C10 10 D-BTEX 10 50 10 10	no mg/kg 10 mg/kg		<100 <100 <50 <10 <10 <10 <50	<100 <100 <50 <10 <10 <10 <50	<100 <100 <50 <10 <10 <50	<100 <100 <50 <10 <10 <50
10 50 PM 2013 Fra :6_C10 10 BTEX 10 50 10 10	mg/kg 0 mg/kg		<100 <50 <10 <10 <50	<100 <50 <10 <10 <50	<100 <50 <10 <10 <50	<100 <50 <10 <10 <50
50 PM 2013 Fra 10 :6_C10 10 :-BTEX 10 10 10	0 mg/kg nctions 0 mg/kg 0 mg/kg 0 mg/kg 10 mg/kg		<50 <10 <10 <10 <50	<50 <10 <10 <50	<50 <10 <10 <50	<50 <10 <10 <50
PM 2013 Fra 36_C10 10 D-BTEX 10 50 10 10	Inctions mg/kg D mg/kg D mg/kg D mg/kg IO mg/kg	 	<10 <10 <50	<10 <10 <50	<10 <10 <50	<10 <10 <50
C6_C10 10 D-BTEX 10 50 10 10	0 mg/kg 0 mg/kg 0 mg/kg 10 mg/kg	 	<10	<10	<10	<10 <50
-BTEX 10 50 10 10	0 mg/kg 0 mg/kg 10 mg/kg	 	<10	<10	<10	<10 <50
50 10 10	0 mg/kg 10 mg/kg		<50	<50	<50	<50
10 10	0 mg/kg					
10			<100	<100		
	0 mg/kg			100	<100	100
			<100	<100	<100	<100
50	0 mg/kg		<50	<50	<50	100
50	0 mg/kg		<50	<50	<50	<50
71-43-2 0.1	2 mg/kg		<0.2	<0.2	<0.2	<0.2
0.8-88-3	5 mg/kg		<0.5	<0.5	<0.5	<0.5
0-41-4 0.			<0.5	<0.5	<0.5	<0.5
06-42-3 0.			<0.5	<0.5	<0.5	<0.5
			<0.5	<0.5	<0.5	<0.5
			<0.2	<0.2	<0.2	<0.2
0.5			<0.5	<0.5	<0.5	<0.5
91-20-3 1			<1	<1	<1	<1
27-88-3 0.1	5 %		81.1	76.1	75.3	73.6
						78.9
						64.9
9 9 9 9	95-47-6 0. 0. 91-20-3 1 91-20-3 0. 91-20-3 0. 91-20-3 0.	95-47-6 0.5 mg/kg 0.2 mg/kg 0.5 mg/kg 91-20-3 1 mg/kg 127-88-3 0.5 % 95-173-6 0.5 %	95-47-6 0.5 mg/kg 9.2 mg/kg 0.5 mg/kg 91-20-3 1 mg/kg 127-88-3 0.5 % 95-173-6 0.5 %	95-47-6 0.5 mg/kg <0.5 0.2 mg/kg <0.2	95-47-6 0.5 mg/kg <0.5 <0.5 <0.5 0.2 mg/kg <0.2	95-47-6 0.5 mg/kg <0.5 <0.5 <0.5 <0.5 0.2 mg/kg <0.2

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Sub-Matrix: SOIL (Matrix: SOIL)				BH108_0.0-0.2	BH101_0.0-0.2	BH101_0.45-0.5	BH301_0.0-0.2	BH301_0.45-0.5
	Cli	ent sampli	ing date / time	22-Aug-2018 00:00	29-Aug-2018 00:00	29-Aug-2018 00:00	30-Aug-2018 00:00	30-Aug-2018 00:00
Compound	CAS Number	LOR	Unit	ES1825728-001	ES1825728-004	ES1825728-006	ES1825728-010	ES1825728-012
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Cont	inued							
2-Fluorobiphenyl	321-60-8	0.5	%		101	95.0	94.1	91.6
Anthracene-d10	1719-06-8	0.5	%		96.0	90.2	87.0	86.6
4-Terphenyl-d14	1718-51-0	0.5	%		81.2	76.8	76.9	74.7
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%		89.8	94.8	114	103
Toluene-D8	2037-26-5	0.2	%		89.9	93.2	115	99.3
4-Bromofluorobenzene	460-00-4	0.2	%		96.2	95.0	116	98.2

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	BH301_0.95-1.0	BH301_1.45-1.5	BH301_2.0-2.1	BH301_2.45-2.5	BH301_3.0-3.1
	Cl	ient sampl	ing date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-013	ES1825728-014	ES1825728-015	ES1825728-016	ES1825728-017
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
рН (F)		0.1	pH Unit	6.2	7.1	7.2	7.2	6.5
pH (Fox)		0.1	pH Unit	2.9	4.4	4.6	4.0	3.4
Reaction Rate		1	Reaction Unit	2	2	2	2	2

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	BH301_3.5-3.6	BH302_0.0-0.2	BH302_0.2-0.3	BH302_0.95-1.0	BH302_1.45-1.5
· · · · · · · · · · · · · · · · · · ·	Cl	ient sampl	ing date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-018	ES1825728-023	ES1825728-024	ES1825728-026	ES1825728-027
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
рН (F)		0.1	pH Unit	6.5			7.7	6.8
pH (Fox)		0.1	pH Unit	3.6			3.4	4.0
Reaction Rate		1	Reaction Unit	2			3	2
EA055: Moisture Content (Dried	d @ 105-110°C)							
Moisture Content		1.0	%		9.5	5.6		
EG005T: Total Metals by ICP-AE	ES							
Arsenic	7440-38-2	5	mg/kg		6	<5		
Cadmium	7440-43-9	1	mg/kg		<1	<1		
Chromium	7440-47-3	2	mg/kg		3	5		
Copper	7440-50-8	5	mg/kg		14	10		
Lead	7439-92-1	5	mg/kg		9	11		
Nickel	7440-02-0	2	mg/kg		4	4		
Zinc	7440-66-6	5	mg/kg		29	52		
EG035T: Total Recoverable Me	ercury by FIMS							
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1		
EP075(SIM)B: Polynuclear Aron								
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		0.6	0.6		
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5		
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5		
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5		
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5		
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5		
Benzo(b+j)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 hydro	ocarbons	0.5	mg/kg		0.6	0.6		
^ Benzo(a)pyrene TEQ (zero)		0.5	mg/kg		<0.5	<0.5		

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH301_3.5-3.6	BH302_0.0-0.2	BH302_0.2-0.3	BH302_0.95-1.0	BH302_1.45-1.5
	Cli	ient samplii	ng date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-018	ES1825728-023	ES1825728-024	ES1825728-026	ES1825728-027
Compound	CAS Number	20/1	-	Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hy	drooorbono Cont	inuad		Result	rtesuit	1 Court	result	result
[^] Benzo(a)pyrene TEQ (half LOR)	drocarbons - Cont	0.5	mg/kg		0.6	0.6		
A Benzo(a)pyrene TEQ (LOR)		0.5	mg/kg		1.2	1.2		
		0.0	mg/kg		1.2	1.2		
EP080/071: Total Petroleum Hydrocarb C6 - C9 Fraction		10	malka		<10	<10		
		10	mg/kg		<50	<50		
C10 - C14 Fraction		50	mg/kg					
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 Hydroca	rbons - NEPM 201	3 Fractio	ns					
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10		
C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg		<10	<10		
(F1)								
>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		50	mg/kg		<50	<50		
(F2)								
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		
	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		
EP075(SIM)S: Phenolic Compound Sur	rogates							
Phenol-d6	13127-88-3	0.5	%		74.0	74.8		
2-Chlorophenol-D4	93951-73-6	0.5	%		79.2	79.8		
2.4.6-Tribromophenol	118-79-6	0.5	%		70.3	65.7		
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%		91.6	92.5		
Anthracene-d10	1719-06-8	0.5	%		86.7	86.6		

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH301_3.5-3.6	BH302_0.0-0.2	BH302_0.2-0.3	BH302_0.95-1.0	BH302_1.45-1.5
	Cli	ent sampli	ng date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-018	ES1825728-023	ES1825728-024	ES1825728-026	ES1825728-027
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
4-Terphenyl-d14	1718-51-0	0.5	%		74.8	74.6		
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%		98.4	99.1		
Toluene-D8	2037-26-5	0.2	%		97.8	103		
4-Bromofluorobenzene	460-00-4	0.2	%		100	102		

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	BH302_2.0-2.1	BH302_2.45-2.5	BH302_2.95-3.0	BH302_3.5-3.6	BH302_3.95-4.0
	Cl	ient sampl	ing date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-028	ES1825728-029	ES1825728-030	ES1825728-031	ES1825728-032
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
рН (F)		0.1	pH Unit	6.8	6.3	6.6	6.4	6.7
pH (Fox)		0.1	pH Unit	2.2	2.3	4.4	4.3	2.1
Reaction Rate		1	Reaction Unit	4	4	2	2	3

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ient sample ID	BH302_4.45-4.5	BH302_4.9-5.0	BH306_0.0-0.2	BH306_0.2-0.3	BH306_0.45-0.5
	Cli	ient sampl	ing date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-033	ES1825728-034	ES1825728-036	ES1825728-037	ES1825728-038
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
рН (F)		0.1	pH Unit	6.2	6.8			5.2
pH (Fox)		0.1	pH Unit	4.1	2.4			2.9
Reaction Rate		1	Reaction Unit	4	3			3
EA055: Moisture Content (Dried	d @ 105-110°C)							
Moisture Content		1.0	%			5.6	13.6	
EG005T: Total Metals by ICP-A	FS							
Arsenic	7440-38-2	5	mg/kg			7	<5	
Cadmium	7440-43-9	1	mg/kg			<1	<1	
Chromium	7440-47-3	2	mg/kg			16	6	
Copper	7440-50-8	5	mg/kg			16	<5	
Lead	7439-92-1	5	mg/kg			20	<5	
Nickel	7440-02-0	2	mg/kg			13	<2	
Zinc	7440-66-6	5	mg/kg			69	<5	
EG035T: Total Recoverable Me								
Mercury	7439-97-6	0.1	mg/kg			<0.1	<0.1	
EP075(SIM)B: Polynuclear Aror								
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			0.6	<0.5	
Anthracene	120-12-7	0.5	mg/kg			<0.5	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg			<0.5	<0.5	
Pyrene	129-00-0	0.5	mg/kg			<0.5	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg			<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg			<0.5	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg			<0.5	<0.5	
Benzo(k)fluoranthene	205-99-2 205-82-3	0.5	mg/kg 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 mg/kg			<0.5	<0.5	
^ Sum of polycyclic aromatic hydro		0.5	mg/kg			0.6	<0.5	
		0.5				<0.5	<0.5	
^ Benzo(a)pyrene TEQ (zero)		0.0	mg/kg			~0.5	~0.5	

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH302_4.45-4.5	BH302_4.9-5.0	BH306_0.0-0.2	BH306_0.2-0.3	BH306_0.45-0.5
	Cli	ient sampli	ng date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-033	ES1825728-034	ES1825728-036	ES1825728-037	ES1825728-038
Compound	CAC Number			Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hy	drocarbone Cont	inuad		Köödit	i toodit	rtoout		rtoout
[^] 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 Hydrocarb 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				<100	<100	
^ C10 - C36 Fraction (sum)		50	mg/kg mg/kg			<50	<50	
							-00	
EP080/071: Total Recoverable Hydroca						<10	<10	
C6 - C10 Fraction	C6_C10	10	mg/kg			<10	<10	
[^] C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg			<10	<10	
(F1)		50					-50	
>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	
EP075(SIM)S: Phenolic Compound Sur	rogates							
Phenol-d6	13127-88-3	0.5	%			74.8	77.6	
2-Chlorophenol-D4	93951-73-6	0.5	%			79.6	83.1	
2.4.6-Tribromophenol	118-79-6	0.5	%			67.4	70.9	
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%			92.5	96.1	
Anthracene-d10	1719-06-8	0.5	%			87,0	90.9	

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH302_4.45-4.5	BH302_4.9-5.0	BH306_0.0-0.2	BH306_0.2-0.3	BH306_0.45-0.5
	Cli	ent sampli	ing date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-033	ES1825728-034	ES1825728-036	ES1825728-037	ES1825728-038
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
4-Terphenyl-d14	1718-51-0	0.5	%			75.2	78.2	
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%			96.1	104	
Toluene-D8	2037-26-5	0.2	%			88.2	106	
4-Bromofluorobenzene	460-00-4	0.2	%			90.8	111	

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	BH306_0.95-1.0	BH306_1.45-1.5	BH306_2.0-2.1	BH306_2.45-2.5	BH306_3.0-3.1
	Cl	ient sampli	ing date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-039	ES1825728-040	ES1825728-041	ES1825728-042	ES1825728-043
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
рН (F)		0.1	pH Unit	5.4	5.2	5.0	5.2	6.5
pH (Fox)		0.1	pH Unit	2.9	2.8	2.8	3.1	1.4
Reaction Rate		1	Reaction Unit	3	3	2	2	3

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ient sample ID	BH306_3.5-3.6	BH306_3.9-4.0	BH306_4.45-4.5	BHA302_0.0-0.2	BHA302_0.2-0.3
	Cl	ient sampl	ing date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-044	ES1825728-045	ES1825728-046	ES1825728-048	ES1825728-049
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
pH (F)		0.1	pH Unit	6.4	6.5	6.2		7.7
pH (Fox)		0.1	pH Unit	1.8	2.4	2.2		4.7
Reaction Rate		1	Reaction Unit	3	3	4		3
EA055: Moisture Content (Dried	d @ 105-110°C)							
Moisture Content		1.0	%				7.3	
EG005T: Total Metals by ICP-AI	FS							
Arsenic	7440-38-2	5	mg/kg				6	
Cadmium	7440-43-9	1	mg/kg				<1	
Chromium	7440-47-3	2	mg/kg				4	
Copper	7440-50-8	5	mg/kg				18	
Lead	7439-92-1	5	mg/kg				23	
Nickel	7440-02-0	2	mg/kg				<2	
Zinc	7440-66-6	5	mg/kg				168	
EG035T: Total Recoverable Me	arcury by FIMS							
Mercury	7439-97-6	0.1	mg/kg				<0.1	
EP075(SIM)B: Polynuclear Aror								
Naphthalene	91-20-3	0.5	mg/kg				<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg				<0.5	
Acenaphthene	83-32-9	0.5	mg/kg				<0.5	
Fluorene	86-73-7	0.5	mg/kg				<0.5	
Phenanthrene	85-01-8	0.5	mg/kg				<0.5	
Anthracene	120-12-7	0.5	mg/kg				<0.5	
Fluoranthene	206-44-0	0.5	mg/kg				<0.5	
Pyrene	129-00-0	0.5	mg/kg				<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg				<0.5	
Chrysene	218-01-9	0.5	mg/kg				<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg				<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg				<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg				<0.5	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg				<0.5	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg				<0.5	
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg				<0.5	
^ Sum of polycyclic aromatic hydro	ocarbons	0.5	mg/kg				<0.5	
^ Benzo(a)pyrene TEQ (zero)		0.5	mg/kg				<0.5	

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH306_3.5-3.6	BH306_3.9-4.0	BH306_4.45-4.5	BHA302_0.0-0.2	BHA302_0.2-0.3
	Client sa		ng date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-044	ES1825728-045	ES1825728-046	ES1825728-048	ES1825728-049
Compound	ONO Number			Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hy	dracarbone Cont	inuad		Kesuk	rtesuit	1 Court	Result	result
 [^] Benzo(a)pyrene TEQ (half LOR) 		0.5	mg/kg				0.6	
 [^] Benzo(a)pyrene TEQ (LOR) 		0.5	mg/kg				1.2	
EP080/071: Total Petroleum Hydrocarb								
C6 - C9 Fraction		10	mg/kg				<10	
C10 - C14 Fraction		50	mg/kg				<50	
C15 - C28 Fraction		100	mg/kg				<100	
C29 - C36 Fraction		100	mg/kg				<100	
^ C10 - C36 Fraction (sum)		50	mg/kg				<50	
							-00	
EP080/071: Total Recoverable Hydroca C6 - C10 Fraction		3 Fraction 10	ns mg/kg				<10	
	C6_C10	10					<10	
[^] C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg				<10	
(F1) >C10 - C16 Fraction		50	mg/kg				<50	
>C16 - C34 Fraction		100	mg/kg				<100	
>C34 - C40 Fraction		100	mg/kg				<100	
^ >C10 - C40 Fraction (sum)		50	mg/kg				<50	
 ^ >C10 - C16 Fraction minus Naphthalene 		50	mg/kg				<50	
(F2)								
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg				<0.2	
Toluene	108-88-3	0.5	mg/kg				<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg				<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg				<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg				<0.5	
^ Sum of BTEX		0.2	mg/kg				<0.2	
^ Total Xylenes		0.5	mg/kg				<0.5	
Naphthalene	91-20-3	1	mg/kg				<1	
EP075(SIM)S: Phenolic Compound Sur	rogates							
Phenol-d6	13127-88-3	0.5	%				74.8	
2-Chlorophenol-D4	93951-73-6	0.5	%				79.8	
2.4.6-Tribromophenol	118-79-6	0.5	%				64.7	
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%				92.1	
Anthracene-d10	1719-06-8	0.5	%				88.5	

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH306_3.5-3.6	BH306_3.9-4.0	BH306_4.45-4.5	BHA302_0.0-0.2	BHA302_0.2-0.3
	Cli	ent sampli	ng date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-044	ES1825728-045	ES1825728-046	ES1825728-048	ES1825728-049
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
4-Terphenyl-d14	1718-51-0	0.5	%				75.3	
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%				98.3	
Toluene-D8	2037-26-5	0.2	%				98.9	
4-Bromofluorobenzene	460-00-4	0.2	%				105	

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Sub-Matrix: SOIL Client sample ID (Matrix: SOIL)				BHA302_0.45-0.5	BHA302_0.95-1.0	BHA302_1.45-1.5	BHA302_2.0-2.1	BHA302_2.45-2.5
	Client sampling date / time				30-Aug-2018 00:00	30-Aug-2018 00:00	30-Aug-2018 00:00	30-Aug-2018 00:00
Compound	CAS Number	LOR	Unit	ES1825728-050	ES1825728-051	ES1825728-052	ES1825728-053	ES1825728-054
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
pH (F)		0.1	pH Unit	9.3	5.9	6.6	6.5	7.0
pH (Fox)		0.1	pH Unit	4.5	2.2	2.2	4.4	4.1
Reaction Rate		1	Reaction Unit	3	4	2	2	2
EA055: Moisture Content (Dried	@ 105-110°C)							
Moisture Content		1.0	%	24.7				
EG005T: Total Metals by ICP-AE	ES							
Arsenic	7440-38-2	5	mg/kg	6				
Cadmium	7440-43-9	1	mg/kg	<1				
Chromium	7440-47-3	2	mg/kg	9				
Copper	7440-50-8	5	mg/kg	<5				
Lead	7439-92-1	5	mg/kg	<5				
Nickel	7440-02-0	2	mg/kg	3				
Zinc	7440-66-6	5	mg/kg	<5				
EG035T: Total Recoverable Me	reury by FIMS							
Mercury	7439-97-6	0.1	mg/kg	<0.1				
EP075(SIM)B: Polynuclear Arom								
Naphthalene	91-20-3	0.5	mg/kg	<0.5				
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5				
Acenaphthene	83-32-9	0.5	mg/kg	<0.5				
Fluorene	86-73-7	0.5	mg/kg	<0.5				
Phenanthrene	85-01-8	0.5	mg/kg	<0.5				
Anthracene	120-12-7	0.5	mg/kg	<0.5				
Fluoranthene	206-44-0	0.5	mg/kg	<0.5				
Pyrene	129-00-0	0.5	mg/kg	<0.5				
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5				
Chrysene	218-01-9	0.5	mg/kg	<0.5				
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5				
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5				
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5				
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5				
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5				
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5				
^ Sum of polycyclic aromatic hydro		0.5	mg/kg	<0.5				
^ Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5				

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BHA302_0.45-0.5	BHA302_0.95-1.0	BHA302_1.45-1.5	BHA302_2.0-2.1	BHA302_2.45-2.5
(Matrix, SOIL)	Client sampling date / time		30-Aug-2018 00:00					
Compound	CAS Number	LOR	Unit	ES1825728-050	ES1825728-051	ES1825728-052	ES1825728-053	ES1825728-054
Compound	CAS Number	LOK	Unit	Result	Result	Result	Result	Result
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hy [^] Benzo(a)pyrene TEQ (half LOR)		0.5	malka	0.6				
A Benzo(a)pyrene TEQ (LOR)		0.5	mg/kg mg/kg	1.2				
		0.5	ilig/kg	1.2				
EP080/071: Total Petroleum Hydrocarb		10						
C6 - C9 Fraction		10	mg/kg	<10				
C10 - C14 Fraction		50	mg/kg	<50				
C15 - C28 Fraction		100	mg/kg	<100				
C29 - C36 Fraction		100	mg/kg	<100				
^ C10 - C36 Fraction (sum)		50	mg/kg	<50				
EP080/071: Total Recoverable Hydroca	arbons - NEPM 201	3 Fractio	ns					
C6 - C10 Fraction	C6_C10	10	mg/kg	<10				
[^] C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg	<10				
(F1)								
>C10 - C16 Fraction		50	mg/kg	<50				
>C16 - C34 Fraction		100	mg/kg	<100				
>C34 - C40 Fraction		100	mg/kg	<100				
^ >C10 - C40 Fraction (sum)		50	mg/kg	<50				
^ >C10 - C16 Fraction minus Naphthalene		50	mg/kg	<50				
(F2)								
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2				
Toluene	108-88-3	0.5	mg/kg	<0.5				
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5				
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5				
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5				
^ Sum of BTEX		0.2	mg/kg	<0.2				
^ Total Xylenes		0.5	mg/kg	<0.5				
Naphthalene	91-20-3	1	mg/kg	<1				
EP075(SIM)S: Phenolic Compound Sur	rogates							
Phenol-d6	13127-88-3	0.5	%	75.1				
2-Chlorophenol-D4	93951-73-6	0.5	%	80.6				
2.4.6-Tribromophenol	118-79-6	0.5	%	65.6				
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	93.2				
Anthracene-d10	1719-06-8	0.5	%	88.5				

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BHA302_0.45-0.5	BHA302_0.95-1.0	BHA302_1.45-1.5	BHA302_2.0-2.1	BHA302_2.45-2.5
	Cli	ent sampli	ng date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-050	ES1825728-051	ES1825728-052	ES1825728-053	ES1825728-054
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
4-Terphenyl-d14	1718-51-0	0.5	%	76.2				
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	86.6				
Toluene-D8	2037-26-5	0.2	%	80.7				
4-Bromofluorobenzene	460-00-4	0.2	%	85.2				

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	BHA302_3.0-3.1	BHA302_3.5-3.6	BHA302_3.9-4.0	BHA302_4.45-4.5	BHA302_4.9-5.0
	Cl	ient sampl	ing date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-055	ES1825728-056	ES1825728-057	ES1825728-058	ES1825728-059
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
рН (F)		0.1	pH Unit	7.1	7.0	6.6	7.1	6.1
pH (Fox)		0.1	pH Unit	2.3	2.1	4.2	2.9	3.8
Reaction Rate		1	Reaction Unit	4	3	2	2	4

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ient sample ID	BHA304_0.0-0.2	BHA304_0.45-0.5	BHA304_0.95-1.0	BHA304_1.5-1.6	BHA304_2.0-2.1
· · ·	Cl	ient sampl	ing date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-061	ES1825728-063	ES1825728-064	ES1825728-065	ES1825728-066
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
рН (F)		0.1	pH Unit			7.2	5.6	5.7
pH (Fox)		0.1	pH Unit			3.9	2.5	1.9
Reaction Rate		1	Reaction Unit			3	4	4
EA055: Moisture Content (Dried	1@105-110°C)							
Moisture Content		1.0	%	6.8	6.2			
EA200: AS 4964 - 2004 Identifica	ation of Asbestos in Soils							
Asbestos Detected	1332-21-4	0.1	g/kg	No				
Asbestos (Trace)	1332-21-4	5	Fibres	No				
Asbestos Type	1332-21-4	-		-				
Sample weight (dry)		0.01	g	262				
APPROVED IDENTIFIER:		-		G.MORGAN				
EG005T: Total Metals by ICP-AE	ES							1
Arsenic	7440-38-2	5	mg/kg	7	15			
Cadmium	7440-43-9	1	mg/kg	<1	<1			
Chromium	7440-47-3	2	mg/kg	8	6			
Copper	7440-50-8	5	mg/kg	16	33			
Lead	7439-92-1	5	mg/kg	100	148			
Nickel	7440-02-0	2	mg/kg	6	5			
Zinc	7440-66-6	5	mg/kg	144	282			
EG035T: Total Recoverable Me	rcurv by FIMS							
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1			
EP075(SIM)B: Polynuclear Aron	natic 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	0.6	0.8			
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5			
Fluoranthene	206-44-0	0.5	mg/kg	1.7	1.2			
Pyrene	129-00-0	0.5	mg/kg	1.6	1.3			
Benz(a)anthracene	56-55-3	0.5	mg/kg	0.5	<0.5			
Chrysene	218-01-9	0.5	mg/kg	0.6	0.5			
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	1.0	0.6			
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5			

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Client	: GHD PTY LTD
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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BHA304_0.0-0.2	BHA304_0.45-0.5	BHA304_0.95-1.0	BHA304_1.5-1.6	BHA304_2.0-2.1
	Cl	ient samplii	ng date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-061	ES1825728-063	ES1825728-064	ES1825728-065	ES1825728-066
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hy	drocarbons - Cont	inued						
Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.8	0.6			
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	0.8	0.5			
Sum of polycyclic aromatic hydrocarbons		0.5	mg/kg	8.1	5.5			
Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	1.0	0.7			
Benzo(a)pyrene TEQ (half LOR)		0.5	mg/kg	1.3	1.0			
Benzo(a)pyrene TEQ (LOR)		0.5	mg/kg	1.6	1.3			
EP080/071: Total Petroleum Hydrocarb	ons							
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	160			
C10 - C36 Fraction (sum)		50	mg/kg	<50	160			
EP080/071: Total Recoverable Hydroca	rbons - NEPM 201	3 Fraction	ns					
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10			
C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg	<10	<10			
(F1)								
>C10 - C16 Fraction		50	mg/kg	<50	<50			
>C16 - C34 Fraction		100	mg/kg	<100	170			
>C34 - C40 Fraction		100	mg/kg	<100	150			
>C10 - C40 Fraction (sum)		50	mg/kg	<50	320			
>C10 - C16 Fraction minus Naphthalene		50	mg/kg	<50	<50			
(F2)								
P080: 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			

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BHA304_0.0-0.2	BHA304_0.45-0.5	BHA304_0.95-1.0	BHA304_1.5-1.6	BHA304_2.0-2.1
	Cli	ent sampli	ng date / time	30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-061	ES1825728-063	ES1825728-064	ES1825728-065	ES1825728-066
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Sur	rogates - Continued	I						
Phenol-d6	13127-88-3	0.5	%	75.7	75.4			
2-Chlorophenol-D4	93951-73-6	0.5	%	80.7	81.2			
2.4.6-Tribromophenol	118-79-6	0.5	%	68.1	71.2			
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	93.8	93.4			
Anthracene-d10	1719-06-8	0.5	%	88.5	88.5			
4-Terphenyl-d14	1718-51-0	0.5	%	74.5	75.1			
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	96.1	99.8			
Toluene-D8	2037-26-5	0.2	%	94.9	98.9			
4-Bromofluorobenzene	460-00-4	0.2	%	99.4	102			

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Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			BHA304_2.45-2.5	BHA304_3.0-3.1	BHA304_3.5-3.6	BHA304_3.95-4.0	BHA304_4.5-4.6
	Client sampling date / time			30-Aug-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1825728-067	ES1825728-068	ES1825728-069	ES1825728-070	ES1825728-071
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
рН (F)		0.1	pH Unit	6.0	5.9	5.8	5.9	5.9
pH (Fox)		0.1	pH Unit	2.2	2.1	2.2	2.2	2.2
Reaction Rate		1	Reaction Unit	4	4	4	4	4

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Sub-Matrix: SOIL		Cl	ient sample ID	BHA304_4.9-5.0	BH104_0.0-0.2	BH104_0.2-0.3	
(Matrix: SOIL)							
	Client sampling date / time			30-Aug-2018 00:00	31-Jul-2018 00:00	31-Jul-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1825728-072	ES1825728-074	ES1825728-075	
				Result	Result	Result	
EA003 :pH (field/fox)							
рН (F)		0.1	pH Unit	6.1			
pH (Fox)		0.1	pH Unit	2.1			
Reaction Rate		1	Reaction Unit	3			
EA055: Moisture Content (Dried	@ 105-110°C)						
Moisture Content		1.0	%		3.9	6.2	
EA200: AS 4964 - 2004 Identifica	ation of Asbestos in Soils	;					
Asbestos Detected	1332-21-4	0.1	g/kg		No		
Asbestos (Trace)	1332-21-4	5	Fibres		No		
Asbestos Type	1332-21-4	-			-		
Sample weight (dry)		0.01	g		155		
APPROVED IDENTIFIER:		-			G.MORGAN		
EG005T: Total Metals by ICP-AE	S						
Arsenic	7440-38-2	5	mg/kg		<5	<5	
Cadmium	7440-43-9	1	mg/kg		<1	1	
Chromium	7440-47-3	2	mg/kg		5	7	
Copper	7440-50-8	5	mg/kg		72	120	
Lead	7439-92-1	5	mg/kg		25	36	
Nickel	7440-02-0	2	mg/kg		<2	2	
Zinc	7440-66-6	5	mg/kg		108	166	
EG035T: Total Recoverable Mer	rcury by FIMS						
Mercury	7439-97-6	0.1	mg/kg		0.4	0.6	
EP075(SIM)B: Polynuclear Arom	natic 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	
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	

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BHA304_4.9-5.0	BH104_0.0-0.2	BH104_0.2-0.3	
	Client sampling date / time			30-Aug-2018 00:00	31-Jul-2018 00:00	31-Jul-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1825728-072	ES1825728-074	ES1825728-075	
				Result	Result	Result	
EP075(SIM)B: Polynuclear Aromatic H	drocarbons - Cont	inued					
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	s	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 Hydrocarb	ons						
C6 - C9 Fraction		10	mg/kg		<10	<10	
C10 - C14 Fraction		50	mg/kg		<50	<50	
C15 - C28 Fraction		100	mg/kg		180	340	
C29 - C36 Fraction		100	mg/kg		240	370	
C10 - C36 Fraction (sum)		50	mg/kg		420	710	
EP080/071: Total Recoverable Hydroca	rbons - NEPM 201	3 Fractio	ns				
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	
C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg		<10	<10	
(F1)	_						
>C10 - C16 Fraction		50	mg/kg		<50	<50	
>C16 - C34 Fraction		100	mg/kg		350	600	
>C34 - C40 Fraction		100	mg/kg		140	200	
>C10 - C40 Fraction (sum)		50	mg/kg		490	800	
>C10 - C16 Fraction minus Naphthalene		50	mg/kg		<50	<50	
(F2)							
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	
	91-20-3	1	mg/kg		<1	<1	

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Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			BHA304_4.9-5.0	BH104_0.0-0.2	BH104_0.2-0.3		
	Cli	ent sampli	ng date / time	30-Aug-2018 00:00	31-Jul-2018 00:00	31-Jul-2018 00:00		
Compound	CAS Number	LOR	Unit	ES1825728-072	ES1825728-074	ES1825728-075		
				Result	Result	Result		
EP075(SIM)S: Phenolic Compound Surro								
Phenol-d6	13127-88-3	0.5	%		80.4	80.6		
2-Chlorophenol-D4	93951-73-6	0.5	%		85.2	83.1		
2.4.6-Tribromophenol	118-79-6	0.5	%		68.8	71.9		
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%		85.5	85.4		
Anthracene-d10	1719-06-8	0.5	%		86.1	87.1		
4-Terphenyl-d14	1718-51-0	0.5	%		84.0	92.2		
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%		96.4	109		
Toluene-D8	2037-26-5	0.2	%		97.8	106		
4-Bromofluorobenzene	460-00-4	0.2	%		99.0	109		

Analytical Results

Descriptive Results

Sub-Matrix: SOIL

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos	s in Soils	
EA200: Description	BH108_0.0-0.2 - 22-Aug-2018 00:00	Mid brown sandy soil.
EA200: Description	BH101_0.0-0.2 - 29-Aug-2018 00:00	Mid brown sandy soil.
EA200: Description	BHA304_0.0-0.2 - 30-Aug-2018 00:00	Mid brown sandy soil.
EA200: Description	BH104_0.0-0.2 - 31-Jul-2018 00:00	Mid brown sandy soil.

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Surrogate Control Limits

Sub-Matrix: COMPOSITE		Recovery	Limits (%)
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
Sub-Matrix: SOIL	Recovery Limits (%)		
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130



QUALITY CONTROL REPORT

Work Order	: ES1825728	Page	: 1 of 11
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MS ALISON MONKLEY	Contact	Brenda Hong
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	:	Telephone	: (02) 8784 8504
Project	: 2219573	Date Samples Received	31-Aug-2018
Order number	:	Date Analysis Commenced	: 05-Sep-2018
C-O-C number	:	Issue Date	10-Sep-2018
Sampler	; JULIAN FOWLER		Hac-MRA NAT
Site	:		
Quote number	: EN/005/18		The Column
No. of samples received	: 80		Accredited for compliance v
No. of samples analysed	: 60		ISO/IEC 17025 - Test

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full. This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gerrad Morgan	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW

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General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL						Laboratory I	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA003 :pH (fie <mark>l</mark> d/fox	(QC Lot: 1919242)								
ES1825728-013	BH301_0.95-1.0	EA003: pH (F)		0.1	pH Unit	6.2	6.2	0.00	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	2.9	2.9	0.00	0% - 20%
ES1825728-029	BH302_2.45-2.5	EA003: pH (F)		0.1	pH Unit	6.3	6.4	1.57	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	2.3	2.2	4.44	0% - 20%
EA003 :pH (field/fox	(QC Lot: 1919243)								
ES1825728-043	BH306_3.0-3.1	EA003: pH (F)		0.1	pH Unit	6.5	6.5	0.00	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	1.4	1.4	0.00	0% - 50%
ES1825728-054	BHA302_2.45-2.5	EA003: pH (F)		0.1	pH Unit	7.0	6.9	1.44	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	4.1	4.2	2.41	0% - 20%
EA003 :pH (field/fox	x) (QC Lot: 1919244)								
ES1825728-069	BHA304_3.5-3.6	EA003: pH (F)		0.1	pH Unit	5.8	5.8	0.00	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	2.2	2.2	0.00	0% - 20%
ES1826106-009	Anonymous	EA003: pH (F)		0.1	pH Unit	7.4	7.3	1.36	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	3.4	3.4	0.00	0% - 20%
EA055: Moisture Co	ontent (Dried @ 105-110°	C) (QC Lot: 1916932)							
ES1825728-010	BH301_0.0-0.2	EA055: Moisture Content		0.1	%	6.3	6.9	9.59	No Limit
ES1825728-075	BH104_0.2-0.3	EA055: Moisture Content		0.1	%	6.2	4.7	28.4	No Limit
EG005T: Total Meta	Is by ICP-AES (QC Lot:	1919079)							
ES1825728-004	BH101_0.0-0.2	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit

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Sub-Matrix: SOIL						Laboratory I	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Meta	Is by ICP-AES (QC Lot:	: 1919079) - continued							
ES1825728-004	BH101_0.0-0.2	EG005T: Zinc	7440-66-6	5	mg/kg	32	28	12.7	No Limit
ES1825728-061	BHA304_0.0-0.2	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	8	9	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	6	6	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	7	7	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	16	16	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	100	120	18.5	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	144	158	9.12	0% - 20%
EG005T: Total Meta	Is by ICP-AES (QC Lot:	: 1919239)							
ES1825728-074	BH104_0.0-0.2	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	5	6	18.8	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	72	82	13.2	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	25	30	19.7	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	108	101	6.72	0% - 20%
EG035T: Total Rec	overable Mercury by FI	MS (QC Lot: 1919080)							
ES1825728-004	BH101_0.0-0.2	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1825728-061	BHA304_0.0-0.2	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG035T: Total Rec	overable Mercury by FIN	MS (QC Lot: 1919240)							
ES1825728-074	BH104 0.0-0.2	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.4	0.5	0.00	No Limit
	ated Biphenyls (PCB) (
ES1825728-079	COMP 2	EP066: Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	<0.1	0.00	No Limit
				0.1	mg/kg	-0.1	-0.1	0.00	
	orine Pesticides (OC) (040.04.0	0.05		10.05	10.05		N. 17. 7
ES1825728-079	COMP 2	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	< 0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	< 0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8 76-44-8	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit
		EP068: Heptachlor		0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9 60-57-1	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit
		EP068: Dieldrin		0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit

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Sub-Matrix: SOIL						Laboratory I	Duplicate (DUP) Report	t	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP068A: Organochl	orine Pesticides (OC)(QC Lot: 1917222) - continued							
ES1825728-079	COMP 2	EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP075(SIM)B: Polyn	uclear Aromatic Hydro	carbons (QC Lot: 1914407)							
ES1825728-004	BH101_0.0-0.2	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic		0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		hydrocarbons							
		EP075(SIM): Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1825728-061	BHA304_0.0-0.2	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	0.6	0.8	26.3	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	1.7	2.3	31.9	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	1.6	2.2	31.8	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	0.5	0.8	37.4	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	0.6	1.0	41.1	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	1.0	1.4	38.3	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	0.6	0.00	No Limit

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Sub-Matrix: SOIL						Laboratory	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Poly	nuclear Aromatic Hydrod	carbons (QC Lot: 1914407) - continued							
ES1825728-061	BHA304_0.0-0.2	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.8	1.2	37.5	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	0.5	0.8	43.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	0.8	1.1	41.2	No Limit
		EP075(SIM): Sum of polycyclic aromatic		0.5	mg/kg	8.1	# 12.2	40.4	0% - 20%
		hydrocarbons							
		EP075(SIM): Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	1.0	1.6	43.7	No Limit
EP075(SIM)B: Poly	nuclear Aromatic Hydrod	carbons (QC Lot: 1915278)							
ES1826014-007	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
	EP075(SIM): Benzo(b+j)fluoranthene	EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic		0.5	mg/kg	<0.5	0.5	0.00	No Limit
		hydrocarbons							
		EP075(SIM): Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total P	etroleum Hydrocarbons	(QC Lot: 1914408)							
ES1825728-004	BH101_0.0-0.2	EP071: C15 - C28 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction		50	mg/kg	<50	<50	0.00	No Limit
ES1825728-061	BHA304_0.0-0.2	EP071: C15 - C28 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction		50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total P	etroleum Hydrocarbons	(QC Lot: 1914563)							
ES1825728-004	BH101_0.0-0.2	EP080: C6 - C9 Fraction		10	mg/kg	<10	<10	0.00	No Limit
ES1825728-061	BHA304_0.0-0.2	EP080: C6 - C9 Fraction		10	mg/kg	<10	<10	0.00	No Limit
EP080/07 <u>1: Total P</u>	etroleum Hydrocarbons	(QC Lot: 1915277)							
ES1826014-007	Anonymous	EP071: C15 - C28 Fraction		100	mg/kg	<100	<100	0.00	No Limit

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Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Pe	troleum Hydrocarbons	(QC Lot: 1915277) - continued							
ES1826014-007	Anonymous	EP071: C29 - C36 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction		50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Re	ecoverable Hydrocarbor	ns - NEPM 2013 Fractions (QC Lot: 1914408)							
ES1825728-004	BH101_0.0-0.2	EP071: >C16 - C34 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction		50	mg/kg	<50	<50	0.00	No Limit
ES1825728-061	BHA304_0.0-0.2	EP071: >C16 - C34 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction		50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Re	ecoverable Hydrocarbor	ns - NEPM 2013 Fractions (QC Lot: 1914563)							
ES1825728-004	BH101_0.0-0.2	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1825728-061	BHA304_0.0-0.2	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Re	ecoverable Hydrocarbor	ns - NEPM 2013 Fractions (QC Lot: 1915277)							
ES1826014-007	Anonymous	EP071: >C16 - C34 Fraction		100	mg/kg	120	100	16.9	No Limit
		EP071: >C34 - C40 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction		50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC	Lot: 1914563)								
ES1825728-004	BH101_0.0-0.2	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1825728-061	BHA304_0.0-0.2	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit



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

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

Sub-Matrix: SOIL				Method Blank (MB)		Laboratory Control Spike (LCS) Report		
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1919	079)							
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	112	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	89.7	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	106	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	110	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	95.0	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	99.9	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	109	80	122
EG005T: Total Metals by ICP-AES (QCLot: 1919	239)							
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	95.0	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	102	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	92.7	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	95.0	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	101	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	104	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	110	80	122
EG035T: Total Recoverable Mercury by FIMS(QCLot: 1919080)							
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	73.2	70	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1919240)							
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	72.0	70	105
EP066: Polychlorinated Biphenyls (PCB) (QCLc	ot: 1917223)							
EP066: Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	1 mg/kg	102	62	126
EP068A: Organochlorine Pesticides (OC) (QCL	ot: 1917222)							
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	95.5	69	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	93.1	65	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	95.8	67	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	95.9	68	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	100	65	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	94.0	67	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	93.8	69	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	98.2	62	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	97.8	63	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	100	66	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	101	64	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	66	116

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Sub-Matrix: SOIL				Method Blank (MB)		Laboratory Control Spike (LCS) Report		
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC)(QCL	ot: 1917222) - continued							
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	106	67	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	93.7	67	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	99.1	69	115
P068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	100	69	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	94.9	56	120
P068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	92.7	62	124
P068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	90.1	66	120
P068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	97.1	64	122
P068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	82.3	54	130
P075(SIM)B: Polynuclear Aromatic Hydrocarbo	ons (QCLot: 1914407)							
P075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	123	77	125
P075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	123	72	124
P075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	118	73	127
P075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	122	72	126
P075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	120	75	127
P075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	120	77	127
P075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	123	73	127
P075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	125	74	128
P075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	109	69	123
P075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	120	75	127
P075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	108	68	116
	205-82-3							
:P075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	124	74	126
P075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	116	70	126
P075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	117	61	121
P075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	118	62	118
P075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	113	63	121
P075(SIM)B: Polynuclear Aromatic Hydrocarbo	ons (QCLot: 1 <u>915278)</u>							
P075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	96.2	77	125
P075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	94.6	72	124
P075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	92.7	73	127
P075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	98.4	72	126
P075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	95.6	75	127
P075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	97.8	77	127
P075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	98.5	73	127
P075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	99.4	74	128
P075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	95.1	69	123
P075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	92.1	75	127

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Sub-Matrix: SOIL				Method Blank (MB)	Laboratory Control Spike (LCS) Report			
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbo	ns (QCLot: 1915278) - con	tinued						
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	94.4	68	116
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	93.7	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	89.9	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	97.0	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	96.0	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	97.1	63	121
EP080/071: Total Petroleum Hydrocarbons(QCL	.ot: 1914408)							
EP071: C10 - C14 Fraction		50	mg/kg	<50	300 mg/kg	91.3	75	129
EP071: C15 - C28 Fraction		100	mg/kg	<100	450 mg/kg	92.6	77	131
EP071: C29 - C36 Fraction		100	mg/kg	<100	300 mg/kg	92.5	71	129
EP080/071: Total Petroleum Hydrocarbons(QCL	.ot: 1914563)							
EP080: C6 - C9 Fraction		10	mg/kg	<10	26 mg/kg	89.8	68	128
EP080/071: Total Petroleum Hydrocarbons(QCL	.ot: 1915277)							
EP071: C10 - C14 Fraction		50	mg/kg	<50	300 mg/kg	102	75	129
EP071: C15 - C28 Fraction		100	mg/kg	<100	450 mg/kg	106	77	131
EP071: C29 - C36 Fraction		100	mg/kg	<100	300 mg/kg	93.6	71	129
EP080/071: Total Recoverable Hydrocarbons - N	EPM 2013 Fractions (QCLc	ot: 1914408)						
EP071: >C10 - C16 Fraction		50	mg/kg	<50	375 mg/kg	94.6	77	125
EP071: >C16 - C34 Fraction		100	mg/kg	<100	525 mg/kg	90.8	74	138
EP071: >C34 - C40 Fraction		100	mg/kg	<100	225 mg/kg	96.4	63	131
EP080/071: Total Recoverable Hydrocarbons - N	EPM 2013 Fractions (QCLc	ot: 1914563)						
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	94.1	68	128
EP080/071: Total Recoverable Hydrocarbons - N	FPM 2013 Fractions (QCL o	ot: 1915277)						
P071: >C10 - C16 Fraction		50	mg/kg	<50	375 mg/kg	107	77	125
EP071: >C16 - C34 Fraction		100	mg/kg	<100	525 mg/kg	108	74	138
EP071: >C34 - C40 Fraction		100	mg/kg	<100	225 mg/kg	81.0	63	131
EP080: BTEXN (QCLot: 1914563)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	93.4	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	83.1	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	85.0	65	117
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	84.1	66	118
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	89.9	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	81.4	63	119

Matrix Spike (MS) Report

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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				M	atrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery L	_imits (%)	
aboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
G005T: Total Met	als by ICP-AES (QCLot: 1919079)							
ES1825728-004	BH101_0.0-0.2	EG005T: Arsenic	7440-38-2	50 mg/kg	122	70	130	
	_	EG005T: Cadmium	7440-43-9	50 mg/kg	94.4	70	130	
		EG005T: Chromium	7440-47-3	50 mg/kg	102	70	130	
		EG005T: Copper	7440-50-8	250 mg/kg	108	70	130	
		EG005T: Lead	7439-92-1	250 mg/kg	98.0	70	130	
		EG005T: Nickel	7440-02-0	50 mg/kg	95.5	70	130	
		EG005T: Zinc	7440-66-6	250 mg/kg	110	70	130	
EG005T: Total Met	als by ICP-AES (QCLot: 1919239)							
ES1825728-074	BH104 0.0-0.2	EG005T: Arsenic	7440-38-2	50 mg/kg	96.5	70	130	
		EG005T: Cadmium	7440-43-9	50 mg/kg	100	70	130	
		EG005T: Chromium	7440-47-3	50 mg/kg	103	70	130	
		EG005T: Copper	7440-50-8	250 mg/kg	92.1	70	130	
		EG005T: Lead	7439-92-1	250 mg/kg	99.5	70	130	
		EG005T: Nickel	7440-02-0	50 mg/kg	100	70	130	
		EG005T: Zinc	7440-66-6	250 mg/kg	101	70	130	
-G035T: Total Re	coverable Mercury by FIMS (QCLot: 1919080)							
ES1825728-004	BH101 0.0-0.2	EG035T: Mercury	7439-97-6	5 mg/kg	73.7	70	130	
			1100 01 0	o mg/ng	10.1	10	100	
	coverable Mercury by FIMS (QCLot: 1919240)							
ES1825728-074	BH104_0.0-0.2	EG035T: Mercury	7439-97-6	5 mg/kg	75.7	70	130	
EP066: Polychlori	nated Biphenyls (PCB) (QCLot: 1917223)							
ES1825728-079	COMP 2	EP066: Total Polychlorinated biphenyls		1 mg/kg	95.0	70	130	
EP068A: Organocl	norine Pesticides (OC) (QCLot: 1917222)							
ES1825728-079	COMP 2	EP068: gamma-BHC	58-89-9	0.5 mg/kg	95.6	70	130	
		EP068: Heptachlor	76-44-8	0.5 mg/kg	86.3	70	130	
		EP068: Aldrin	309-00-2	0.5 mg/kg	87.7	70	130	
		EP068: Dieldrin	60-57-1	0.5 mg/kg	99.2	70	130	
		EP068: Endrin	72-20-8	2 mg/kg	90.2	70	130	
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	93.3	70	130	
P075(SIM)B: Poly	nuclear Aromatic Hydrocarbons (QCLot: 1914407)						1	
ES1825728-004	BH101_0.0-0.2	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	95.2	70	130	
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	112	70	130	
P075(SIM)B: Dol	nuclear Aromatic Hydrocarbons (QCLot: 1915278)							
ES1826014-007			83-32-9	10 ma/ka	02.0	70	120	
E31020014-00/	Anonymous	EP075(SIM): Acenaphthene		10 mg/kg	93.0	70	130	
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	90.1	70	130	

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Sub-Matrix: SOIL		Matrix Spike (MS) Report					
				Spike	SpikeRecovery(%)	Recovery I	.imits (%)
aboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total F	Petroleum Hydrocarbons(QCLot: 19 [,]	14408)					
ES1825728-004	BH101_0.0-0.2	EP071: C10 - C14 Fraction		523 mg/kg	106	73	137
		EP071: C15 - C28 Fraction		2319 mg/kg	118	53	131
		EP071: C29 - C36 Fraction		1714 mg/kg	127	52	132
EP080/071: Total F	Petroleum Hydrocarbons(QCLot: 19 [,]	14563)					
ES1825728-004	BH101_0.0-0.2	EP080: C6 - C9 Fraction		32.5 mg/kg	87.7	70	130
EP080/071: Total F	Petroleum Hydrocarbons (QCLot: 19 [,]	15277)					
ES1826014-007	Anonymous	EP071: C10 - C14 Fraction		523 mg/kg	82.2	73	137
		EP071: C15 - C28 Fraction		2319 mg/kg	114	53	131
		EP071: C29 - C36 Fraction		1714 mg/kg	125	52	132
EP080/071: Total F	Recoverable Hydrocarbons - NEPM 20	013 Fractions (QCLot: 1914408)					
ES1825728-004	BH101 0.0-0.2	EP071: >C10 - C16 Fraction		860 mg/kg	109	73	137
	_	EP071: >C16 - C34 Fraction		3223 mg/kg	122	53	131
		EP071: >C34 - C40 Fraction		1058 mg/kg	118	52	132
EP080/071: Total F	Recoverable Hydrocarbons - NEPM 20	013 Fractions (QCLot: 1914563)					
ES1825728-004	BH101_0.0-0.2	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	90.9	70	130
EP080/071: Total F	Recoverable Hydrocarbons - NEPM 20	013 Fractions (QCLot: 1915277)					
ES1826014-007	Anonymous	EP071: >C10 - C16 Fraction		860 mg/kg	95.3	73	137
		EP071: >C16 - C34 Fraction		3223 mg/kg	120	53	131
		EP071: >C34 - C40 Fraction		1058 mg/kg	107	52	132
EP080: BTEXN (Q	QCLot: 1914563)						
ES1825728-004	BH101_0.0-0.2	EP080: Benzene	71-43-2	2.5 mg/kg	82.9	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	82.2	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	81.7	70	130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	81.2	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	84.1	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	71.2	70	130



QA/QC Compliance Assessment to assist with Quality Review						
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Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney			
Contact	MS ALISON MONKLEY	Telephone	: (02) 8784 8504			
Project	: 2219573	Date Samples Received	: 31-Aug-2018			
Site	:	Issue Date	: 10-Sep-2018			
Sampler	: JULIAN FOWLER	No. of samples received	: 80			
Order number	:	No. of samples analysed	: 60			

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.

- <u>NO</u> Method Blank value outliers occur.
- <u>NO</u> Laboratory Control outliers occur.
- <u>NO</u> Matrix Spike outliers occur.
- Duplicate outliers exist please see following pages for full details.
- For all regular sample matrices, <u>NO</u> surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

• <u>NO</u> Quality Control Sample Frequency Outliers exist.

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Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: SOIL

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	ES1825728061	BHA304_0.0-0.2	Sum of polycyclic		40.4 %	0% - 20%	RPD exceeds LOR based limits
			aromatic				
			hydrocarbons				

Outliers : Analysis Holding Time Compliance

Matrix: SOIL							
Method		Ex	Extraction / Preparation			Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°	С)						
Soil Glass Jar - Unpreserved							
BH104_0.0-0.2,	BH104_0.2-0.3				06-Sep-2018	14-Aug-2018	23
EG035T: Total Recoverable Mercury by FIM	IS						
Soil Glass Jar - Unpreserved							
BH104_0.0-0.2,	BH104_0.2-0.3	06-Sep-2018	28-Aug-2018	9	07-Sep-2018	28-Aug-2018	10
EP075(SIM)B: Polynuclear Aromatic Hydrod	arbons						
Soil Glass Jar - Unpreserved							
BH104_0.0-0.2,	BH104_0.2-0.3	05-Sep-2018	14-Aug-2018	22			
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved							
BH104_0.0-0.2,	BH104_0.2-0.3	05-Sep-2018	14-Aug-2018	22			
Soil Glass Jar - Unpreserved							
BH104_0.0-0.2,	BH104_0.2-0.3	05-Sep-2018	14-Aug-2018	22	06-Sep-2018	14-Aug-2018	23
EP080/071: Total Recoverable Hydrocarbon	s - NEPM 2013 Fractions						
Soil Glass Jar - Unpreserved							
BH104_0.0-0.2,	BH104_0.2-0.3	05-Sep-2018	14-Aug-2018	22			
Soil Glass Jar - Unpreserved							
BH104_0.0-0.2,	BH104_0.2-0.3	05-Sep-2018	14-Aug-2018	22	06-Sep-2018	14-Aug-2018	23
EP080: BTEXN							
Soil Glass Jar - Unpreserved							
BH104_0.0-0.2,	BH104_0.2-0.3	05-Sep-2018	14-Aug-2018	22	06-Sep-2018	14-Aug-2018	23

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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					Evaluatior	: 🗴 = Holding time	e breach ; ✓ = Withi	n holding tim
Method		Sample Date	Date Extraction / Preparation		Analysis			
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA003 :pH (field/fox)								
Snap Lock Bag - frozen on receipt at ALS (EA	A003)							
BH301_0.95-1.0,	BH301_1.45-1.5,	30-Aug-2018	07-Sep-2018	25-May-2021	~	07-Sep-2018	06-Dec-2018	✓
BH301_2.0-2.1,	BH301_2.45-2.5,							
BH301_3.0-3.1,	BH301_3.5-3.6,							
BH302_0.95-1.0,	BH302_1.45-1.5,							
BH302_2.0-2.1,	BH302_2.45-2.5,							
BH302_2.95-3.0,	BH302_3.5-3.6,							
BH302_3.95-4.0,	BH302_4.45-4.5,							
BH302_4.9-5.0,	BH306_0.45-0.5,							
BH306_0.95-1.0,	BH306_1.45-1.5,							
BH306_2.0-2.1,	BH306_2.45-2.5,							
BH306_3.0-3.1,	BH306_3.5-3.6,							
BH306_3.9-4.0,	BH306_4.45-4.5,							
BHA302_0.45-0.5,	BHA302_0.95-1.0,							
BHA302_1.45-1.5,	BHA302_2.0-2.1,							
BHA302_2.45-2.5,	BHA302_3.0-3.1,							
BHA302_3.5-3.6,	BHA302_3.9-4.0,							
BHA302_4.45-4.5,	BHA302_4.9-5.0,							
BHA304_0.95-1.0,	BHA304_1.5-1.6,							
BHA304_2.0-2.1,	BHA304_2.45-2.5,							
BHA304_3.0-3.1,	BHA304_3.5-3.6,							
BHA304_3.95-4.0,	BHA304_4.5-4.6,							
BHA304_4.9-5.0								
Soil Glass Jar - Frozen on receipt (EA003) BHA302_0.2-0.3		30-Aug-2018	07-Sep-2018	25-May-2021	1	07-Sep-2018	06-Dec-2018	1

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Matrix: SOIL					Evaluation	n: 🗶 = Holding time	e breach ; ✓ = Withi	n holding tim
Method		Sample Date	Ex	traction / 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)								
BH101_0.0-0.2,	BH101_0.45-0.5	29-Aug-2018				06-Sep-2018	12-Sep-2018	✓
Soil Glass Jar - Unpreserved (EA055)								
BH301_0.0-0.2,	BH301_0.45-0.5,	30-Aug-2018				06-Sep-2018	13-Sep-2018	 ✓
BH302_0.0-0.2,	BH302_0.2-0.3,							
BH306_0.0-0.2,	BH306_0.2-0.3,							
BHA302_0.0-0.2,	BHA302_0.45-0.5,							
BHA304_0.0-0.2,	BHA304_0.45-0.5,							
COMP 2								
Soil Glass Jar - Unpreserved (EA055)								
COMP 3		31-Aug-2018				06-Sep-2018	14-Sep-2018	 ✓
Soil Glass Jar - Unpreserved (EA055)								
BH104_0.0-0.2,	BH104_0.2-0.3	31-Jul-2018				06-Sep-2018	14-Aug-2018	×
EA200: AS 4964 - 2004 Identification of Asbestos in S	oils							
Snap Lock Bag - ACM/Asbestos Grab Bag (EA200)								
BH108_0.0-0.2		22-Aug-2018				05-Sep-2018	18-Feb-2019	 ✓
Snap Lock Bag - ACM/Asbestos Grab Bag (EA200)								
BH101_0.0-0.2		29-Aug-2018				05-Sep-2018	25-Feb-2019	✓
Snap Lock Bag - ACM/Asbestos Grab Bag (EA200)								
BHA304_0.0-0.2		30-Aug-2018				05-Sep-2018	26-Feb-2019	✓
Snap Lock Bag - ACM/Asbestos Grab Bag (EA200)		31-Jul-2018				05 0 0040	07 1 0040	
BH104_0.0-0.2		31-Jul-2018				05-Sep-2018	27-Jan-2019	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH101_0.0-0.2,	BH101_0.45-0.5	29-Aug-2018	06-Sep-2018	25-Feb-2019	~	06-Sep-2018	25-Feb-2019	✓
Soil Glass Jar - Unpreserved (EG005T)								
BH301_0.0-0.2,	BH301_0.45-0.5,	30-Aug-2018	06-Sep-2018	26-Feb-2019	1	06-Sep-2018	26-Feb-2019	 ✓
BH302_0.0-0.2,	BH302_0.2-0.3,							
BH306_0.0-0.2,	BH306_0.2-0.3,							
BHA302_0.0-0.2,	BHA302_0.45-0.5,							
BHA304_0.0-0.2,	BHA304_0.45-0.5							
Soil Glass Jar - Unpreserved (EG005T)								
BH104_0.0-0.2,	BH104_0.2-0.3	31-Jul-2018	06-Sep-2018	27-Jan-2019	✓	06-Sep-2018	27-Jan-2019	 ✓

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Matrix: SOIL					Evaluation	n: × = Holding time	breach ; ✓ = Withi	n holding tin
Method		Sample Date	Extraction / Preparation					
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH101_0.0-0.2,	BH101_0.45-0.5	29-Aug-2018	06-Sep-2018	26-Sep-2018	✓	07-Sep-2018	26-Sep-2018	✓
Soil Glass Jar - Unpreserved (EG035T)								
BH301_0.0-0.2,	BH301_0.45-0.5,	30-Aug-2018	06-Sep-2018	27-Sep-2018	✓	07-Sep-2018	27-Sep-2018	✓
BH302_0.0-0.2,	BH302_0.2-0.3,							
BH306_0.0-0.2,	BH306_0.2-0.3,							
BHA302_0.0-0.2,	BHA302_0.45-0.5,							
BHA304_0.0-0.2,	BHA304_0.45-0.5							
Soil Glass Jar - Unpreserved (EG035T)								
BH104_0.0-0.2,	BH104_0.2-0.3	31-Jul-2018	06-Sep-2018	28-Aug-2018	*	07-Sep-2018	28-Aug-2018	×
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)							40.0.4.0040	
COMP 2		30-Aug-2018	06-Sep-2018	13-Sep-2018	✓	07-Sep-2018	16-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP066)		31-Aug-2018	06-Sep-2018	14-Sep-2018		07-Sep-2018	16-Oct-2018	
COMP 3		51-Aug-2016	06-3ep-2018	14-3ep-2018	~	07-Sep-2018	10-001-2018	✓
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
COMP 2		30-Aug-2018	06-Sep-2018	13-Sep-2018	-	07-Sep-2018	16-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP068)		24 Aug 2040	00.0 0040	14 Car 2019		07.0 0040	10.0++ 2018	
COMP 3		31-Aug-2018	06-Sep-2018	14-Sep-2018	✓	07-Sep-2018	16-Oct-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH101_0.0-0.2,	BH101_0.45-0.5	29-Aug-2018	05-Sep-2018	12-Sep-2018	✓	06-Sep-2018	15-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP075(SIM))				10.0 0010			45.0.1.0040	
BH301_0.0-0.2,	BH301_0.45-0.5,	30-Aug-2018	05-Sep-2018	13-Sep-2018	~	06-Sep-2018	15-Oct-2018	✓
BH302_0.0-0.2,	BH302_0.2-0.3,							
BH306_0.0-0.2,	BH306_0.2-0.3,							
BHA302_0.0-0.2,	BHA302_0.45-0.5,							
BHA304_0.0-0.2,	BHA304_0.45-0.5							
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH104_0.0-0.2,	BH104_0.2-0.3	31-Jul-2018	05-Sep-2018	14-Aug-2018	*	05-Sep-2018	15-Oct-2018	✓

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Method		Sample Date	Extraction / Preparation Analysis					
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
BH101_0.0-0.2,	BH101_0.45-0.5	29-Aug-2018	05-Sep-2018	12-Sep-2018	 ✓ 	06-Sep-2018	12-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP080)								
BH301_0.0-0.2,	BH301_0.45-0.5,	30-Aug-2018	05-Sep-2018	13-Sep-2018	✓	06-Sep-2018	13-Sep-2018	 ✓
BH302_0.0-0.2,	BH302_0.2-0.3,							
BH306_0.0-0.2,	BH306_0.2-0.3,							
BHA302 0.0-0.2,	BHA302 0.45-0.5,							
BHA304 0.0-0.2,	BHA304 0.45-0.5							
Soil Glass Jar - Unpreserved (EP071)								
BH104_0.0-0.2		31-Jul-2018	05-Sep-2018	14-Aug-2018	×	05-Sep-2018	15-Oct-2018	 ✓
Soil Glass Jar - Unpreserved (EP080)								
BH104_0.0-0.2		31-Jul-2018	05-Sep-2018	14-Aug-2018	x	06-Sep-2018	14-Aug-2018	×
Soil Glass Jar - Unpreserved (EP071)								
BH104_0.2-0.3		31-Jul-2018	05-Sep-2018	14-Aug-2018	*	05-Sep-2018	15-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080)								
BH104_0.2-0.3		31-Jul-2018	05-Sep-2018	14-Aug-2018	2	06-Sep-2018	14-Aug-2018	×
EP080/071: Total Recoverable Hydrocarbons - N	NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)								
BH101_0.0-0.2,	BH101_0.45-0.5	29-Aug-2018	05-Sep-2018	12-Sep-2018	 ✓ 	06-Sep-2018	12-Sep-2018	 ✓
Soil Glass Jar - Unpreserved (EP080)								
BH301_0.0-0.2,	BH301_0.45-0.5,	30-Aug-2018	05-Sep-2018	13-Sep-2018	✓	06-Sep-2018	13-Sep-2018	✓
BH302_0.0-0.2,	BH302_0.2-0.3,							
BH306_0.0-0.2,	BH306_0.2-0.3,							
BHA302 0.0-0.2,	BHA302 0.45-0.5,							
BHA304 0.0-0.2,	BHA304 0.45-0.5							
Soil Glass Jar - Unpreserved (EP071)								
BH104_0.0-0.2		31-Jul-2018	05-Sep-2018	14-Aug-2018	<u>x</u>	05-Sep-2018	15-Oct-2018	 ✓
Soil Glass Jar - Unpreserved (EP080)								
BH104_0.0-0.2		31-Jul-2018	05-Sep-2018	14-Aug-2018	×	06-Sep-2018	14-Aug-2018	×
Soil Glass Jar - Unpreserved (EP071)								
BH104_0.2-0.3		31-Jul-2018	05-Sep-2018	14-Aug-2018	*	05-Sep-2018	15-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080)								
BH104_0.2-0.3		31-Jul-2018	05-Sep-2018	14-Aug-2018	<u>x</u>	06-Sep-2018	14-Aug-2018	x

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Matrix: SOIL					Evaluation	: × = Holding time	breach ; 🗸 = Withi	n holding tim
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
BH101_0.0-0.2,	BH101_0.45-0.5	29-Aug-2018	05-Sep-2018	12-Sep-2018	✓	06-Sep-2018	12-Sep-2018	 ✓
Soil Glass Jar - Unpreserved (EP080)								
BH301_0.0-0.2,	BH301_0.45-0.5,	30-Aug-2018	05-Sep-2018	13-Sep-2018	✓	06-Sep-2018	13-Sep-2018	 ✓
BH302_0.0-0.2,	BH302_0.2-0.3,							
BH306_0.0-0.2,	BH306_0.2-0.3,							
BHA302_0.0-0.2,	BHA302_0.45-0.5,							
BHA304_0.0-0.2,	BHA304_0.45-0.5							
Soil Glass Jar - Unpreserved (EP080)								
BH104_0.0-0.2,	BH104_0.2-0.3	31-Jul-2018	05-Sep-2018	14-Aug-2018	<u>.</u>	06-Sep-2018	14-Aug-2018	×

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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				Evaluatio	n: \star = Quality Co	ntrol frequency	not within specification ; \checkmark = Quality Control frequency within specification.
Quality Control Sample Type		-	Count		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	3	20	15.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	50.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH field/fox	EA003	6	56	10.71	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	50.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	2	20	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	50.00	5.00	~	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	22	9.09	5.00	~	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	2	20	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	2	20	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	50.00	5.00	1	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	50.00	5.00	 Image: A start of the start of	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	25	8.00	5.00		NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	<u> </u>	NEPM 2013 B3 & ALS QC Standard

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Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH field/fox	EA003	SOIL	In house: Referenced to Ahern et al 1998 - determined on a 1:5 soil/water extract designed to simulate field measured pH and pH after the extract has been oxidised with peroxide.
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 (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
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 (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. 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 (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Preparation Methods	Method	Matrix	Method Descriptions
Sample Compositing	* EN020	SOIL	Equal weights of each original soil are taken, then mixed and homogenised. The combined mixture is labelled as a new sample.
Drying only	EN020D	SOIL	In house

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Preparation Methods	Method	Matrix	Method Descriptions
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 (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

		CHAIN OF	QADELAIDE Ph: 08 8359 0	21 Burma Road Pooraka SA 5095 890 E: adelaide@alsglobal.com	⊡MACKA1 Ph; 07 494	78 Harbour Road Mackay QLD 47 4 0177 E: mackay@slegtobal.com	'40	NEWCASTLE 5/585 Maitland h: 02 4014 2500 E: samples ne	Rd Mayfield West NSW 2304 wcastle@alsglobal.com	DSYDNEY 277-289 Woodpark Road Smithfield N Ph: 02 8784 8555 E: samples.sydney@alsglobal.c	5W 2164
		CUSTODY	CIBRISBANE	32 Shand Street Stafford QLD 4053 222 E: samples.brisbane@alsglobal.com	GMELBOL Ph: 03 854	IRNE 2-4 Westall Road Springvale 3 9600 E: samples.melbourne@als	VIC 3171 global.com	LINOWRA 4/13 Geary Place I Ph: 024423 2063 E: nowa@a	North Nowra NSW 2541	LITOWNSVILLE 14-15 Desma Court Bohle QLD 4 Ph; 07 4796 0500 E: townsville.environmental@alegto	818
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PROJECT			ALS QUO	TE NO.;		·	COC SEQUENCE NUMBER (0 COC: 1 2 3 4 5	Part and a second		
	MANAGER: Alison Monkley	CONTACT	PH: 4979999	9			OF: 1 2 3 4 75	6 7 Outpermient		
	C Julian Fowler		NOBILE: 04		RELINQUISHED BY	· ~ .	RECEIVED BY:	RELINQUISHED BY:		RECEIVED BY:
COC emai	iled to ALS? (YES / NO)	EDD FORM	AT (or defau	it): Esdat	titu	Fort	LIONY			ma
Email Rep	oorts to (will default to PM if no other addresse	es are listed): Alison, ghdla	b reports, ntl.	car	DATE/TIME:		DATE/TIME: B//8/18/06/~	DATE/TIME:		DATE/TIME: 31/81/8 7:30 AM
Email Invo	pice to (will default to PM if no other addresses	s are listed): ap-fss@ghd.c	on		<u> '5\/8/17</u>	_1505	B//8//8/-00/			sil & Og C.SOPM
COMMENT	TS/SPECIAL HANDLING/STORAGE OR DISF								,	
ALS USE	SAMPLE DE MATRIX SOUD (S)	TAILS WATER (W)		CONTAINER INFO	DRMATION		S REQUIRED including SUITES (NB. Suite re required, specify Total (unfiltered bottle req			Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATI (refer to codes below)						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
19	BH 301 _ 3.95-4.0 BH 301 _ 4.45-45	30/8/18	S	A55	1					
20	BH301-445-45		1		Î					
21	BH301 - 49-5.6		+++			_				
22	BANKING FUB			Jar					_	
23	BH3DZ 00-0.2	<u> </u>		т в	2					
24	0 1101 0		+		2					
25	BH302 0.2-0.3 RH202	┼──				_ <u>_</u>				
26	GH 302 _ 045-0.5				AS 3 2					
	BH 302 _ 0-95-1,0			- W	F <u>4</u>					
27	BH 302_ 1.45-15									
28	BH 302 - 20-21									NEKT.
29	BU 302 245-24	5			1			LARC	- Circi	
30	64 302 295-20				1					
31	RU 302 305-3.6		╺╍╴┠╼┽╴		1					
32	All 201 295-42				1					
3.2	64 302 - 3.95-40 61 302 - 4.45-4.5									
34	BH 302- 4-9-5.0	<u> </u>								
33 34 35	FD7				1	+		Name and a		han an a
36	BH306 - 0.0-0.2		1	Jur B	2					
					TOTAL					
Water Conf	fainer Codes: P = Unpreserved Plastic; N = Nitric P	reserved Plastic; ORC = Nitric	Preserved OF	C; SH = Sodium Hydroxide/Cd Pres	served; S = Sodium Hydro	ide Preserved Plastic;	AG = Amber Glass Unpreserved; AP - Airfrei	ight Unpreserved Plastic		

Water Container Container Contex: P = Onpreserved Plastic; N = Nime Preserved Plastic; Or C = Nime Preserved Arc, S = Solutin Hydroxide Or Preserved Plastic; N = Vol Nime Preserved Plastic; F = Formaldehyde Preserved Glass; V = VOA Vial HCI Preserved Plastic; V = Vol Nime Preserved Vial Suffunic Preserved Vial Sol = Suffunic Preserved Plastic; H = HCI preserved Plastic; H = HCI preserved Speciation bottle; SP = Suffunic Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; SS = Suffunic Preserved Solis; B = Unpreserved Bottle; B = Unpreserved Bottle; C = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solis; B = Unpreserved Bag.

	konmentar (CHAIN OF CUSTODY ALS Laboratory: please tick ->	Ph: 08 8359 DBRISBAN Ph: 07 3243 LIGLADST0	0890 E: adelai E 32 Shand Str 7222 E: sampl DNE 46 Callem 5600 E: gladst	ad Pooraka SA 5095 ide@alsglobal.com reat Stafford QLD 4053 les.brisbane@alsglobal.com ondah Drive Clinkon QLD 4 icone@alsglobal.com	4680	Ph: 07 4944 0 DMELBOURN Ph: 03 6549 9 DMUDGEE Ph: 02 6372	177 E: mackay@ VE 2-4 Westall Re 600 E: samples.n 27 Sydney Road 6735 E: mudgee.	ad Springvale VIC 317: helbourne@alsglobal.co Mudgee NSW 2650 mail@alsglobal.com	1 M	Ph: 02 4014 25 INOWRA 4 Ph: 024423 IPERTH 10	E 5/565 Mailand Rd M 00 E: samples.newca /13 Geary Place Nortl 2063 E: nowra@alsgli -tod Way Malaga WA 665 E: samples.perth	stle@alsglobal.com h Nowra NSW 2541 obal.com & 6090 @alsglobal.com		Ph: 02 8784 85 TOWNSVILL Ph: 07 4796 06 DWOLLONGO Ph: 02 4225 33	7-289 Woodpark Road 555 E; samples.sydneyr E 14-15 Desma Court i 000 E: tawnsville.environn DNG 89 Kenny Street V 125 E: portkemba@als	@alsglobal.com Sohle QLD 4818 nental@alsglobal.com Vollongong NSW 2500
CLIENT:					ROUND REQUIREN TAT may be longer for			lard TAT (Lis	-				FO	L'ITALORATO	RAUGEON	lty (cicle)	
OFFICE: PROJECT:	Newcastle			Ultra Trace	e Organics)		Non S	Standard or u	rgent TAT (List due			E NUMBER (Cin		ooy soorintiid Re Mozenne	Linear and the		an a
ORDER NU				ALS QU	JOTE NO.:					 		• <u>)</u>	rece	ne dom Shiftplati	中国教育中国 自己 化乙基甲基基	The second capture and the second second	l e
	MANAGER: Alison Monkle		CONTACT	PH: 497999	999					OF:	1 2 3		80000	cominant			
	: Julian Fowler		SAMPLER	MOBILE: 0	466049181		RELINQUI	SHED BY:		RECE	VED BY:		RELINQU	ISHED BY:		RECEIVE	DBY:
COC email	led to ALS? (YES / NO)		EDD FORM	AT (or defa	ault): Esdat		1 1	The F	al		Son	21				4 N	UC
Email Rep	orts to (will default to PM if no	o other addresses a	re listed): Alison, ghdla	b reports, n	ntl.car		DATE/TIM		17. 4	DATE/	MECIN	- 7 1.08ph	DATE/TIN	1E:			
Emaíl Invo	ice to (will default to PM if no	other addresses ar	e listed): ap-fss@ghd.c	om			3\/	8118	1305	3	1 8/10	1.000	<u></u>		-	31/8/	168 7.30pm
COMMENT	IS/SPECIAL HANDLING/STO	RAGE OR DISPOS	AL:				· ·	•			•						
ALS. USE	MAT	SAMPLE DETAIL RIX SOLID (S) WA			CON	NTAINER INFO	DRMATION		ANAŁYSIS Where Metals are			TES (NB. Suite Co ittered bottle requir				Additio	nal Information
LAB ID	SAMPLE ID	ł	DATE / TIME	MATRIX		PRESERVAT		TOTAL CONTAINERS	4								r contaminant levels, s requiring specific QC
37	B# 306_	0.2-0.3	30/8/18	5	Jur	ß		2								·	
38	BH 306 _ 0	LK-0.5	/ /	1	J.	1.1	455	२									
39					• <i>(</i> -		1	1	+						-		
40		95-1.0					}	1								<u> </u>	<u> </u>
41		-0-2.1						1									
42		45-2.5					1	1	<u> </u>	{					<u>+</u>		
43		0-3.1				•	1	1		f							
44		5-3.6						1									
45	641306-3)			1									
46	64306 -40							1						-			
47	FD 9				Jai	- 1		1						AB OF	FORI	GIN:	
48	B44302	0.0-0.L		1-1-	Ju	· , B	·v	2					-		CAST	y poord track track	
48	BUA302. BHA302_	1.7-0.3			1	. 1		2		1		_					
50	644302_	0-115-0-5			V V	∕′↓,	A\$\$	3				_					
51	BHA 302 -	0.95-10						{				_		r.M			
52	SHA 307 1	1.45-1.5						1									
50 51 52 53 53	BUA 302_ SUA 302_ SUA 302_ SUA 302_ SUA 302_ SUA 302_	2.0-21					1	1		†			L	-			
54	SHA 302 -	245-2.5	\checkmark	V			$\overline{\mathbf{V}}$	1									·····
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Water Cont	ainer Codes: P = Unpreserved P	Plastic; N = Nitric Prese	erved Plastic; ORC = Nitri	c Preserved (ORC; SH = Sodium Hy	ydroxide/Cd Pre	served; S = So	dium Hydroxida	Preserved Plastic; A	AG = Ambe	er Glass Unpresel	ved; AP - Airfreigh	t Unpreserved Pi	astic	I		,

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V = VOA Value Preserved Pastic, N = Volume Preserved VB = VOA Value Valu

\$	CHAIN OF CUSTODY ALS Laboratory: please tot.	Ph: 08 8359 □BRISBANG Ph: 07 3243 □GLADSTO	3890 E: adelaide(32 Shand Sireet 7222 E: samples. NE 46 Callemond	Stafford QLD 4053	□MACKAY 78 Harbour Road M Ph: 07 4944 0177 E: mackay@al □MELBOURINE 2-4 Westall Roe Ph: 03 8549 5600 E: samples.me □MUDGEE 27 Sydney Road M Ph: 02 6372 6735 E: mudges.m	sglobal.com d Springvale VIC 3171 Ibourne@alsglobal.com udgee NSW 2850	Ph: 02 4014 2500 E: sa DNOWRA 4/13 Gea n Ph: 024423 2063 E: DPERTH 10 Hod Wa	Mailand Rd Mayfield West NSW 2304 mpes.newcastle@alegiobal.com y Piace North Nowra NSW 2541 nowra@alegiobal.com Malaga WA 5090 amples.porth@alsglobal.com	Ph: 02 8784 8 TOWNSVILI Ph: 07 4796 00 DW0LLONG	7-288 Woodpark Roed Smithfield NSW 2164 655 E: sanples sydrey@aksjot64 com 12 Ho15 Desmo 900 E: townwille.arvironmental@aksjot8a1.com 900 69 Kamy Street Wolongong NSW 2500 125 E: portkembla@aksjot8a1.com
CLIENT:	GHD			OUND REQUIREMENTS :	Standard TAT (List	due date):		FOPLAB	ORATORY USE ON	EV (Cide
OFFICE:			(Standard TA Ultra Trace C	AT may be longer for some tests e.g Drganics)	Non Standard or urg	ent TAT (List due	e date):	CURINDY SE	dela esta del a	ka ke ke
PROJECT:			ALS QUO	TE NO.:				Peceupica d	izen lee on sichteen Richter of Kinner of	
ORDER NU				<u>-</u> .	· · · ·		_ COC: 1 2 3 (4		null remperation	Rep. 12
	MANAGER: Alison Monkley	CONTACT F					OF: 1 2 3 4		ient.	RECEIVED BY:
	Julian Fowler	SAMPLER N			RELINQUISHED BY:	. /	RECEIVED BY:	RELINQUISHED	BT:	M(
	ed to ALS? (YES / NO)				DATE/TIME:			DATE/TIME:		DATE/TIME:
	ice to (will default to PM if no other addresses				31/8/18	1305	DATE/TIME: 31/8/18/18/18	6m		31/8/18 7.30 pm
	S/SPECIAL HANDLING/STORAGE OR DISPO						1-1/-/10	_ <u>r_</u>		<u> </u>
		AND REAL PROPERTY OF THE REAL PROPERTY OF THE								
ALS USE	SAMPLE DETA MATRIX: SOLID (S) W	ATER (W)		CONTAINER INFO	RMATION			B. Sulte Codes must be listed to att offic required) or Dissolved (field fi		Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIV (refer to codes below)	TOTAL CONTAINERS					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
55	BHA302_ 30-3.1	30/8/13	S	ASS	1					1
56	B44302 3-5-36		1		1					
57	3HA302_ 3.9-4.0				1		<u>,</u>			
58	GHA 302 _ 4.45-4.5				1					
59	GUA302_ 4.9-50									
60	FDIA			Jar						
61	BHA 304_ 0.0-0.2			1 8	2				1	
62	SHA 304 - 0.2-03			, 1	2					
63	047304_0.45-0.5			, A	55 3	_				
64	BHA-304_0.95-1.0			V.V.	3					
65	BHA-304_1.5-1.6				1			LABO	F ORIGI	N:
66	BUA 304 - 2.0-2.1				(NEW	CARTE	
67	344-304-2.45-2.5 BHA 304-3.0-3.1								U . U	
68	SHA 304- 3.0-3.1				1					
69	SHP 304_ 3.5-36				1					
70	BUA 304 _ 3.95-4.0				f					
71	154A 304 4.5-46				1			L		
72	BUA 304 _ 419-50	V	*		·					
					TOTAL					

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LIENT:				OUND REQUIREMENTS : TAT may be longer for some tests e.g.,	ធរ Standard						_	SC3040020		UT (E140)
	Newcastle		Ultra Trace	Organics)	Non Stand	lard or ur	geni TAT (Lis	it due date):				Cherry a rinne	nen 1977 1976 - Angelen Standards	
ROJECT:		······································	ALS QU	DTE NO.:				coc:	<i>m</i>	ENCE NUMBE		1122-522		
	MANAGER: Alison Monkley	CONTACT			······································				$\frac{(\gamma)^2}{1}$	34		7 Rindom Onlight 7 Official and the	ന്നിയും പ്രകു	
	Julian Fowler	SAMPLER			RELINQUISHE	D BY:			EIVED BY:	<u> </u>	<u> </u>	7 Offerenting	www.ashre.com/www.com	RECEIVED BY:
	ed to ALS7 (YES / NO)	EDD FORM			Talm	1	En	- 7	UNN	n Oj				
· •	rts to (will default to PM if no other addresses				DATE/TIME:	/	1000	DAT	E/TIME:		D	TE/TIME:		DATE/TIME;
nail Invoi	ce to (will default to PM if no other addresses	are listed): ap-fss@ghd.c		· · · · · · · · · · · · · · · · · · ·	31/8	118	130	5 3	i1 <i>X 11</i> 8	1:064	m			
OMMENT	S/SPECIAL HANDLING/STORAGE OR DISPO	DSAL:							10-112					
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	nonexe V(B)GUDS MERCH			CONVINERING	RMATION		ANAL Where Meta	YSIS REQUIN	RED including 8, specify Total	SUITES (NB. (unfiltered bot	Suite Codes mu le required) or D	st be listed to attract a issolved (field filtered	uite price) bottle required).	Additional Information
			and the second second	Restlingdor, <u>Radind</u> , Co <u>ns</u> atros, ang	alertain de en en la servici de la servi	() ()	EXN	-4	٤	6				
			¥	TYPE & PRESERVATIV	a =	TOTAL CONTAINERS	GTEXN 8 mehul		+ 5	っと	N Z			Comments on likely contaminant levels,
LABID	SAMPLE ID	DATE / YIME	MATRIX	(refer to codes below)	-	101 IAI	-	Ashestus Piskemee	soren	22	Šā			dilutions, or samples requiring specific QC analysis etc.
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_	- 0						1-03	a	4~	10			ACC	heave hold all
۱. I	54108_ 0.0-0.2	22/8/18	S	В				$\triangleright <$	1		÷		-{(``>7	Kundesmisha
2	BH108_0-1-0.3		5	b		1					1	fubc	ONIRO	The second second
	011100		c	R		1-								ward Lab / Split
3	DH108_ 0.5-0.6	V.		<u></u>		• 	K ~		·			185/	Analys	
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6	BHIDI _ 0.45- 05						$ \rightarrow $	[<u> </u>	ol	
7	BH101- 0.95-10					2						Ataci	By PC	Internal Of
8	BUILION 1.45-1.5	X		-		T			1					Internal Sheet:
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9	<u>FU6</u>	V	_	Y		<u>.</u>	<u> </u>	1-	Į		$ \rightarrow $	-		، ا ـــــ
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12	BUBO1_095-10	\		\mathbf{V} \mathbf{V}	\$5	3			\times					
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CLIENT:				UND REQUIREMENTS : (T may be longer for some tests c.g.,	Siandard								RAIORYUSEO	문화가 지난 것이 많아? 아파가 지난 것 같아요. 그 것이 같아요.
	ICE: Newcastle Uliva Trace Organica) DJECT: 2219573 ALS QUOTE NO.:					dard or urg	ent TAT (List	t due date):	COC SEQUE		ER (Circle)	CUTODVS: 1	nations Anna Anna Anna Anna Anna Anna Anna Anna	inentiti VC: (K: ()
ORDER NU	······		100 400					coc:	1 2	3 4	5 6	(COLDI?		
PROJECT	MANAGER: Alison Monkley	CONTACT	H: 49799999)				OF:	1 2	3 4	1 .	7 Othercomme		
SAMPLER:	Julian Fowler	SAMPLER N	OBILE: 046	6049181	RELINQUISH	ED BY:	\geq ,	RECE	IVED BY:	. 0.	0	RELINQUISHED	BY:	RECEIVED BY:
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	orts to (will default to PM if no other addresses			car	DATE/TIME:	Ð	12~	CDATE	TIME: 1011 V	int	ing-	DATE/TIME:		DATE/TIME:
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LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATI (refer to codes below)		TOTAL CONTAINERS	TPU/JFEW	53	ASS (Ercentu	one 2 (all	Conf 3'	-		Comments on Bkely contaminant leveis, dilutions, or samples requiring specific QC analysis etc.
19	8-1301_3.95-4.0	30/8/18	S	<u>455</u>		1								
20	BH301-445-45		11			ĩ								
21	84301 _ 49-5.0		\square			1								
22	Rating 508.			Jur		1								
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36	BH306- 00-02	. V	V	Jur B		2	\succ				\mathbf{X}			
	n an an ann ann an ann ann ann ann ann	an a		an a	TOTAL									
V = VOA VI	tainer Codes: P = Unpreserved Plastic; N ≃ Nitrio Pr al HCI Preserved; VB = VOA Vial Socium Bisuphate F state Preserved Botte; <u>E = ED</u> TA Preserved Bottes;	Preserved: VS = VOA Vial St	func Preserver	1: AV = Airtreight Unpreserved Vial Si	3 = Sulfuric Preser	n Hydroxide rved Amber	Preserved Pla Giass: H = H	nstic; AG = An ICI preserved	ber Glass Ung Plastic: HS =	reserved; AP HCl preserve	- Aitreight Un d Speciation bo	pteserved Plastic Ille, SP = Sulfutic Pr	reserved Plastic; F	= Formaldehyde Preserved Glass;

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<u>s</u> noi	CHAIN OF Ph: D6 83550990 F. alcuade@alspicbat.com Ph: CUSTODY ORRISON® 32 Stens Steller Stellard OLD 4053 D Ph: 07 347 272 ZE: Larget & Kished OLD 4053 D D Ph: 07 347 272 ZE: Larget & Kished OLD 4053 D D Ph: 07 347 272 ZE: Larget & Kished OLD 4053 D D Ph: 07 347 272 ZE: Larget & Kished OLD 4053 D D Ph: 07 347 1560 E: 0717 271 560 E: 0717			BMACKAY 78 Harbour R Ph: 07 4944 0177 6 Inac BMELBOURNE 2-4 Was Ph: 03 8540 9603 6, sam CIMUDGEE 27 System Ph: 02 6772 6735 5; mu	3171 al com 1	(h: U2 4014 2500 E : sar UNOWRA 4/13 Gear) Ph: 024423 2053 등 n CPERTH 10 Red Way		DTOWNSVIL Ph: 07 4796 C DWOLL DYG	OSYDNEY 277-289 Woodpark Road Smithfeld MSW2164 Ph:02 8784 6555 E. samples aydoing@alsgobal.com DTOWNEY/LE 14-16 Denna Court Bedou DL 04318 Ph:07 4759 0500 E: Iveenviele, mei en mei 4d physicitai.com OWOLL DVGDNG By Fenny Street Wodonyng NSW 2500 Ph:02 4225 3125 E: polivembla@alsglobal.com			
CLIENT:					DUND REQUIREMENTS : AT may be longer for some tests e.g.	5tandard TAT					IORAIORVAUSI= O	UP (Gred)
OFFICE:	Newcastie			Liltra Trace (Drganics)	Non Standard	or urgent TAT (List		FEBUENCE NUM		usmatrik, ha m Upulter	7415 (X): (1945) Tentron
ORDER NO		·····		ALS QUO	1 E NO.:			COC		花也在我的人在 我	ເພຍາຍີ່ຜູ້ເພື່ອການ	
	MANAGER: Alison Mo	nkiey	CONTACT P	l 1: 4979999	9			OF: 1	2 3 4	(5) 6 7 Other com		
SAMPLER	Julian Fowler		SAMPLER N	OBILE: 04	66049181	RELINQUISHED E	Y:	RECEIVED	BY:	RELINQUISHE		RECEIVED BY:
COC email	led to ALS? (YES / N	0)	EDD FORMA	T (or defau	lt): Esdat	the.	For	K	MARI			
Email Rep	orts to (will default to PM	if no other addresses a	re listed); Alison, ghdlab	reports, nil	car	DATE/TIME:	1764	DATENTIAL	POLIQI	OSPM DATE/TIME:		DATE/TIME:
Email Invo	ice to (will default to PM i	if no other addresses ar	e listed): ap-fss@ghd.co	m		31/8/18	1301	5 511	8/10 1			
COMMENT	SISPECIAL HANDLING	STORAGE OR DISPOS	SAL:			\ 		· · · · · · · · · · · · · · · · · · ·				
ANS USE	() 	BATTINE DEPAIL	나 <u>라</u> 해프로신(W))		CONTAINERINFO	A Contract of the state	Where Metals	SIS REQUIRED in	cluding SUITES (N ly Total (unfiltured b	B. Suite Codes must be listed to a ottle required) or Dissolved (field	tra cl suite price) Sitered bottle required)). Additional Information
LAB ID	SAMPL	E ID	DATE / TIME	MATRIX	TYPE & PRESERVATI (refer to codes below)		TPH / STEXU PAH, SMethys	atrichos Prixee-e/atree	comp 2 (comp 2 (comp 2	cent 3		Comments on likely contaminant levels, dilutors, of samples requiring specific QC analysis etc.
27	64306	0.2-0.3	30/8/18	S	Jur B	2		<u> </u>				
36	BH 306 _	0.45-0.5	, , .		V, V, A	<u>55 3</u>		\sim	\leq			
34	64306	0.95-1.0			· · · · ·	1						
40	Ruzoh	145-1-5				j j		<	Х—			
41	-112 al							K	<u> </u>	+		
	34306-	2-0-2.1						— K	\geq			
42	CH 306_	2.45-2.5				'			\rightarrow			
43	BH306_	30-3-1				1		<u> </u>	\leq			
44	2H306-	3.5-3.6							<			
45	64306-	3.9-1:0				1		5	<			
46	6.4306 -					1 1		K	\geq			
					Jur	64 I			<u> </u>			
47	FD 9											······
48	134 # 307	2_ 0.0-0.2			Jur B	2	\rightarrow					
44	BHAJOL.	- 0.7,-0.3	1			2			\prec'			
\odot	B4 A 302	- 0-45-0.5			$-\sqrt{1}$	ASS 3	\times	\triangleright	<			
13	BUA 302	0.95-1.0							\mathbf{X}			
+	RIIA. 7			+				K	2			
	BUA 2	1.45-15			······································			-	\geq			
S4	BUA 302.	245-2.5		$ \mathbf{\Lambda} $				5	2			
						TOTAL						
V = VOA VI	ial HCI Preserved; VB = VOA	Vial Socium Bisuphate Pre	eserved; VS = VOA Viai Sulf	unic Preserve	RC; SH = Sodium Hydroxide/Cd Pres d; AV = Antreight Unpreserved Viat SC old Subhate Solis: B = Uppreserved Fi	= Sulfuric Preserved	rolde Preserved Plan Amber Glass; H = H	stic; AG = Amber G Ci preserved Plaste	lass Unpreserved; Al ;; HS = HCI preserved;	P - Axfreight Unpreserved Plastic ed Speciation bottle; SP = Sulfuric	Proverved Plastic: F =	= Formaldefiyite Preserved Glass;

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12mai	ALS Manmeritat	CHAIN OF CUSTODY ALS Laboratory: please lick ->	우h 08 8359 []]BRISBANI Ph 07 3243 []]GLADSTC	0890 F. adel 232 Strand S 7222 E: sam INE 46 Caller	tad Porrika SA 5055 arle@akg.obal.com vest Swillard OLD 4053 des brisba re@akglobal.com noraskh Drwc Grinon QLD 4680 store@aksji0bal.com	DMACKAY 73 Harboot Road Vackay 0LD 7400, Ph 07 4944 0177 E: markay@atxpoats.com DMELBOUNDE24 Vestall Road: Spingwale VIO 3171 Ph 03 8549 5000 E: sambles antibisarning atspications DMUDGE27 Spinger Road Musique NSY 4500 EMU 02 6372 6735 E: midgee matigaitsjobal com		ໍ ຕົກ 3171 ສໄຊວທ	02 4014 2500 E: sa DNOWRA #13 Gear %: 024423 2063 E. r	dailanc Rd Mayheki West NSW 2 nples.new:cat/le@aisglobai.com y Place North Nowna NSW 2541 rownag Jisglobal.com Malaga WA 6030 maphes.pathi@alaglobal.com	Ph: 02 8784 OTOWNSVI Ph: 07 4796	277.269 Woodgaak Rood Smitheld NSW2164 8555 E: samples sydneyng Msglohal rom LIE -4-15 Deena Cool Bolte OLD 4815 8506 E: forstalle amerianeth Willing Msglohal con 30NG 99 Kerey Street Wollongung NSW 2250 3125 E: parkenning Bydsjolat con
CLIENT:	GHD				ROUND REQUIREMENTS :	Standard TAT (FOR	LABORATORYUSEG	NEY (ERC)	
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PROJECT:		····		ALS Q	UOTE NO.:							
	MANAGER: Alison Mo	nklev	CONTACT	H: 49795	998			COC: 1		5 6 7 Band	iningrication Annami	R XXXX &
	: Julian Fowler		SAMPLER			RELINQUISHED BY	:	RECEIVED	Xi a A	RELINQUI	SHED BY;	RECEIVED BY:
	led to ALS? { YES / N	10}	EDD FORM	at (or da	(ault): Esdat	Julin F		\mathcal{K}	INU			
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Email Invo	lice to (will default to PM	if no other addresses a	re listed); ap-(as@ghd.c	070		31/8/18	[30]	5 3/18	11810	opin		
COMMENT	TS/SPECIAL HANDLING	STORAGE OR DISPO	SAL:			/ 						
<u>, 2006</u> 1007-		Somple Deva Matrix: Soud (8),W	nus Ater(KV)		O-INI-SEMINITION	RMATION	Where Metals	YSIS REQUIRED incl s are required, specify	uding SUITES (N Total (unfilered b	B. Suite Codes must be listed pattle required) or Dissolved (l to altract suite price) (field filtered bottle required). Additional Information
LABID	SAMPL		DATE / TIME	MATRIX	TYPE & PRESERVATI (refer to codes below)		Thi/BEXN PAH, Smelal	Bhestas Fiescence/com ASS	Kreem Z	(orr) RB)		Comments on likely contaminant levels, dictions, or samples requiring specific QC analysis etc.
55	BHA302 944 30 2	3-0-3-1	30/8/13	S	ASS	1			\leq			
56	944302	3.5-3.6	ĺ.	1		1			\langle			
57	3HA302_	3.9-4.0				1					· · · ·	
100	BUA 302	RUX-DT		1		1		$-\epsilon$	<u>}</u>			
20	01162.0	<u></u>						-	\geq			
29	QUA 302	. 4.9-5.0							\searrow			
60	FDIO		¥		Jar	I						
61	BHA 304	00-0-2	1		B	2	\times	\times				
62		- 0.2-03				2						
63	AHA-304	- 0.45-0.5	·	+ +-		55 3	$\overline{\mathbf{X}}$					
64				++		$\frac{3}{3}$			/			
		_0.45-1.0			V, V,	<u>,</u>						
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106	1 GUR 304	- 2.0-2.1				1	_		\leq	:		
57	344 300	-2.45-2.5				1			< $-$			
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70	84A 304	3.95-40							5			
1	1547A 304	4.5-4.6				1			\leq	_		
72	- BUA302	4.9-5.V	V	4	e.				<			
						TOTAL						
V = VOA V	(int HC) Preserved; VB = VOA	Vial Sodium Bisulphate Pi	reserved; VS = VOA Vial St	duric Prese	d ORC; SH = Sodium Hydroxide/Cd Pres :rved; AV = Airtreight Unpreserved Vial SC or Acid Sulphate Sons: B = Unpreserved B	5 = Sulturic Preserved A	xide Preserved Pla nber Glass; H = H	istic; AG = Ainber Gla iCi preserved Plastic;	is Unpreserved; A HS = HCI preserv	P - Airfreight Unpreserved Pla ed Speciation bottle; SP = Su	i nutic Mutic Preserved Plastic; F	= Formaldehyde Preserved Giass;

sii grasiis∉	Kasilarike≣Erikesi please tick →	UGLADSTON Pt: 07 74715	500 E gladulon	iah Dine Cinton OLD 4560 e@aliglobal.cos)	DMUDGEE 27 Sys Ph 02 6372 5735 8	: Muciger ma	a@eisglobal.com		UPERTH Phr 06 92	110 Hod Way M 199 7655 E: sain	alagu WA 5000 plasperih@alag	Idbal.con	Ph: 02 4225 3125 (99 Kenny Street Wollongong NSW 2500 5: portkembla@alsglobel.com	
LIENT: G				DUND REQUIREMENTS : AT may be longer for some tests e.g.,	Standard T							FORLABORATO	A CONTRACTOR OF		
OFFICE: N			Ultra Trace (Drganics)	Non Stand	ignu to bis	ent TAT (List					Custody Seat hilact	o Balain gere e vinner	107. (N/A 71	
ROJECT:			ALS QUO	TE NO.;				{	COC SEQUE		*	CCC IF			
RDER NUN	ANAGER: Alison Monkley	CONTAGT PI	J. 4079099	<u>, </u>					1 2	3 4	×:	7 Random Sample Te	Obsiding ou see		
	Julian Fowler	SAMPLER M		· · · · · · · · · · · · · · · · · · ·	RELINQUISHE	D BY			IVED BY:	3 4	<u>v</u> .	7 Otheocommental RELINQUISHED BY:	and more than	DECENTE OV	4
	d to ALS? (YES / NO)	EDD FORMA			TT	<u> </u>	Sw	5	UN ~	\mathcal{A}_{i}		RECINQUISICED B1.		RECEIVED BY:	
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	SPECIAL HANDLING/STORAGE OR DISPO									<u> </u>		<u> </u>			-
		and the second													-
	SATELLE DETA MATRIXE SCUD(S)W	1(L)S /\vier+((V))		CONTRINERING	TIM TON		Where Metals					must be listed to attract suite r Dissolved (field Sitered be		Additional Information	
LABID	SAMPLE ID	DATE / TIME	MATRIX	1 YPE & PRESERVATI (refer to codes below)	Æ	E 2 1	PPH/STEXN PPH Smekly	Astestus Precenc/abse	AJS / Sceniny	(arr, RB)	сотр 3 (ors. <i>P</i> cú)	+	, diệt	mments on likely contaminant levels. Utons, of samples requiring specific QC alysis etc.	
73	FDI	30/8/18	S	Sar		1									-
74	34104 0.0-02	31/8/18	S			2	\searrow	\times		\times					
75			c			2		X							~
	BH104_0.2-0.3		3			5	$\leq \leq$								
76	34104-0.45-0.5		5	,		4									_
77	94104 0.43-1.0	\vee	S	ľ V		2									
78	FD 12	11	C			1									-
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					TOTAL										
	uiner Codes: P = Unpreserved Plastic; N = Nitrio Pr										1				_



CERTIFICATE OF ANALYSIS

Work Order	ES1826044	Page	: 1 of 19
Client	: GHD PTY LTD	Laboratory	Environmental Division Sydney
Contact	: MS ALISON MONKLEY	Contact	Brenda Hong
Address	: PO BOX 5403	Address	277-289 Woodpark Road Smithfield NSW Australia 2164
	NEWCASTLE WEST NSW, AUSTRALIA 2302		
Telephone		Telephone	: (02) 8784 8504
Project	: 2219573	Date Samples Received	: 04-Sep-2018 16:28
Order number	:	Date Analysis Commenced	18-Sep-2018
C-O-C number	:	ssue Date	24-Sep-2018 18:26
Sampler	: JULIAN FOWLER		124-Sep-2018 18:26
Site	:		
Quote number	: EN/005/18		The Contraction of the second
No. of samples received	: 56		Accredited for compliance with
No. of samples analysed	: 28		ISO/IEC 17025 - Testing

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	Position	Accreditation Category	
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW	
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW	
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW	
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW	
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD	
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW	

Page	2 of 19
Work Order	ES1826044
Client	: GHD PTY LTD
Project	2219573



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

 Key :
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

 LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- ASS: EA003 (NATA Field and F(ox) screening): pH F(ox) Reaction Rate: 1 Slight; 2 Moderate; 3 Strong; 4 Extreme
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) 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.
- ED007 and ED008: When Exchange Acidity by 1M KCI Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Page	3 of 19
Work Order	ES1826044
Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	BHA303_0.0-0.2	BHA303_0.45-0.5	BH201_0.0-0.2	BH201_0.45-0.5	BH201_0.95-1.0
	Clie	ent sampl	ing date / time	04-Sep-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1826044-001	ES1826044-003	ES1826044-014	ES1826044-016	ES1826044-017
compound				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soi l s)								
pH Value		0.1	pH Unit			6.3		
EA003 :pH (field/fox)								
pH (F)		0.1	pH Unit					6.7
pH (Fox)		0.1	pH Unit					2.8
Reaction Rate		1	Reaction Unit					2
EA055: Moisture Content (Dried @ 10								_
Moisture Content		1.0	%	26.8	21.3	33.8	18.5	
			,,,					
ED007: Exchangeable Cations Exchangeable Calcium		0.1	meq/100g			4.6		
Exchangeable Calcium Exchangeable Magnesium		0.1	meq/100g			2.7		
		0.1				0.2		
Exchangeable Potassium			meq/100g					
Exchangeable Sodium		0.1	meq/100g			0.4		
Cation Exchange Capacity		0.1	meq/100g %			7.9 5.7		
Exchangeable Sodium Percent		0.1	%			5./		
EG005T: Total Metals by ICP-AES		_			_			
Arsenic	7440-38-2	5	mg/kg	9	<5	13	15	
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	
Chromium	7440-47-3	2	mg/kg	8	2	11	18	
Copper	7440-50-8	5	mg/kg	39	<5	21	10	
Lead	7439-92-1	5	mg/kg	54	<5	44	14	
Nickel	7440-02-0	2	mg/kg	8	<2	10	4	
Zinc	7440-66-6	5	mg/kg	289	7	95	23	
EG035T: Total Recoverable Mercury	by FIMS							
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	
EP066: Polychlorinated Biphenyls (P	CB)							
Total Polychlorinated biphenyls		0.1	mg/kg			<0.1	<0.1	
EP068A: Organochlorine Pesticides (OC)							
alpha-BHC	319-84-6	0.05	mg/kg			<0.05	<0.05	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg			<0.05	<0.05	
beta-BHC	319-85-7	0.05	mg/kg			<0.05	<0.05	
gamma-BHC	58-89-9	0.05	mg/kg			<0.05	<0.05	
delta-BHC	319-86-8	0.05	mg/kg			<0.05	<0.05	
Heptachlor	76-44-8	0.05	mg/kg			<0.05	<0.05	
Aldrin	309-00-2	0.05	mg/kg			<0.05	<0.05	

Page	4 of 19
Work Order	ES1826044
Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BHA303_0.0-0.2	BHA303_0.45-0.5	BH201_0.0-0.2	BH201_0.45-0.5	BH201_0.95-1.0
	Cl	ient samplii	ng date / time	04-Sep-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1826044-001	ES1826044-003	ES1826044-014	ES1826044-016	ES1826044-017
			-	Result	Result	Result	Result	Result
EP068A: Organochlorine Pestici	des (OC) - Continued							
Heptachlor epoxide	1024-57-3	0.05	mg/kg			<0.05	<0.05	
^ Total Chlordane (sum)		0.05	mg/kg			<0.05	<0.05	
trans-Chlordane	5103-74-2	0.05	mg/kg			<0.05	<0.05	
alpha-Endosulfan	959-98-8	0.05	mg/kg			<0.05	<0.05	
cis-Chlordane	5103-71-9	0.05	mg/kg			<0.05	<0.05	
Dieldrin	60-57-1	0.05	mg/kg			<0.05	<0.05	
4.4`-DDE	72-55-9	0.05	mg/kg			<0.05	<0.05	
Endrin	72-20-8	0.05	mg/kg			<0.05	<0.05	
beta-Endosulfan	33213-65-9	0.05	mg/kg			<0.05	<0.05	
• Endosulfan (sum)	115-29-7	0.05	mg/kg			<0.05	<0.05	
4.4`-DDD	72-54-8	0.05	mg/kg			<0.05	<0.05	
Endrin aldehyde	7421-93-4	0.05	mg/kg			<0.05	<0.05	
Endosulfan sulfate	1031-07-8	0.05	mg/kg			<0.05	<0.05	
4.4`-DDT	50-29-3	0.2	mg/kg			<0.2	<0.2	
Endrin ketone	53494-70-5	0.05	mg/kg			<0.05	<0.05	
Methoxychlor	72-43-5	0.2	mg/kg			<0.2	<0.2	
Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg			<0.05	<0.05	
Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.05	mg/kg			<0.05	<0.05	
	0-2							
EP075(SIM)B: Polynuclear Arom	atic Hydrocarbons							
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	1.0	<0.5	
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	1.0	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0 <u>.</u> 5	<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.6	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.8	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0 <u>.</u> 5	<0.5	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.6	<0.5	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BHA303_0.0-0.2	BHA303_0.45-0.5	BH201_0.0-0.2	BH201_0.45-0.5	BH201_0.95-1.0
	Cli	ient sampli	ng date / time	04-Sep-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1826044-001	ES1826044-003	ES1826044-014	ES1826044-016	ES1826044-017
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hy	drocarbons - Cont	inued						
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
[^] Sum of polycyclic aromatic hydrocarbons		0.5	mg/kg	<0.5	<0.5	4.0	<0.5	
[^] Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5	<0.5	0.7	<0.5	
[^] Benzo(a)pyrene TEQ (half LOR)		0.5	mg/kg	0.6	0.6	1.0	0.6	
[^] Benzo(a)pyrene TEQ (LOR)		0.5	mg/kg	1.2	1.2	1.3	1.2	
EP080/071: Total Petroleum Hydrocarbo	ons							
C6 - C9 Fraction		10	mg/kg	<10	<10	<10	<10	
C10 - C14 Fraction		50	mg/kg	<50	<50	<50	<50	
C15 - C28 Fraction		100	mg/kg	<100	<100	<100	<100	
C29 - C36 Fraction		100	mg/kg	<100	<100	<100	<100	
[^] C10 - C36 Fraction (sum)		50	mg/kg	<50	<50	<50	<50	
EP080/071: Total Recoverable Hydroca	bons - NEPM 201	3 Fractio	ns					
C6 - C10 Fraction	C6 C10	10	mg/kg	<10	<10	<10	<10	
[^] C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	
(F1)	-							
>C10 - C16 Fraction		50	mg/kg	<50	<50	<50	<50	
>C16 - C34 Fraction		100	mg/kg	<100	<100	<100	<100	
>C34 - C40 Fraction		100	mg/kg	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)		50	mg/kg	<50	<50	<50	<50	
^ >C10 - C16 Fraction minus Naphthalene		50	mg/kg	<50	<50	<50	<50	
(F2)								
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
≦ Sum of BTEX		0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	
∖ Total Xylenes		0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%			104	127	
EP068S: Organochlorine Pesticide Surr	ogate							
Dibromo-DDE	21655-73-2	0.05	%			129	130	

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Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID		BHA303_0.0-0.2	BHA303_0.45-0.5	BH201_0.0-0.2	BH201_0.45-0.5	BH201_0.95-1.0	
	Cli	ent sampli	ing date / time	04-Sep-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1826044-001	ES1826044-003	ES1826044-014	ES1826044-016	ES1826044-017
				Result	Result	Result	Result	Result
EP068T: Organophosphorus Pe	sticide Surrogate							
DEF	78-48-8	0.05	%			96.3	98.2	
EP075(SIM)S: Phenolic Compou	nd Surrogates							
Phenol-d6	13127-88-3	0.5	%	74.5	77.8	78.4	75.4	
2-Chlorophenol-D4	93951-73-6	0.5	%	77.5	81.5	81.7	79.1	
2.4.6-Tribromophenol	118-79-6	0.5	%	68.4	67.3	66.7	63.8	
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	79.9	83.7	85.1	81.0	
Anthracene-d10	1719-06-8	0.5	%	83.3	86.0	86.2	82.8	
4-Terphenyl-d14	1718-51-0	0.5	%	76.1	78.6	78.7	76.1	
EP080S: TPH(V)/BTEX Surrogate	es							
1.2-Dichloroethane-D4	17060-07-0	0.2	%	74.4	96.7	94.0	95.4	
Toluene-D8	2037-26-5	0.2	%	81.0	98.7	95.4	97.7	
4-Bromofluorobenzene	460-00-4	0.2	%	95.0	102	99.8	102	

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	BH201_1.5-1.6	BH201_2.0-2.1	BH201_2.45-2.5	BH201_3.0-3.1	BH201_3.5-3.6
	Cl	ient sampl	ing date / time	04-Sep-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1826044-018	ES1826044-019	ES1826044-020	ES1826044-021	ES1826044-022
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
рН (F)		0.1	pH Unit	6.3	6.1	6.2	6.2	6.2
pH (Fox)		0.1	pH Unit	2.9	2.6	2.6	1.8	2.5
Reaction Rate		1	Reaction Unit	2	2	2	3	3

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	BH201_3.9-4.0	BH201_4.5-4.6	BH201_4.9-5.0	BH202_0.02-0.2	BH202_0.45-0.5
(Client sampling date / time		04-Sep-2018 00:00					
Compound	CAS Number	LOR	Unit	ES1826044-023	ES1826044-024	ES1826044-025	ES1826044-027	ES1826044-029
Compound	er te ritamber			Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
pH (F)		0.1	pH Unit	6.3	6.2	6.0		
pH (Fox)		0.1	pH Unit	2.3	2.4	2.2		
Reaction Rate		1	Reaction Unit	2	2	2		
EA055: Moisture Content (Dried @								
Moisture Content		1.0	%				22.0	13.3
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg				34	9
Cadmium	7440-38-2	1	mg/kg				2	<1
Chromium	7440-43-9	2	mg/kg				13	4
Copper	7440-47-3	5	mg/kg				170	60
Lead	7440-50-8	5	mg/kg				395	73
Nickel	7439-92-1	2	mg/kg				10	3
Zinc		5	mg/kg				2360	896
	7440-66-6	5	iiig/kg				2300	030
EG035T: Total Recoverable Mercur		2 4						
Mercury	7439-97-6	0.1	mg/kg				<0.1	<0.1
EP066: Polychlorinated Biphenyls ((PCB)							
Total Polychlorinated biphenyls		0.1	mg/kg				<0.1	<0.1
EP068A: Organochlorine Pesticides	s (OC)							
alpha-BHC	319-84-6	0.05	mg/kg				<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg				<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg				<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg				<0 <u>.</u> 05	<0.05
delta-BHC	319-86-8	0.05	mg/kg				<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg				<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg				<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg				<0.05	<0.05
^ Total Chlordane (sum)		0.05	mg/kg				<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg				<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg				<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg				<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg				<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg				<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg				<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg				<0.05	<0.05

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH201_3.9-4.0	BH201_4.5-4.6	BH201_4.9-5.0	BH202_0.02-0.2	BH202_0.45-0.5
	Cl	lient samplii	ng date / time	04-Sep-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1826044-023	ES1826044-024	ES1826044-025	ES1826044-027	ES1826044-029
Compound	ente Namber			Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticide	es (OC) - Continued							
^ Endosulfan (sum)	115-29-7	0.05	mg/kg				<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg				<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg				<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg				<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg				<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg				<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg				<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg				<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.05	mg/kg				<0.05	<0.05
	0-2							
EP075(SIM)B: Polynuclear Aromat	tic 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				4.3	3.2
Anthracene	120-12-7	0.5	mg/kg				1.0	<0.5
Fluoranthene	206-44-0	0.5	mg/kg				12.1	1.9
Pyrene	129-00-0	0.5	mg/kg				11.0	1.4
Benz(a)anthracene	56-55-3	0.5	mg/kg				5.1	0.8
Chrysene	218-01-9	0.5	mg/kg				5.6	0.8
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg				8.0	0.6
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg				3.0	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg				6.0	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg				3.3	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg				0.9	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg				4.1	<0.5
^ Sum of polycyclic aromatic hydroca	rbons	0.5	mg/kg				64.4	8.7
^ Benzo(a)pyrene TEQ (zero)		0.5	mg/kg				8.9	<0.5
^ Benzo(a)pyrene TEQ (half LOR)		0.5	mg/kg				8.9	0.7
^ Benzo(a)pyrene TEQ (LOR)		0.5	mg/kg				8.9	1.2
EP080/071: Total Petroleum Hydro	ocarbons							
C6 - C9 Fraction		10	mg/kg				<10	<10
C10 - C14 Fraction		50	mg/kg				<50	<50
C15 - C28 Fraction		100	mg/kg				220	500

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Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			BH201_3.9-4.0	BH201_4.5-4.6	BH201_4.9-5.0	BH202_0.02-0.2	BH202_0.45-0.5
· ,	Cl	ient sampli	ng date / time	04-Sep-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1826044-023	ES1826044-024	ES1826044-025	ES1826044-027	ES1826044-029
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydroca	rbons - Continued							
C29 - C36 Fraction		100	mg/kg				210	230
^ C10 - C36 Fraction (sum)		50	mg/kg				430	730
EP080/071: Total Recoverable Hydro	carbons - NEPM 201	3 Fractio	ns					
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	90
>C16 - C34 Fraction		100	mg/kg				350	620
>C34 - C40 Fraction		100	mg/kg				190	160
>C10 - C40 Fraction (sum)		50	mg/kg				540	870
^ >C10 - C16 Fraction minus Naphthalene	;	50	mg/kg				<50	90
(F2)								
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
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%				112	116
EP068S: Organochlorine Pesticide S	urrogate							
Dibromo-DDE	21655-73-2	0.05	%				130	92.5
EP068T: Organophosphorus Pesticio	le Surrogate							
DEF	78-48-8	0.05	%				101	68.7
EP075(SIM)S: Phenolic Compound S	urrogates							
Phenol-d6	13127-88-3	0.5	%				78.5	77.0
2-Chlorophenol-D4	93951-73-6	0.5	%				81.2	79.6
2.4.6-Tribromophenol	118-79-6	0.5	%				71.6	70.0
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%				83.0	83.5
Anthracene-d10	1719-06-8	0.5	%				83.7	79.6

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH201_3.9-4.0	BH201_4.5-4.6	BH201_4.9-5.0	BH202_0.02-0.2	BH202_0.45-0.5
	Cli	ent sampli	ng date / time	04-Sep-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1826044-023	ES1826044-024	ES1826044-025	ES1826044-027	ES1826044-029
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
4-Terphenyl-d14	1718-51-0	0.5	%				76.5	76.2
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%				93.8	86.8
Toluene-D8	2037-26-5	0.2	%				93.5	90.8
4-Bromofluorobenzene	460-00-4	0.2	%				97.4	84.2

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	BH202_0.95-1.0	BH202_1.5-1.6	BH202_2.0-2.1	BH202_2.45-2.5	BH202_3.0-3.1
	Cl	ient sampli	ing date / time	04-Sep-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1826044-030	ES1826044-031	ES1826044-032	ES1826044-033	ES1826044-034
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
рН (F)		0.1	pH Unit	6.4	6.7	6.6	6.5	6.8
pH (Fox)		0.1	pH Unit	3.2	2.0	1.6	1.5	2.3
Reaction Rate		1	Reaction Unit	3	4	4	4	4

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	BH202_3.5-3.6	BH202_3.9-4.0	BH202_4.5-4.6	BH202_4.9-5.0	FD15
	Client sampling date / time		04-Sep-2018 00:00					
Compound	CAS Number	LOR	Unit	ES1826044-035	ES1826044-036	ES1826044-037	ES1826044-038	ES1826044-039
				Result	Result	Result	Result	Result
EA003 :pH (field/fox)								
pH (F)		0.1	pH Unit	6.8	6.9	6.8	6.9	
pH (Fox)		0.1	pH Unit	2.1	2.1	2.3	2.2	
Reaction Rate		1	Reaction Unit	4	4	2	2	
EA055: Moisture Content (Driec	d @ 105-110°C)							
Moisture Content		1.0	%					25.5
EG005T: Total Metals by ICP-AE	ES							
Arsenic	7440-38-2	5	mg/kg					54
Cadmium	7440-43-9	1	mg/kg					1
Chromium	7440-47-3	2	mg/kg					11
Copper	7440-50-8	5	mg/kg					143
Lead	7439-92-1	5	mg/kg					287
Nickel	7440-02-0	2	mg/kg					9
Zinc	7440-66-6	5	mg/kg					1610
EG035T: Total Recoverable Me	ercury by FIMS							
Mercury	7439-97-6	0.1	mg/kg					<0.1
EP075(SIM)B: Polynuclear Aron	natic Hydrocarbons							
Naphthalene	91-20-3	0.5	mg/kg					<0.5
Acenaphthylene	208-96-8	0.5	mg/kg					<0.5
Acenaphthene	83-32-9	0.5	mg/kg					<0.5
Fluorene	86-73-7	0.5	mg/kg					<0.5
Phenanthrene	85-01-8	0.5	mg/kg					3.5
Anthracene	120-12-7	0.5	mg/kg					0.6
Fluoranthene	206-44-0	0.5	mg/kg					8.6
Pyrene	129-00-0	0.5	mg/kg					7.9
Benz(a)anthracene	56-55-3	0.5	mg/kg					3.7
Chrysene	218-01-9	0.5	mg/kg					4.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg					5.7
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg					1.8
Benzo(a)pyrene	50-32-8	0.5	mg/kg					4.2
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg					2.0
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg					0.6
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg					2.5
Sum of polycyclic aromatic hydro	ocarbons	0.5	mg/kg					45.1
[^] Benzo(a)pyrene TEQ (zero)		0.5	mg/kg					6.2

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Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			BH202_3.5-3.6	BH202_3.9-4.0	BH202_4.5-4.6	BH202_4.9-5.0	FD15
	Client sampling date / time		04-Sep-2018 00:00					
Compound	CAS Number	LOR	Unit	ES1826044-035	ES1826044-036	ES1826044-037	ES1826044-038	ES1826044-039
compound				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hy	drocarbone Cont	inuod		Köödit	rtoourt	rtoour	rtoourt	rtoourt
[^] Benzo(a)pyrene TEQ (half LOR)		0.5	mg/kg					6,2
^ Benzo(a)pyrene TEQ (LOR)		0.5	mg/kg					6.2
EP080/071: Total Petroleum Hydrocarb								
C6 - C9 Fraction		10	mg/kg					<10
C10 - C14 Fraction		50	mg/kg					<50
C15 - C28 Fraction		100	mg/kg					300
C29 - C36 Fraction		100	mg/kg					220
^ C10 - C36 Fraction (sum)		50	mg/kg					520
EP080/071: Total Recoverable Hydroca C6 - C10 Fraction	C6_C10	3 Fraction 10	ns mg/kg					<10
[^] C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg					<10
(F1)	CO_CIU-BIEX	10	mg/kg					10
>C10 - C16 Fraction		50	mg/kg					<50
>C16 - C34 Fraction		100	mg/kg					430
>C34 - C40 Fraction		100	mg/kg					190
^ >C10 - C40 Fraction (sum)		50	mg/kg					620
 >C10 - C16 Fraction minus Naphthalene 		50	mg/kg					<50
(F2)								
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg					<0.2
Toluene	108-88-3	0.5	mg/kg					<0.5
Ethylbenzene	100-41-4	0.5	mg/kg					<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg					<0.5
ortho-Xylene	95-47-6	0.5	mg/kg					<0.5
Sum of BTEX		0.2	mg/kg					<0.2
^ Total Xylenes		0.5	mg/kg					<0.5
Naphthalene	91-20-3	1	mg/kg					<1
EP075(SIM)S: Phenolic Compound Sur	rogates							
Phenol-d6	13127-88-3	0.5	%					77.0
2-Chlorophenol-D4	93951-73-6	0.5	%					80.1
2.4.6-Tribromophenol	118-79-6	0.5	%					73.7
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%					81.7
Anthracene-d10	1719-06-8	0.5	%					82.2

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH202_3.5-3.6	BH202_3.9-4.0	BH202_4.5-4.6	BH202_4.9-5.0	FD15
	Cli	ent sampli	ng date / time	04-Sep-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1826044-035	ES1826044-036	ES1826044-037	ES1826044-038	ES1826044-039
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
4-Terphenyl-d14	1718-51-0	0.5	%					75.8
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%					87.1
Toluene-D8	2037-26-5	0.2	%					87.8
4-Bromofluorobenzene	460-00-4	0.2	%					90.6

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Sub-Matrix: SOIL (Matrix: SOIL)					BH304_0.45-0.5	BH303_0.0-0.2	
	Client sampling date / time			04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1826044-040	ES1826044-042	ES1826044-045	
				Result	Result	Result	
EA002: pH 1:5 (Soils)							
pH Value		0.1	pH Unit			6.0	
EA055: Moisture Content (Dried	@ 105-110°C)						
Moisture Content		1.0	%	10.4	9.7	12.6	
ED007: Exchangeable Cations							
Exchangeable Calcium		0.1	meq/100g			6.8	
Exchangeable Magnesium		0.1	meq/100g			6.0	
Exchangeable Potassium		0.1	meq/100g			0.6	
Exchangeable Sodium		0.1	meq/100g			0.6	
Cation Exchange Capacity		0.1	meq/100g			14.0	
Exchangeable Sodium Percent		0.1	%			4.5	
EG005T: Total Metals by ICP-AE	S III						
Arsenic	7440-38-2	5	mg/kg	<5	6	8	
Cadmium	7440-43-9	1	mg/kg	1	2	<1	
Chromium	7440-47-3	2	mg/kg	4	4	6	
Copper	7440-50-8	5	mg/kg	6	<5	12	
Lead	7439-92-1	5	mg/kg	87	63	34	
Nickel	7440-02-0	2	mg/kg	3	<2	3	
Zinc	7440-66-6	5	mg/kg	92	103	125	
EG035T: Total Recoverable Mer	cury by FIMS						
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	
P075(SIM)B: Polynuclear Aroma	atic Hydrocarbons						
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH304_0.0-0.2	BH304_0.45-0.5	BH303_0.0-0.2	
	Client sampling date / time			04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1826044-040	ES1826044-042	ES1826044-045	
Compound			-	Result	Result	Result	
EP075(SIM)B: Polynuclear Aromatic Hyd	Irocarbons - Cont	inued					
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	
^ Sum of polycyclic aromatic hydrocarbons		0.5	mg/kg	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (half LOR)		0.5	mg/kg	0.6	0.6	0.6	
^ Benzo(a)pyrene TEQ (LOR)		0.5	mg/kg	1.2	1.2	1.2	
EP080/071: Total Petroleum Hydrocarbo	ns						
C6 - C9 Fraction		10	mg/kg	<10	<10	<10	
C10 - C14 Fraction		50	mg/kg	<50	<50	<50	
C15 - C28 Fraction		100	mg/kg	<100	<100	<100	
C29 - C36 Fraction		100	mg/kg	<100	<100	<100	
[^] C10 - C36 Fraction (sum)		50	mg/kg	<50	<50	<50	
EP080/071: Total Recoverable Hydrocarl	bons - NEPM 201	3 Fractio	ns				
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	
[^] C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg	<10	<10	<10	
(F1)							
>C10 - C16 Fraction		50	mg/kg	<50	<50	<50	
>C16 - C34 Fraction		100	mg/kg	100	<100	<100	
>C34 - C40 Fraction		100	mg/kg	<100	<100	<100	
^ >C10 - C40 Fraction (sum)		50	mg/kg	100	<50	<50	
^ >C10 - C16 Fraction minus Naphthalene		50	mg/kg	<50	<50	<50	
(F2)							
EP080: BTEXN							
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0 <u>.</u> 5	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	
	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	
^ Sum of BTEX		0.2	mg/kg	<0.2	<0.2	<0.2	
^ Total Xylenes		0.5	mg/kg	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	
EP075(SIM)S: Phenolic Compound Surro	ogates						
Phenol-d6	13127-88-3	0.5	%	77.6	77.8	78.8	

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Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			BH304_0.0-0.2	BH304_0.45-0.5	BH303_0.0-0.2	
	Cli	ent sampli	ing date / time	04-Sep-2018 00:00	04-Sep-2018 00:00	04-Sep-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1826044-040	ES1826044-042	ES1826044-045	
				Result	Result	Result	
EP075(SIM)S: Phenolic Compound Surr	ogates - Continued						
2-Chlorophenol-D4	93951-73-6	0.5	%	81.2	81.7	81.2	
2.4.6-Tribromophenol	118-79-6	0.5	%	77.2	69.7	68.6	
EP075(SIM)T: PAH Surrogates							
2-Fluorobiphenyl	321-60-8	0.5	%	83.0	83.6	83.3	
Anthracene-d10	1719-06-8	0.5	%	86.4	86.5	86.2	
4-Terphenyl-d14	1718-51-0	0.5	%	77.6	77.9	77.6	
EP080S: TPH(V)/BTEX Surrogates							
1.2-Dichloroethane-D4	17060-07-0	0.2	%	102	95.8	96.6	
Toluene-D8	2037-26-5	0.2	%	98.7	95.6	95.9	
4-Bromofluorobenzene	460-00-4	0.2	%	106	99.6	101	

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Surrogate Control Limits

Sub-Matrix: SOIL		Recovery	Limits (%)
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130



QUALITY CONTROL REPORT

Work Order	: ES1826044	Page	: 1 of 9	
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydne	у
Contact	: MS ALISON MONKLEY	Contact	: Brenda Hong	-
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smi	thfield NSW Australia 2164
Telephone	:	Telephone	: (02) 8784 8504	
Project	: 2219573	Date Samples Received	: 04-Sep-2018	
Order number	:	Date Analysis Commenced	18-Sep-2018	Martin A
C-O-C number	:	Issue Date	24-Sep-2018	
Sampler	: JULIAN FOWLER			Hac-MRA NATA
Site	:			
Quote number	: EN/005/18			The Calut
No. of samples received	: 56			Accredited for compliance with
No. of samples analysed	: 28			ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full. This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
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General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL						Laboratory I	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA002: pH 1:5 (Soils	s) (QC Lot: 1936505)								
ES1826044-014	BH201_0.0-0.2	EA002: pH Value		0.1	pH Unit	6.3	6.2	0.00	0% - 20%
ES1827443-001	Anonymous	EA002: pH Value		0.1	pH Unit	5.9	5.8	0.00	0% - 20%
EA003 :pH (field/fox) (QC Lot: 1939661)								
EM1814915-001	Anonymous	EA003: pH (F)		0.1	pH Unit	7.8	7.8	0.00	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	4.8	4.8	0.00	0% - 20%
ES1826044-021	BH201_3.0-3.1	EA003: pH (F)		0.1	pH Unit	6.2	6.1	1.63	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	1.8	1.8	0.00	0% - 50%
EA003 :pH (field/fox) (QC Lot: 1939662)								
ES1826044-036	BH202_3.9-4.0	EA003: pH (F)		0.1	pH Unit	6.9	6.9	0.00	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	2.1	2.2	4.65	0% - 20%
EA055: Moisture Co	ntent (Dried @ 105-110°C)	QC Lot: 1937107)							
ES1826044-003	BHA303_0.45-0.5	EA055: Moisture Content		0.1	%	21.3	20.3	4.94	0% - 20%
ES1826547-007	Anonymous	EA055: Moisture Content		0.1	%	5.9	5.7	3.00	No Limit
ED007: Exchangeab	le Cations (QC Lot: 194186	8)							
ES1826044-014	BH201_0.0-0.2	ED007: Exchangeable Sodium Percent		0.1	%	5.7	5.7	0.00	0% - 20%
		ED007: Exchangeable Calcium		0.1	meq/100g	4.6	4.5	0.00	0% - 20%
		ED007: Exchangeable Magnesium		0.1	meq/100g	2.7	2.6	0.00	0% - 20%
		ED007: Exchangeable Potassium		0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED007: Exchangeable Sodium		0.1	meq/100g	0.4	0.4	0.00	No Limit
		ED007: Cation Exchange Capacity		0.1	meq/100g	7.9	7.8	0.00	0% - 20%
ES1827443-004	Anonymous	ED007: Exchangeable Sodium Percent		0.1	%	5.7	5.4	5.40	0% - 20%
		ED007: Exchangeable Calcium		0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED007: Exchangeable Magnesium		0.1	meq/100g	0.8	0.8	0.00	No Limit
		ED007: Exchangeable Potassium		0.1	meq/100g	0.2	0.2	0.00	No Limit

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Project	2219573



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)	
ED007: Exchangeab	e Cations (QC Lot: 19	41868) - continued								
ES1827443-004	Anonymous	ED007: Exchangeable Sodium		0.1	meq/100g	<0.1	<0.1	0.00	No Limit	
		ED007: Cation Exchange Capacity		0.1	meq/100g	1.0	1.0	0.00	0% - 50%	
EG005T: Total Meta	Is by ICP-AES (QC Lot:	1940870)								
ES1826044-001	BHA303_0.0-0.2	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit	
	_	EG005T: Chromium	7440-47-3	2	mg/kg	8	9	0.00	No Limit	
		EG005T: Nickel	7440-02-0	2	mg/kg	8	7	0.00	No Limit	
		EG005T: Arsenic	7440-38-2	5	mg/kg	9	8	0.00	No Limit	
		EG005T: Copper	7440-50-8	5	mg/kg	39	31	22.6	No Limit	
		EG005T: Lead	7439-92-1	5	mg/kg	54	47	12.1	0% - 50%	
		EG005T: Zinc	7440-66-6	5	mg/kg	289	258	11.4	0% - 20%	
EG035T: Total Reco	overable Mercury by FIN	MS (QC Lot: 1940871)								
ES1826044-001	BHA303 0.0-0.2	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit	
	ated Biphenyls (PCB) (
ES1826044-014	BH201 0.0-0.2	EP066: Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	<0.1	0.00	No Limit	
	_			0.1	mg/kg	-0.1	-0.1	0.00		
	orine Pesticides (OC) (040.04.0	0.05		10.05	10.05	0.00	Nie Lineit	
ES1826044-014	BH201_0.0-0.2	EP068: alpha-BHC	319-84-6	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit	
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit	
		EP068: beta-BHC	319-85-7	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit	
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit	
		EP068: delta-BHC	319-86-8	0.05	mg/kg	< 0.05	<0.05	0.00	No Limit	
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit	
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	< 0.05	0.00	No Limit	
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	< 0.05	0.00	No Limit	
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	< 0.05	0.00	No Limit	
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit	
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	< 0.05	< 0.05	0.00	No Limit	
		EP068: Dieldrin	60-57-1 72-55-9	0.05	mg/kg	< 0.05	<0.05 <0.05	0.00	No Limit No Limit	
		EP068: 4.4`-DDE		0.05	mg/kg	< 0.05				
		EP068: Endrin	72-20-8 33213-65-9	0.05	mg/kg	<0.05	<0.05 <0.05	0.00	No Limit No Limit	
		EP068: beta-Endosulfan	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit	
		EP068: 4.4`-DDD	72-54-8		mg/kg		<0.05			
		EP068: Endrin aldehyde	1031-07-8	0.05	mg/kg	<0.05 <0.05	<0.05	0.00	No Limit No Limit	
		EP068: Endosulfan sulfate	1031-07-8 53494-70-5	0.05	mg/kg	<0.05	<0.05			
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit No Limit	
		EP068: 4.4'-DDT	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit No Limit	
		EP068: Methoxychlor	/ 2-43-5	0.2	mg/kg	<u><u></u> </u>	<u> ~U.2</u>	0.00		
		carbons (QC Lot: 1935862)								
ES1826044-014	BH201_0.0-0.2	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	

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Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)	
EP075(SIM)B: Polyr	nuclear Aromatic Hydro	carbons (QC Lot: 1935862) - continued								
ES1826044-014	BH201_0.0-0.2	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	1.0	1.5	43.5	No Limit	
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	1.0	1.5	41.9	No Limit	
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	0.6	0.00	No Limit	
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	0.6	0.8	31.4	No Limit	
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	0.8	1.2	32.6	No Limit	
			205-82-3							
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.6	0.8	30.6	No Limit	
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	0.6	0.00	No Limit	
		EP075(SIM): Sum of polycyclic aromatic		0.5	mg/kg	4.0	# 7 <u>.</u> 0	54.5	0% - 50%	
		hydrocarbons								
		EP075(SIM): Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	0.7	1.0	36.7	No Limit	
EP080/071: Total Pe	troleum Hydrocarbons	(QC Lot: 1935863)								
ES1826044-014	BH201_0.0-0.2	EP071: C15 - C28 Fraction		100	mg/kg	<100	<100	0.00	No Limit	
		EP071: C29 - C36 Fraction		100	mg/kg	<100	<100	0.00	No Limit	
		EP071: C10 - C14 Fraction		50	mg/kg	<50	<50	0.00	No Limit	
EP080/071: Total Pe	troleum Hydrocarbons	(QC Lot: 1936161)								
ES1826044-001	BHA303 0.0-0.2	EP080: C6 - C9 Fraction		10	mg/kg	<10	<10	0.00	No Limit	
ES1826044-045	BH303_0.0-0.2	EP080: C6 - C9 Fraction		10	mg/kg	<10	<10	0.00	No Limit	
EP080/071: Total Re	ecoverable Hvdrocarbo	ns - NEPM 2013 Fractions (QC Lot: 1935863)								
ES1826044-014	BH201 0.0-0.2	EP071: >C16 - C34 Fraction		100	mg/kg	<100	<100	0.00	No Limit	
201020011011	<u>Di 120 i _</u> 010 012	EP071: >C34 - C40 Fraction		100	mg/kg	<100	<100	0.00	No Limit	
		EP071: >C10 - C16 Fraction		50	mg/kg	<50	<50	0.00	No Limit	
EP080/071: Total Re	coverable Hydrocarbo	ns - NEPM 2013 Fractions (QC Lot: 1936161)								
ES1826044-001	BHA303 0.0-0.2		C6 C10	10	ma/ka	<10	<10	0.00	No Limit	
ES1826044-001	BH303 0.0-0.2	EP080: C6 - C10 Fraction	C6_C10 C6_C10	10	mg/kg mg/kg	<10	<10	0.00	No Limit	
	_	EP080: C6 - C10 Fraction	00_010	10	iiig/kg	<10	<10	0.00		
EP080: BTEXN (QC										
ES1826044-001	BHA303_0.0-0.2	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit	
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	< 0.5	<0.5	0.00	No Limit	
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	

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Sub-Matrix: SOIL	Sub-Matrix: SOIL			Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC	Lot: 1936161) - continued								
ES1826044-001	BHA303_0.0-0.2	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1826044-045	BH303_0.0-0.2	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit



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

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

Sub-Matrix: SOIL		Method Blank (MB)			Laboratory Control Spike (LCS) Report			
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED007: Exchangeable Cations (QCLot: 1941868								
ED007: Exchangeable Calcium		0.1	meq/100g	<0.1	1 meq/100g	93.0	76	120
ED007: Exchangeable Magnesium		0.1	meq/100g	<0.1	1.67 meq/100g	94.0	75	115
ED007: Exchangeable Potassium		0.1	meq/100g	<0.1	0.51 meq/100g	94.7	80	120
ED007: Exchangeable Sodium		0.1	meq/100g	<0.1	0.87 meq/100g	92.0	80	120
ED007: Cation Exchange Capacity		0.1	meq/100g	<0.1				
ED007: Exchangeable Sodium Percent		0.1	%	<0.1				
EG005T: Total Metals by ICP-AES (QCLot: 1940	870)							
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	96.2	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	95.2	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	89.4	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	96.0	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	94.2	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	99.2	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	107	80	122
EG035T: Total Recoverable Mercury by FIMS (0	QCLot: 1940871)							
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	76.6	70	105
EP066: Polychlorinated Biphenyls (PCB) (QCLo	ot: 1935865)							
EP066: Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	1 mg/kg	125	62	126
EP068A: Organochlorine Pesticides (OC) (QCLo	ot: 1935864)							
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	101	69	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	99.3	65	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	97.1	67	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	100	68	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	102	65	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.1	67	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	102	69	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	107	62	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	104	63	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	106	66	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	108	64	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	104	66	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	106	67	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	107	67	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	< 0.05	0.5 mg/kg	108	69	115

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Sub-Matrix: SOIL				Method Blank (MB)		Laboratory Control Spike (LCS) Report		
			1	Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC)(QCL	Lot: 1935864) - continued							
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	98.3	69	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	92.2	56	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	104	62	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	104	66	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	104	64	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	101	54	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarb	oons (QCLot: 1935862)							
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	111	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	106	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	107	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	108	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	110	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	113	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	114	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	117	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	98.9	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0 <u>.</u> 5	6 mg/kg	103	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	92.9	68	116
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	101	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	101	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	77.7	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	80.8	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	73.5	63	121
EP080/071: Total Petroleum Hydrocarbons(Q0	CLot: 1935863)							
EP071: C10 - C14 Fraction		50	mg/kg	<50	300 mg/kg	102	75	129
EP071: C15 - C28 Fraction		100	mg/kg	<100	450 mg/kg	106	77	131
EP071: C29 - C36 Fraction		100	mg/kg	<100	300 mg/kg	104	71	129
EP080/071: Total Petroleum Hydrocarbons(Q0	CLot: 1936161)							
EP080: C6 - C9 Fraction		10	mg/kg	<10	26 mg/kg	86.2	68	128
EP080/071: Total Recoverable Hydrocarbons -	NEPM 2013 Eractions (OCL)	t· 1935863)						
EP071: >C10 - C16 Fraction		50	mg/kg	<50	375 mg/kg	104	77	125
EP071: >C16 - C34 Fraction		100	mg/kg	<100	525 mg/kg	106	74	138
EP071: >C34 - C40 Fraction		100	mg/kg	<100	225 mg/kg	92.9	63	131
EP080/071: Total Recoverable Hydrocarbons -	NEPM 2013 Erections (OCL	+ 1036161						1
EP080/071: Total Recoverable Hydrocarbons - EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	90.3	68	128
	010		inging		o i nignig			120
EP080: BTEXN (QCLot: 1936161)	74.40.0			<0 0	d	00.5	60	4.10
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	93.5	62	116

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Sub-Matrix: SOIL			Method Blank (MB)	Laboratory Control Spike (LCS) Report				
			Report	Spike	Spike Recovery (%)	Recovery Limits (%)		
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 1936161) - continued								
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	93.2	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	94.2	65	117
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	91.5	66	118
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	93.6	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	96.1	63	119

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	SpikeRecovery(%)	Recovery I	Limits (%)	
aboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
G005T: Total Met	tals by ICP-AES (QCLot: 1940870)							
ES1826044-001	BHA303_0.0-0.2	EG005T: Arsenic	7440-38-2	50 mg/kg	97.8	70	130	
		EG005T: Cadmium	7440-43-9	50 mg/kg	97.3	70	130	
		EG005T: Chromium	7440-47-3	50 mg/kg	96.6	70	130	
		EG005T: Copper	7440-50-8	250 mg/kg	94.5	70	130	
		EG005T: Lead	7439-92-1	250 mg/kg	95.0	70	130	
		EG005T: Nickel	7440-02-0	50 mg/kg	97.0	70	130	
		EG005T: Zinc	7440-66-6	250 mg/kg	97.4	70	130	
EG035T: Total Re	ecoverable Mercury by FIMS(QCLot: 194087	1)						
ES1826044-001	BHA303_0.0-0.2	EG035T: Mercury	7439-97-6	5 mg/kg	76.6	70	130	
EP066: Polychlori	inated Biphenyls (PCB) (QCLot: 1935865)							
ES1826044-014	BH201_0.0-0.2	EP066: Total Polychlorinated biphenyls		1 mg/kg	104	70	130	
EP068A: Organoc	hlorine Pesticides (OC) (QCLot: 1935864)							
ES1826044-014	BH201_0.0-0.2	EP068: gamma-BHC	58-89-9	0.5 mg/kg	107	70	130	
		EP068: Heptachlor	76-44-8	0.5 mg/kg	94.6	70	130	
		EP068: Aldrin	309-00-2	0.5 mg/kg	89.9	70	130	
		EP068: Dieldrin	60-57-1	0.5 mg/kg	96.2	70	130	
		EP068: Endrin	72-20-8	2 mg/kg	99.2	70	130	
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	96.3	70	130	
P075(SIM)B: Poly	ynuclear Aromatic Hydrocarbons (QCLot: 1	935862)						
ES1826044-014	BH201_0.0-0.2	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	96.0	70	130	
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	112	70	130	

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ub-Matrix: SOIL			Matrix Spike (MS) Report						
				Spike	SpikeRecovery(%)	Recovery L	.imits (%)		
aboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High		
EP080/071: Total	Petroleum Hydrocarbons (QCLot: 1935863) - continເ	ed							
ES1826044-014	BH201_0.0-0.2	EP071: C10 - C14 Fraction		523 mg/kg	112	73	137		
		EP071: C15 - C28 Fraction -		2319 mg/kg	124	53	131		
		EP071: C29 - C36 Fraction -		1714 mg/kg	128	52	132		
EP080/071: Total	Petroleum Hydrocarbons (QCLot: 1936161)								
ES1826044-001	BHA303_0.0-0.2	EP080: C6 - C9 Fraction		32.5 mg/kg	75.4	70	130		
EP080/071: Total	Recoverable Hydrocarbons - NEPM 2013 Fractions(CLot: 1935863)							
ES1826044-014	BH201_0.0-0.2	EP071: >C10 - C16 Fraction -		860 mg/kg	103	73	137		
		EP071: >C16 - C34 Fraction -		3223 mg/kg	116	53	131		
		EP071: >C34 - C40 Fraction -		1058 mg/kg	118	52	132		
EP080/071: Total	Recoverable Hydrocarbons - NEPM 2013 Fractions(QCLot: 1936161)							
ES1826044-001	BHA303_0.0-0.2	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	74.1	70	130		
EP080: BTEXN (G	QCLot: 1936161)								
ES1826044-001	BHA303_0.0-0.2	EP080: Benzene	71-43-2	2.5 mg/kg	77.6	70	130		
		EP080: Toluene	108-88-3	2.5 mg/kg	78.7	70	130		
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	82.2	70	130		
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	79.9	70	130		
		· · · · · · · · · · · · · · · · · · ·	106-42-3						
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	84.7	70	130		
		EP080: Naphthalene	91-20-3	2.5 mg/kg	81.2	70	130		



	QA/QC Compliand	ce Assessment to assist with	n Quality Review	
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Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney	
Contact	: MS ALISON MONKLEY	Telephone	: (02) 8784 8504	
Project	: 2219573	Date Samples Received	: 04-Sep-2018	
Site	:	Issue Date	: 24-Sep-2018	
Sampler	: JULIAN FOWLER	No. of samples received	: 56	
Order number	:	No. of samples analysed	: 28	

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- <u>NO</u> Method Blank value outliers occur.
- <u>NO</u> Laboratory Control outliers occur.
- <u>NO</u> Matrix Spike outliers occur.
- Duplicate outliers exist please see following pages for full details.
- For all regular sample matrices, <u>NO</u> surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

• <u>NO</u> Quality Control Sample Frequency Outliers exist.

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Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: SOIL

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	ES1826044014	BH201_0.0-0.2	Sum of polycyclic		54.5 %	0% - 50%	RPD exceeds LOR based limits
			aromatic				
			hydrocarbons				

Outliers : Analysis Holding Time Compliance

Matrix: SOIL							
Method		Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved							
BH201_0.0-0.2,	BH303_0.0-0.2	19-Sep-2018	11-Sep-2018	8			
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved							
BHA303_0.0-0.2,	BHA303_0.45-0.5,				19-Sep-2018	18-Sep-2018	1
BH201_0.0-0.2,	BH201_0.45-0.5,						
BH202_0.02-0.2,	BH202_0.45-0.5,						
FD15,	BH304_0.0-0.2,						
BH304_0.45-0.5,	BH303_0.0-0.2						
EP080/071: Total Recoverable Hydrocarbons - NEF	M 2013 Fractions						
Soil Glass Jar - Unpreserved							
BHA303_0.0-0.2,	BHA303_0.45-0.5,				19-Sep-2018	18-Sep-2018	1
BH201_0.0-0.2,	BH201_0.45-0.5,						
BH202_0.02-0.2,	BH202_0.45-0.5,						
FD15,	BH304_0.0-0.2,						
BH304_0.45-0.5,	BH303_0.0-0.2						
EP080: BTEXN							
Soil Glass Jar - Unpreserved							
BHA303_0.0-0.2,	BHA303_0.45-0.5,				19-Sep-2018	18-Sep-2018	1
BH201_0.0-0.2,	BH201_0.45-0.5,						
BH202_0.02-0.2,	BH202_0.45-0.5,						
FD15,	BH304_0.0-0.2,						
BH304_0.45-0.5,	BH303_0.0-0.2						

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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 <u>VOC in soils</u> 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 <u>or</u> Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: SOIL					Evaluation	n: 🗶 = Holding time	e breach ; ✓ = Withi	n holding time
Method		Sample Date	E	xtraction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002)								
BH201_0.0-0.2,	BH303_0.0-0.2	04-Sep-2018	19-Sep-2018	11-Sep-2018	*	19-Sep-2018	19-Sep-2018	\checkmark
EA003 :pH (field/fox)								
Snap Lock Bag - frozen on receipt at ALS (EA00	•							
BH201_0.95-1.0,	BH201_1.5-1.6,	04-Sep-2018	20-Sep-2018	30-May-2021	1	20-Sep-2018	19-Dec-2018	✓
BH201_2.0-2.1,	BH201_2.45-2.5,							
BH201_3.0-3.1,	BH201_3.5-3.6,							
BH201_3.9-4.0,	BH201_4.5-4.6,							
BH201_4.9-5.0,	BH202_0.95-1.0,							
BH202_1.5-1.6,	BH202_2.0-2.1,							
BH202_2.45-2.5,	BH202_3.0-3.1,							
BH202_3.5-3.6,	BH202_3.9-4.0,							
BH202_4.5-4.6,	BH202_4.9-5.0							
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BHA303_0.0-0.2,	BHA303_0.45-0.5,	04-Sep-2018				18-Sep-2018	18-Sep-2018	✓
BH201_0.0-0.2,	BH201_0.45-0.5,							
BH202_0.02-0.2,	BH202_0.45-0.5,							
FD15,	BH304_0.0-0.2,							
BH304_0.45-0.5,	BH303_0.0-0.2							
ED007: Exchangeable Cations								
Soil Glass Jar - Unpreserved (ED007)								
BH201_0.0-0.2,	BH303_0.0-0.2	04-Sep-2018	20-Sep-2018	02-Oct-2018	✓	20-Sep-2018	02-Oct-2018	
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BHA303_0.0-0.2,	BHA303_0.45-0.5,	04-Sep-2018	20-Sep-2018	03-Mar-2019	 ✓ 	20-Sep-2018	03-Mar-2019	✓
BH201_0.0-0.2,	BH201_0.45-0.5,							
BH202_0.02-0.2,	BH202_0.45-0.5,							
FD15,	BH304_0.0-0.2,							
BH304_0.45-0.5,	BH303_0.0-0.2							

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Matrix: SOIL					Evaluation	n: × = Holding time	breach ; 🗸 = Withi	n holding time
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BHA303_0.0-0.2,	BHA303_0.45-0.5,	04-Sep-2018	20-Sep-2018	02-Oct-2018	1	20-Sep-2018	02-Oct-2018	✓
BH201_0.0-0.2,	BH201_0.45-0.5,							
BH202_0.02-0.2,	BH202_0.45-0.5,							
FD15,	BH304_0.0-0.2,							
BH304_0.45-0.5,	BH303_0.0-0.2							
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)								
BH201_0.0-0.2,	BH201_0.45-0.5,	04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	28-Oct-2018	✓
BH202_0.02-0.2,	BH202_0.45-0.5							
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
BH201_0.0-0.2,	BH201_0.45-0.5,	04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	28-Oct-2018	✓
BH202_0.02-0.2,	BH202_0.45-0.5							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BHA303_0.0-0.2,	BHA303_0.45-0.5,	04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	28-Oct-2018	✓
BH201_0.0-0.2,	BH201_0.45-0.5,							
BH202_0.02-0.2,	BH202_0.45-0.5,							
FD15,	BH304_0.0-0.2,							
BH304_0.45-0.5,	BH303_0.0-0.2							

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Matrix: SOIL				Evaluation	: × = Holding time	breach ; ✓ = Withi	n holding time
Method	Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071) BHA303_0.0-0.2	04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	28-Oct-2018	~
Soil Glass Jar - Unpreserved (EP080) BHA303_0.0-0.2	04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	18-Sep-2018	×
Soil Glass Jar - Unpreserved (EP071) BHA303_0.45-0.5	04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	28-Oct-2018	~
Soil Glass Jar - Unpreserved (EP080) BHA303_0.45-0.5	04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	18-Sep-2018	x
Soil Glass Jar - Unpreserved (EP071) BH201_0.0-0.2	04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	28-Oct-2018	~
Soil Glass Jar - Unpreserved (EP080) BH201_0.0-0.2, BH201_0.45-0.5	04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	18-Sep-2018	×
Soil Glass Jar - Unpreserved (EP071) BH201_0.45-0.5, BH202_0.02-0.2	04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	28-Oct-2018	~
Soil Glass Jar - Unpreserved (EP080) BH202_0.02-0.2	04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	18-Sep-2018	×
Soil Glass Jar - Unpreserved (EP071) BH202_0.45-0.5	04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	28-Oct-2018	~
Soil Glass Jar - Unpreserved (EP080) BH202_0.45-0.5	04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	18-Sep-2018	×
Soil Glass Jar - Unpreserved (EP071) FD15	04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	28-Oct-2018	1
Soil Glass Jar - Unpreserved (EP080) FD15	04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	18-Sep-2018	×
Soil Glass Jar - Unpreserved (EP071) BH304_0.0-0.2	04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	28-Oct-2018	1
Soil Glass Jar - Unpreserved (EP080) BH304_0.0-0.2	04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	18-Sep-2018	×
Soil Glass Jar - Unpreserved (EP071) BH304_0.45-0.5	04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	28-Oct-2018	~
Soil Glass Jar - Unpreserved (EP080) BH304_0.45-0.5	04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	18-Sep-2018	×
Soil Glass Jar - Unpreserved (EP071) BH303_0.0-0.2	04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	28-Oct-2018	1
Soil Glass Jar - Unpreserved (EP080) BH303_0.0-0.2	04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	18-Sep-2018	x

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Matrix: SOIL					Evaluation	: × = Holding time	breach ; ✓ = Withi	n holding time.
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - N	NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP071)				40.0 0040				
BHA303_0.0-0.2		04-Sep-2018	18-Sep-2018	18-Sep-2018	✓	19-Sep-2018	28-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080) BHA303 0.0-0.2		04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	18-Sep-2018	×
Soil Glass Jar - Unpreserved (EP071)					•			
BHA303_0.45-0.5		04-Sep-2018	18-Sep-2018	18-Sep-2018	✓	19-Sep-2018	28-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080)		04.00040	40.0	10 Car 0010	,	40.0	40 0 0040	
BHA303_0.45-0.5 Soil Glass Jar - Unpreserved (EP071)		04-Sep-2018	18-Sep-2018	18-Sep-2018	✓	19-Sep-2018	18-Sep-2018	×
BH201 0.0-0.2		04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	28-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080)								
BH201_0.0-0.2,	BH201_0.45-0.5	04-Sep-2018	18-Sep-2018	18-Sep-2018	✓	19-Sep-2018	18-Sep-2018	×
Soil Glass Jar - Unpreserved (EP071)		04-Sep-2018	18-Sep-2018	18-Sep-2018		19-Sep-2018	28-Oct-2018	,
BH201_0.45-0.5, Soil Glass Jar - Unpreserved (EP080)	BH202_0.02-0.2	04-369-2018	10-3ep-2016	10-3ep-2010	~	19-3ep-2018	20-001-2010	✓
BH202 0.02-0.2		04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	18-Sep-2018	×
Soil Glass Jar - Unpreserved (EP071)								
BH202_0.45-0.5		04-Sep-2018	18-Sep-2018	18-Sep-2018	✓	19-Sep-2018	28-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080)		04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	18-Sep-2018	
BH202_0.45-0.5 Soil Glass Jar - Unpreserved (EP071)		04-36p-2010	10-3ep-2018	10-060-2010	~	13-3ep-2010	10-060-2010	*
FD15		04-Sep-2018	18-Sep-2018	18-Sep-2018	~	19-Sep-2018	28-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080)								
FD15		04-Sep-2018	18-Sep-2018	18-Sep-2018	✓	19-Sep-2018	18-Sep-2018	*
Soil Glass Jar - Unpreserved (EP071) BH304 0.0-0.2		04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	28-Oct-2018	1
Soil Glass Jar - Unpreserved (EP080)					•			V
BH304_0.0-0.2		04-Sep-2018	18-Sep-2018	18-Sep-2018	✓	19-Sep-2018	18-Sep-2018	×
Soil Glass Jar - Unpreserved (EP071)				10.0 0010				
BH304_0.45-0.5		04-Sep-2018	18-Sep-2018	18-Sep-2018	✓	19-Sep-2018	28-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH304_0.45-0.5		04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	18-Sep-2018	×
Soil Glass Jar - Unpreserved (EP071)				•			•	
BH303_0.0-0.2		04-Sep-2018	18-Sep-2018	18-Sep-2018	✓	19-Sep-2018	28-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080)			49 8-5 0040	18-Sep-2018	,	40 8-5 0040	19 Sec 2010	
BH303_0.0-0.2		04-Sep-2018	18-Sep-2018	16-Sep-2016	~	19-Sep-2018	18-Sep-2018	×
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) BHA303_0.0-0.2,	BHA303 0.45-0.5,	04-Sep-2018	18-Sep-2018	18-Sep-2018	1	19-Sep-2018	18-Sep-2018	x
BH201 0.0-0.2,	BH201 0.45-0.5,				-			*
BH202 0.02-0.2,	BH202_0.45-0.5,							
FD15.	BH304_0.0-0.2,							
BH304_0.45-0.5,	BH303 0.0-0.2							
DH004_0.40-0.0,	0.0-0.2		[

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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.

Quality Control Sample Type			ount		Rate (%)	not within specification ; \checkmark = Quality Control frequency within specificat Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
aboratory Duplicates (DUP)							
Exchangeable Cations	ED007	2	17	11.76	10.00	 Image: A second s	NEPM 2013 B3 & ALS QC Standard
Aoisture Content	EA055	2	20	10.00	10.00	1	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	10	10.00	10.00		NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	25.00	10.00		NEPM 2013 B3 & ALS QC Standard
H (1:5)	EA002	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
H field/fox	EA003	3	23	13.04	10.00		NEPM 2013 B3 & ALS QC Standard
olychlorinated Biphenyls (PCB)	EP066	1	4	25.00	10.00	1	NEPM 2013 B3 & ALS QC Standard
otal Mercury by FIMS	EG035T	1	10	10.00	10.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
otal Metals by ICP-AES	EG005T	1	10	10.00	10.00		NEPM 2013 B3 & ALS QC Standard
RH - Semivolatile Fraction	EP071	1	10	10.00	10.00		NEPM 2013 B3 & ALS QC Standard
RH Volatiles/BTEX	EP080	2	19	10.53	10.00	· · ·	NEPM 2013 B3 & ALS QC Standard
aboratory Control Samples (LCS)					1	_	
xchangeable Cations	ED007	1	17	5.88	5.00	 Image: A second s	NEPM 2013 B3 & ALS QC Standard
AH/Phenols (SIM)	EP075(SIM)	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
esticides by GCMS	EP068	1	4	25.00	5.00	~	NEPM 2013 B3 & ALS QC Standard
olychlorinated Biphenyls (PCB)	EP066	1	4	25.00	5.00	~	NEPM 2013 B3 & ALS QC Standard
otal Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
otal Metals by ICP-AES	EG005T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
RH - Semivolatile Fraction	EP071	1	10	10.00	5.00	~	NEPM 2013 B3 & ALS QC Standard
RH Volatiles/BTEX	EP080	1	19	5.26	5.00	~	NEPM 2013 B3 & ALS QC Standard
lethod Blanks (MB)							
xchangeable Cations	ED007	1	17	5.88	5.00	1	NEPM 2013 B3 & ALS QC Standard
AH/Phenols (SIM)	EP075(SIM)	1	10	10.00	5.00	~	NEPM 2013 B3 & ALS QC Standard
esticides by GCMS	EP068	1	4	25.00	5.00	1	NEPM 2013 B3 & ALS QC Standard
olychlorinated Biphenyls (PCB)	EP066	1	4	25.00	5.00	1	NEPM 2013 B3 & ALS QC Standard
otal Mercury by FIMS	EG035T	1	10	10.00	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
otal Metals by ICP-AES	EG005T	1	10	10.00	5.00	1	NEPM 2013 B3 & ALS QC Standard
RH - Semivolatile Fraction	EP071	1	10	10.00	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
RH Volatiles/BTEX	EP080	1	19	5.26	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
latrix Spikes (MS)							
AH/Phenols (SIM)	EP075(SIM)	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
esticides by GCMS	EP068	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
olychlorinated Biphenyls (PCB)	EP066	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
otal Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
otal Metals by ICP-AES	EG005T	1	10	10.00	5.00	1	NEPM 2013 B3 & ALS QC Standard
RH - Semivolatile Fraction	EP071	1	10	10.00	5.00	1	NEPM 2013 B3 & ALS QC Standard

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Quality Control Sample	е Туре		Co	ount		Rate (%)		Quality Control Specification
Analytical Methods		Method	QC	Reaular	Actual	Expected	Evaluation	
Matrix Spikes (MS)	- Continued							
TRH Volatiles/BTEX	<	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard

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Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
pH field/fox	EA003	SOIL	In house: Referenced to Ahern et al 1998 - determined on a 1:5 soil/water extract designed to simulate field measured pH and pH after the extract has been oxidised with peroxide.
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 (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons (2011) Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
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 (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. 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 (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Higginson (1992) method 15A1. A 1M NH4CI extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
Drying only	EN020D	SOIL	In house

Page	: 10 of 10
Work Order	ES1826044
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Project	2219573



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 (2013) Schedule B(3) (Method 202)
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.

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SAMPLER: Julian Fowler		BILE: 04660		RELINQUISHED	^{3Y:} 5 4	RECEIVE		~	RELINQUI	SHED BY:	RECEIVED	BY:
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CERTIFICATE OF ANALYSIS

Work Order	ES1826547	Page	: 1 of 12
Client	: GHD PTY LTD	Laboratory	Environmental Division Sydney
Contact	: MS ALISON MONKLEY	Contact	Brenda Hong
Address	: PO BOX 5403	Address	277-289 Woodpark Road Smithfield NSW Australia 2164
	NEWCASTLE WEST NSW, AUSTRALIA 2302		
Telephone	:	Telephone	: (02) 8784 8504
Project	: 2219573	Date Samples Received	: 07-Sep-2018 16:18
Order number	:	Date Analysis Commenced	18-Sep-2018
C-O-C number	:	Issue Date	22-Sep-2018 11:49
Sampler	: JULIAN FOWLER		122-Sep-2018 11:49
Site	:		
Quote number	: EN/005/18		Accreditation No. 825
No. of samples received	: 28		Accredited for compliance with
No. of samples analysed	: 11		ISO/IEC 17025 - Testing

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

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

Signatories

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

Signatories	Position	Accreditation Category	
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW	
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW	
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW	
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW	
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW	
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW	

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Work Order	ES1826547
Client	: GHD PTY LTD
Project	2219573



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

- Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 - LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- ø = ALS is not NATA accredited for these tests.
- ~ = Indicates an estimated value.
- EG035: Positive Hg result for ES1826547 #4 has been confirmed by reanalysis.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) 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.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- ED007 and ED008: When Exchangeable AI is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCI Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + AI3+).
- EA200: 'Yes' Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

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Work Order	ES1826547
Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	TP101_0.0-0.2	TP101_0.5-0.6	TP102_0.0-0.2	TP103_0.0-0.2	TP104_0.0-0.2
Client sampling		ng date / time	06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1826547-001	ES1826547-003	ES1826547-004	ES1826547-007	ES1826547-011
Sompound	on to Humbon		-	Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value		0.1	pH Unit	6.0	6.5			
EA055: Moisture Content (Dried								
Moisture Content	@ 103-110 C) 	1.0	%	3.0		11.0	5.9	<1.0
			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					
ED007: Exchangeable Cations Exchangeable Calcium		0.1	meq/100g	2.0	0.3			
Exchangeable Magnesium		0.1	meq/100g	0.4	<0.1			
Exchangeable Potassium		0.1	meq/100g	<0.1	<0.1			
Exchangeable Sodium		0.1	meq/100g	<0.1	<0.1			
Cation Exchange Capacity		0.1	meq/100g	2.5	0.4			
Exchangeable Sodium Percent		0.1	%	1.4	2,4			
		0.1	70	1.4	2.4			
EG005T: Total Metals by ICP-AE		-		-5			-5	-5
Arsenic	7440-38-2	5	mg/kg	<5		<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1		<1	<1	<1
Chromium	7440-47-3	2	mg/kg	<2		4	<2	<2
Copper	7440-50-8	5	mg/kg	6		61	<5	10
Lead	7439-92-1	5	mg/kg	6		16	<5	<5
Nickel	7440-02-0	2	mg/kg	<2		<2	<2	<2
Zinc	7440-66-6	5	mg/kg	36		38	<5	29
G035T: Total Recoverable Mer	cury by FIMS							
Mercury	7439-97-6	0.1	mg/kg	<0.1		0.3	<0.1	<0.1
EP075(SIM)B: Polynuclear Arom	atic Hydrocarbons							
Naphthalene	91-20-3	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5

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Work Order	ES1826547
Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	TP101_0.0-0.2	TP101_0.5-0.6	TP102_0.0-0.2	TP103_0.0-0.2	TP104_0.0-0.2
	Client sampling date / time		06-Sep-2018 00:00					
Compound	CAS Number	LOR	Unit	ES1826547-001	ES1826547-003	ES1826547-004	ES1826547-007	ES1826547-011
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hy	drocarbons - Cont	inued						
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons		0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
[^] Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
[^] Benzo(a)pyrene TEQ (half LOR)		0.5	mg/kg	0.6		0.6	0.6	0.6
[^] Benzo(a)pyrene TEQ (LOR)		0.5	mg/kg	1.2		1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbo	ons							
C6 - C9 Fraction		10	mg/kg	<10		<10	<10	<10
C10 - C14 Fraction		50	mg/kg	<50		<50	<50	<50
C15 - C28 Fraction		100	mg/kg	<100		<100	<100	<100
C29 - C36 Fraction		100	mg/kg	<100		<100	<100	<100
[^] C10 - C36 Fraction (sum)		50	mg/kg	<50		<50	<50	<50
EP080/071: Total Recoverable Hydroca	rbons - NEPM 201	3 Fractio	າຣ					
C6 - C10 Fraction	C6_C10	10	mg/kg	<10		<10	<10	<10
[^] C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg	<10		<10	<10	<10
(F1)	_							
>C10 - C16 Fraction		50	mg/kg	<50		<50	<50	<50
>C16 - C34 Fraction		100	mg/kg	<100		<100	<100	<100
>C34 - C40 Fraction		100	mg/kg	<100		<100	<100	<100
^ >C10 - C40 Fraction (sum)		50	mg/kg	<50		<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene		50	mg/kg	<50		<50	<50	<50
(F2)								
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2		<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
^ Sum of BTEX		0.2	mg/kg	<0.2		<0.2	<0.2	<0.2
^ Total Xylenes		0.5	mg/kg	<0.5		<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1		<1	<1	<1
EP075(SIM)S: Phenolic Compound Sur	rogates							
Phenol-d6	13127-88-3	0.5	%	85.2		79.7	78.0	77.9

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Client	: GHD PTY LTD
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Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			TP101_0.0-0.2	TP101_0.5-0.6	TP102_0.0-0.2	TP103_0.0-0.2	TP104_0.0-0.2
	Cli	ent sampli	ing date / time	06-Sep-2018 00:00				
Compound	CAS Number	LOR	Unit	ES1826547-001	ES1826547-003	ES1826547-004	ES1826547-007	ES1826547-011
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Su	rrogates - Continued							
2-Chlorophenol-D4	93951-73-6	0.5	%	89.3		82.5	82.6	81.9
2.4.6-Tribromophenol	118-79-6	0.5	%	75.9		76.7	72.8	65.4
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	99.0		90.8	91.0	91.3
Anthracene-d10	1719-06-8	0.5	%	94.1		86.5	88.0	87.2
4-Terphenyl-d14	1718-51-0	0.5	%	82.6		76.1	75.9	75.9
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	95.1		109	103	109
Toluene-D8	2037-26-5	0.2	%	94.6		108	98.5	104
4-Bromofluorobenzene	460-00-4	0.2	%	95.9		110	103	106

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	TP105_0.0-0.2	TP105_0.6-0.7	TP106_0.0-0.2	FD20	COMP 4
Client sampling date / time			06-Sep-2018 00:00 06-Sep-2018	06-Sep-2018 00:00	S-Sep-2018 00:00 06-Sep-2018 00:00	06-Sep-2018 00:00	18-Sep-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1826547-014	ES1826547-016	ES1826547-018	ES1826547-022	ES1826547-027
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value		0.1	pH Unit	6.6	6.7			
EA055: Moisture Content (Dried @ 1	05-110°C)							
Moisture Content		1.0	%	<1.0		14.9	13.8	5.3
EA200: AS 4964 - 2004 Identification								
Asbestos Detected	1332-21-4	0.1	g/kg			No		
Asbestos (Trace)	1332-21-4	5	Fibres			No		
Asbestos Type	1332-21-4	-	-			-		
Sample weight (dry)		0.01	g			348		
APPROVED IDENTIFIER:		-				C.OWLER		
ED007: Exchangeable Cations								
Exchangeable Calcium		0.1	meq/100g	0.5	6.9			
Exchangeable Magnesium		0.1	meq/100g	0.2	1.4			
Exchangeable Potassium		0.1	meq/100g	<0.1	<0.1			
Exchangeable Sodium		0.1	meq/100g	<0.1	0.2			
Cation Exchange Capacity		0.1	meq/100g	0.8	8.4			
Exchangeable Sodium Percent		0.1	%	3.8	2.0			
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5		25	20	
Cadmium	7440-43-9	1	mg/kg	<1		<1	<1	
Chromium	7440-47-3	2	mg/kg	<2		5	5	
Copper	7440-50-8	5	mg/kg	<5		194	206	
Lead	7439-92-1	5	mg/kg	<5		246	287	
Nickel	7440-02-0	2	mg/kg	<2		<2	3	
Zinc	7440-66-6	5	mg/kg	21		3130	3740	
EG035T: Total Recoverable Mercury	v by FIMS							
Mercury	7439-97-6	0.1	mg/kg	<0.1		<0.1	<0.1	
EP066: Polychlorinated Biphenyls (F								
Total Polychlorinated biphenyls (0.1	mg/kg					<0.1
EP068A: Organochlorine Pesticides								
alpha-BHC	319-84-6	0.05	mg/kg					< 0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg					< 0.05
beta-BHC	319-85-7	0.05	mg/kg					< 0.05
gamma-BHC	58-89-9	0.05	mg/kg					< 0.05
delta-BHC	319-86-8	0.05	mg/kg					<0.05

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Client	: GHD PTY LTD
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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	TP105_0.0-0.2	TP105_0.6-0.7	TP106_0.0-0.2	FD20	COMP 4
(Cl	Client sampling date / time		06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00	18-Sep-2018 00:00
Compound	CAS Number	LOR	Unit	ES1826547-014	ES1826547-016	ES1826547-018	ES1826547-022	ES1826547-027
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pestici	ides (OC) - Continued							
Heptachlor	76-44-8	0.05	mg/kg					<0.05
Aldrin	309-00-2	0.05	mg/kg					<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg					<0.05
^ Total Chlordane (sum)		0.05	mg/kg					<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg					<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg					<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg					<0.05
Dieldrin	60-57-1	0.05	mg/kg					<0.05
4.4`-DDE	72-55-9	0.05	mg/kg					<0.05
Endrin	72-20-8	0.05	mg/kg					<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg					<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg					<0.05
4.4`-DDD	72-54-8	0.05	mg/kg					<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg					<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg					<0.05
4.4`-DDT	50-29-3	0.2	mg/kg					<0.2
Endrin ketone	53494-70-5	0.05	mg/kg					<0.05
Methoxychlor	72-43-5	0.2	mg/kg					<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg					<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.05	mg/kg					<0.05
	0-2							
EP075(SIM)B: Polynuclear Arom	natic Hydrocarbons							
Naphthalene	91-20-3	0.5	mg/kg	<0.5		<0.5	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5		<0.5	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5		<0.5	<0.5	
Fluorene	86-73-7	0.5	mg/kg	<0.5		<0.5	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5		<0.5	<0.5	
Anthracene	120-12-7	0.5	mg/kg	<0.5		<0.5	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5		<0.5	<0.5	
Pyrene	129-00-0	0.5	mg/kg	<0.5		<0.5	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5		<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg	<0.5		<0.5	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5		<0.5	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5		<0.5	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5		<0.5	<0.5	

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Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	TP105_0.0-0.2	TP105_0.6-0.7	TP106_0.0-0.2	FD20	COMP 4
Client sampling date / time			06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00	18-Sep-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1826547-014	ES1826547-016	ES1826547-018	ES1826547-022	ES1826547-027
			-	Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hyd	Irocarbons - Cont	inued						
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5		<0.5	<0.5	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5		<0.5	<0.5	
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5		<0.5	<0.5	
[^] Sum of polycyclic aromatic hydrocarbons		0.5	mg/kg	<0.5		<0.5	<0.5	
[^] Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5		<0.5	<0.5	
[^] Benzo(a)pyrene TEQ (half LOR)		0.5	mg/kg	0.6		0.6	0.6	
^ Benzo(a)pyrene TEQ (LOR)		0.5	mg/kg	1.2		1.2	1.2	
EP080/071: Total Petroleum Hydrocarbo	ns							
C6 - C9 Fraction		10	mg/kg	<10		<10	<10	
C10 - C14 Fraction		50	mg/kg	<50		<50	<50	
C15 - C28 Fraction		100	mg/kg	<100		<100	<100	
C29 - C36 Fraction		100	mg/kg	<100		<100	<100	
^ C10 - C36 Fraction (sum)		50	mg/kg	<50		<50	<50	
EP080/071: Total Recoverable Hydrocarl	oons - NEPM 201	3 Fractio	าร					
C6 - C10 Fraction	C6 C10	10	mg/kg	<10		<10	<10	
[^] C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg	<10		<10	<10	
(F1)	_							
>C10 - C16 Fraction		50	mg/kg	<50		<50	<50	
>C16 - C34 Fraction		100	mg/kg	<100		<100	<100	
>C34 - C40 Fraction		100	mg/kg	<100		<100	<100	
^ >C10 - C40 Fraction (sum)		50	mg/kg	<50		<50	<50	
^ >C10 - C16 Fraction minus Naphthalene		50	mg/kg	<50		<50	<50	
(F2)								
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2		<0.2	<0.2	
Toluene	108-88-3	0.5	mg/kg	<0.5		<0.5	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5		<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5		<0.5	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5		<0.5	<0.5	
^ Sum of BTEX		0.2	mg/kg	<0.2		<0.2	<0.2	
^ Total Xylenes		0.5	mg/kg	<0.5		<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1		<1	<1	
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%					105

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Work Order	ES1826547
Client	: GHD PTY LTD
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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	TP105_0.0-0.2	TP105_0.6-0.7	TP106_0.0-0.2	FD20	COMP 4
	Cl	ient samplı	ing date / time	06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00	06-Sep-2018 00:00	18-Sep-2018 00:00
Compound	CAS Number	LOR	Unit	ES1826547-014	ES1826547-016	ES1826547-018	ES1826547-022	ES1826547-027
				Result	Result	Result	Result	Result
EP068S: Organochlorine Pestici	de Surrogate							
Dibromo-DDE	21655-73-2	0.05	%					81.8
EP068T: Organophosphorus Pes	sticide Surrogate							
DEF	78-48-8	0.05	%					80.3
EP075(SIM)S: Phenolic Compou	nd Surrogates							
Phenol-d6	13127-88-3	0.5	%	78.5		74.8	74.1	
2-Chlorophenol-D4	93951-73-6	0.5	%	82.0		78.7	77.7	
2.4.6-Tribromophenol	118-79-6	0.5	%	65.2		66.0	65.3	
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	91.2		87.8	86.8	
Anthracene-d10	1719-06-8	0.5	%	86.8		83.8	81.4	
4-Terphenyl-d14	1718-51-0	0.5	%	75.7		73.2	71.7	
EP080S: TPH(V)/BTEX Surrogate	es							
1.2-Dichloroethane-D4	17060-07-0	0.2	%	126		113	112	
Toluene-D8	2037-26-5	0.2	%	119		109	104	
4-Bromofluorobenzene	460-00-4	0.2	%	124		108	105	

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Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	COMP 5	 	
	Cl	ient samplii	ng date / time	18-Sep-2018 00:00	 	
Compound	CAS Number	LOR	Unit	ES1826547-028	 	
Compound	ONO Number			Result	 	
EA055: Moisture Content (Dried @ 10	05-110°C)					
Moisture Content		1.0	%	15.1	 	
EP066: Polychlorinated Biphenyls (P						
Total Polychlorinated biphenyls (0.1	mg/kg	<0.1	 	
EP068A: Organochlorine Pesticides			3 5			
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	 	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	 	
beta-BHC	319-85-7	0.05	mg/kg	<0.05	 	
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	 	
delta-BHC	319-86-8	0.05	mg/kg	<0.05	 	
Heptachlor	76-44-8	0.05	mg/kg	<0.05	 	
Aldrin	309-00-2	0.05	mg/kg	<0.05	 	
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	 	
^ Total Chlordane (sum)		0.05	mg/kg	<0.05	 	
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	 	
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	 	
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	 	
Dieldrin	60-57-1	0.05	mg/kg	<0.05	 	
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	 	
Endrin	72-20-8	0.05	mg/kg	<0.05	 	
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	 	
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	 	
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	 	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	 	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	 	
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	 	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	 	
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	 	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	 	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.05	mg/kg	<0.05	 	
	0-2					
EP066S: PCB Surrogate						
Decachlorobiphenyl	2051-24-3	0.1	%	118	 	
EP068S: Organochlorine Pesticide S	urrogate					
Dibromo-DDE	21655-73-2	0.05	%	87.1	 	

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Sub-Matrix: SOIL (Matrix: SOIL)		Cli	ent sample ID	COMP 5	 	
	Clie	ent sampli	ing date / time	18-Sep-2018 00:00	 	
Compound	CAS Number	LOR	Unit	ES1826547-028	 	
				Result	 	
EP068T: Organophosphorus Pestic	cide Surrogate					
DEF	78-48-8	0.05	%	89.9	 	
Analytical Results						
Descriptive Results						

Sub-Matrix: SOIL

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos	in Soils	
EA200: Description	TP106_0.0-0.2 - 06-Sep-2018 00:00	Mid brown sandy soil

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Surrogate Control Limits

Sub-Matrix: SOIL		Recovery	Limits (%)
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130



QUALITY CONTROL REPORT

Work Order	: ES1826547	Page	: 1 of 9
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MS ALISON MONKLEY	Contact	Brenda Hong
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	:	Telephone	: (02) 8784 8504
Project	: 2219573	Date Samples Received	07-Sep-2018
Order number	:	Date Analysis Commenced	18-Sep-2018
C-O-C number	:	Issue Date	22-Sep-2018
Sampler	; JULIAN FOWLER		Hac-MRA NAT
Site	:		
Quote number	: EN/005/18		The Column
No. of samples received	: 28		Accreditation No. Accredited for compliance v
No. of samples analysed	: 11		ISO/IEC 17025 - Test

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full. This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
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Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

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Client	: GHD PTY LTD
Project	2219573



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

ub-Matrix: SOIL						Laboratory	Duplicate (DUP) Report		
aboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%
A002: pH 1:5 (Soils	s) (QC Lot: 1936505)								
ES1826044-014	Anonymous	EA002: pH Value		0.1	pH Unit	6.3	6.2	0.00	0% - 20%
ES1827443-001	Anonymous	EA002: pH Value		0.1	pH Unit	5.9	5.8	0.00	0% - 20%
A055: Moisture Co	ntent (Dried @ 105-110°C)	(QC Lot: 1937107)							
S1826044-003	Anonymous	EA055: Moisture Content		0.1	%	21.3	20.3	4.94	0% - 20%
S1826547-007	TP103_0.0-0.2	EA055: Moisture Content		0.1	%	5.9	5.7	3.00	No Limit
D007: Exchangeab	le Cations (QC Lot: 194186	8)							
S1826044-014	Anonymous	ED007: Exchangeable Sodium Percent		0.1	%	5.7	5.7	0.00	0% - 20%
		ED007: Exchangeable Calcium		0.1	meq/100g	4.6	4.5	0.00	0% - 20%
		ED007: Exchangeable Magnesium		0.1	meq/100g	2.7	2.6	0.00	0% - 20%
		ED007: Exchangeable Potassium		0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED007: Exchangeable Sodium		0.1	meq/100g	0.4	0.4	0.00	No Limit
		ED007: Cation Exchange Capacity		0.1	meq/100g	7.9	7.8	0.00	0% - 20%
S1827443-004	Anonymous	ED007: Exchangeable Sodium Percent		0.1	%	5.7	5.4	5.40	0% - 20%
		ED007: Exchangeable Calcium		0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED007: Exchangeable Magnesium		0.1	meq/100g	0.8	0.8	0.00	No Limit
		ED007: Exchangeable Potassium		0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED007: Exchangeable Sodium		0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED007: Cation Exchange Capacity		0.1	meq/100g	1.0	1.0	0.00	0% - 50%
G005T: Total Metal	s by ICP-AES (QC Lot: 194	1966)							
S1826547-001	TP101_0.0-0.2	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	6	7	0.00	No Limit

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Project	2219573



ub-Matrix: SOIL						Laboratory	Duplicate (DUP) Report	ult RPD (%) Recovery 0.00 No 8.69 No 0.00 No 32.2 No 0.00 No 32.2 No 0.00 No 35.1 No 13.7 No 28.8 No 0.00 No 0.00 No				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%			
EG005T: Tota <mark>l</mark> Meta	Is by ICP-AES (QC Lot	:: 1941966) - continued										
ES1826547-001	TP101_0.0-0.2	EG005T: Lead	7439-92-1	5	mg/kg	6	6	0.00	No Limit			
		EG005T: Zinc	7440-66-6	5	mg/kg	36	39	8.69	No Limit			
ES1827574-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit			
		EG005T: Chromium	7440-47-3	2	mg/kg	8	11	32.2	No Limit			
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	<2	No Limit			
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<1 0.00 11 32.2 <2 0.00 <5 0.00 <5 0.00 6 35.1 17 13.7 7 28.8 $<<0.10.00<0.10.00<10.00<0.10.00<10.00<10.00<10.00<10.00<10.00<10.00<10.00<10.00<10.00<10.00<10.00<10.00<10.00<10.05<0.050.00<10.05<0.050.00<1<0.05<0.050.00<1<0.05<0.050.00<1<0.05<0.050.00<1<0.05<0.050.00<1<0.05<0.050.00<1<0.05<0.050.00$	No Limit				
		EG005T: Copper	7440-50-8	5	mg/kg	9	6	0.00 1 8.69 1 0.00 32.2 0.00 1 32.2 1 0.00 35.1 13.7 2 28.8 1 0.00 1 <td>No Limit</td>	No Limit			
		EG005T: Lead	7439-92-1	5	mg/kg	Original Result Duplicate Result RPD (%) 6 6 0.00 36 39 8.69 <1	No Limit					
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	7	28.8	No Limit			
G035T: Total Rec	overable Mercury by Fl	MS (QC Lot: 1941965)										
ES1826547-001	TP101 0.0-0.2	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit			
ES1827574-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit			
P066: Polychlorin	ated Biphenyls (PCB)(
ES1827553-001	Anonymous	EP066: Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	<0.1	0.00	No Limit			
	-			0.1	mg/ng	-0.1	-0.1	0.00				
	orine Pesticides (OC)			0.05		0.05			N. 12. 3			
S1827553-001	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg				No Limit			
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg				No Limit			
		EP068: beta-BHC	319-85-7	0.05	mg/kg				No Limit			
		EP068: gamma-BHC	58-89-9	0.05	mg/kg				No Limit			
		EP068: delta-BHC	319-86-8	0.05	mg/kg			0.00	No Limit			
		EP068: Heptachlor	76-44-8	0.05	mg/kg				No Limit			
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit			
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit			
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit			
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit			
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit			
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit			
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit			
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit			
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit			
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit			
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit			
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit			
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	< 0.05	<0.05	0.00	No Limit			
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit			
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit			
P075(SIM)B: Polyr	uclear Aromatic Hydro	ocarbons (QC Lot: 1937041)										
S1826547-001	TP101_0.0-0.2	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit			
201020047-001	1.101_0.0-0.2	EP075(SIM): Naphthalene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit			

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Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL						Laboratory	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polyn	uclear Aromatic Hydro	carbons (QC Lot: 1937041) - continued							
ES1826547-001	TP101_0.0-0.2	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	RPD (%)	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	203-82-3	0.5	mg/kg	< 0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5		No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5		No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5		No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5		No Limit
		EP075(SIM): Sum of polycyclic aromatic		0.5	mg/kg	<0.5	<0.5		No Limit
		hydrocarbons							
		EP075(SIM): Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Pe	troleum Hydrocarbons	(QC Lot: 1936161)							
ES1826044-001	Anonymous	EP080: C6 - C9 Fraction		10	mg/kg	<10	<10	0.00	No Limit
ES1826044-045	Anonymous	EP080: C6 - C9 Fraction		10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Pe	troleum Hydrocarbons	(QC Lot: 1937040)							
ES1826547-001	TP101_0.0-0.2	EP071: C15 - C28 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction		100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction		50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Re	coverable Hydrocarbo	ns - NEPM 2013 Fractions (QC Lot: 1936161)							
ES1826044-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1826044-045	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Re	coverable Hydrocarbo	ns - NEPM 2013 Fractions (QC Lot: 1937040)							
ES1826547-001	TP101 0.0-0.2	EP071: >C16 - C34 Fraction		100	mg/kg	<100	<100	0.00	No Limit
	_	EP071: >C34 - C40 Fraction		100	mg/kg	<100	<100		No Limit
		EP071: >C10 - C16 Fraction		50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC	Lot: 1936161)				0.0				
ES1826044-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5		No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5		No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5		No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	< 0.5	<0.5	0.00	No Limit

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Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)		
EP080: BTEXN (QC	Lot: 1936161) - continued										
ES1826044-001	Anonymous	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit		
ES1826044-045	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit		
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
			106-42-3								
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit		



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

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

Sub-Matrix: SOIL	Sub-Matrix: SOIL					Laboratory Control Spike (LCS) Report		
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED007: Exchangeable Cations (QCLot: 1941868)							
ED007: Exchangeable Calcium		0.1	meq/100g	<0.1	1 meq/100g	93.0	76	120
ED007: Exchangeable Magnesium		0.1	meq/100g	<0.1	1.67 meq/100g	94.0	75	115
ED007: Exchangeable Potassium		0.1	meq/100g	<0.1	0.51 meq/100g	94.7	80	120
D007: Exchangeable Sodium		0.1	meq/100g	<0.1	0.87 meq/100g	92.0	80	120
ED007: Cation Exchange Capacity		0.1	meq/100g	<0.1				
ED007: Exchangeable Sodium Percent		0.1	%	<0.1				
EG005T: Total Metals by ICP-AES (QCLot: 1941	966)							
G005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	96.3	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	96.7	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	81.5	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	97.3	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	95.5	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	95.1	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	106	80	122
EG035T: Total Recoverable Mercury by FIMS(QCLot: 1941965)							
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	74.3	70	105
EP066: Polychlorinated Biphenyls (PCB) (QCLo	t: 1937046)							
EP066: Total Polychlorinated biphenyls		0.1	mg/kg	<0.1	1 mg/kg	103	62	126
EP068A: Organochlorine Pesticides (OC)(QCLo	at: 1937045)							
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	90.6	69	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	87.3	65	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	89.0	67	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	90.2	68	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	101	65	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	87.6	67	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	91.5	69	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	98.2	62	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	93.5	63	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	104	66	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	106	64	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	97.3	66	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.8	67	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	97.1	67	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	97.1	69	115

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Sub-Matrix: SOIL			Method Blank (MB)		Laboratory Control Spike (LCS) Report			
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC)(QCLot	: 1937045) - continued							
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	98.0	69	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	89.9	56	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	99.6	62	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	104	66	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	104	64	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	103	54	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbor	is (QCLot: 1937041)							
P075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	83.2	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	80.8	72	124
P075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	80.6	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	80.8	72	126
P075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	83.3	75	127
P075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	83.3	77	127
P075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	82.3	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	83.1	74	128
P075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	86.0	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0 <u>.</u> 5	6 mg/kg	89.9	75	127
P075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	83.9	68	116
P075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	93.7	74	126
P075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	81.6	70	126
P075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	80.0	61	121
P075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	77.7	62	118
P075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	80.5	63	121
P080/071: Total Petroleum Hydrocarbons (QCL	ot: 1936161)							
P080: C6 - C9 Fraction		10	mg/kg	<10	26 mg/kg	86.2	68	128
EP080/071: Total Petroleum Hydrocarbons (QCL	ot: 1937040)							
EP071: C10 - C14 Fraction		50	mg/kg	<50	300 mg/kg	104	75	129
EP071: C15 - C28 Fraction		100	mg/kg	<100	450 mg/kg	116	77	131
EP071: C29 - C36 Fraction		100	mg/kg	<100	300 mg/kg	100	71	129
P080/071: Total Recoverable Hydrocarbons - NE	PM 2013 Fractions (QCLo	t: 1936161)						
P080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	90.3	68	128
EP080/071: Total Recoverable Hydrocarbons - NE	PM 2013 Eractions (OCL o	t· 1937040)						
P071: >C10 - C16 Fraction		50	mg/kg	<50	375 mg/kg	104	77	125
EP071: >C16 - C34 Fraction		100	mg/kg	<100	525 mg/kg	112	74	138
EP071: >C34 - C40 Fraction		100	mg/kg	<100	225 mg/kg	105	63	131
EP080: BTEXN (QCLot: 1936161)								1
EP080: BELXN (QCCOL. 1930101)	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	93.5	62	116

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Sub-Matrix: SOIL				Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Recovery Limits (%)		
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EP080: BTEXN (QCLot: 1936161) - continued									
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	93.2	67	121	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	94.2	65	117	
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	91.5	66	118	
	106-42-3								
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	93.6	68	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	96.1	63	119	

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	SpikeRecovery(%)	Recovery	Limits (%)	
aboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
G005T: Total Met	tals by ICP-AES (QCLot: 1941966)							
ES1826547-001	TP101_0.0-0.2	EG005T: Arsenic	7440-38-2	50 mg/kg	102	70	130	
		EG005T: Cadmium	7440-43-9	50 mg/kg	103	70	130	
		EG005T: Chromium	7440-47-3	50 mg/kg	102	70	130	
		EG005T: Copper	7440-50-8	250 mg/kg	101	70	130	
		EG005T: Lead	7439-92-1	250 mg/kg	103	70	130	
		EG005T: Nickel	7440-02-0	50 mg/kg	101	70	130	
		EG005T: Zinc	7440-66-6	250 mg/kg	109	70	130	
EG035T: Total Re	coverable Mercury by FIMS (QCLot: 1941965	;)						
ES1826547-001	TP101_0.0-0.2	EG035T: Mercury	7439-97-6	5 mg/kg	75.7	70	130	
EP066: Polychlori	nated Biphenyls (PCB) (QCLot: 1937046)							
ES1827553-001	Anonymous	EP066: Total Polychlorinated biphenyls		1 mg/kg	100.0	70	130	
EP068A: Organocl	hlorine Pesticides (OC) (QCLot: 1937045)							
ES1827553-001	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	85.6	70	130	
		EP068: Heptachlor	76-44-8	0.5 mg/kg	73.9	70	130	
		EP068: Aldrin	309-00-2	0.5 mg/kg	107	70	130	
		EP068: Dieldrin	60-57-1	0.5 mg/kg	107	70	130	
		EP068: Endrin	72-20-8	2 mg/kg	93.4	70	130	
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	80.0	70	130	
P075(SIM)B: Poly	ynuclear Aromatic Hydrocarbons (QCLot: 19	37041)						
ES1826547-001	TP101_0.0-0.2	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	105	70	130	
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	126	70	130	

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Sub-Matrix: SOIL				Matrix Spike (MS) Report					
				Spike	SpikeRecovery(%)	Recovery	_imits (%)		
aboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High		
EP080/071: Total	Petroleum Hydrocarbons (QCLot: 1936161) - continued							
ES1826044-001	Anonymous	EP080: C6 - C9 Fraction		32.5 mg/kg	75.4	70	130		
EP080/071: Total	Petroleum Hydrocarbons (QCLot: 1937040)							
ES1826547-001	TP101_0.0-0.2	EP071: C10 - C14 Fraction		523 mg/kg	115	73	137		
		EP071: C15 - C28 Fraction		2319 mg/kg	127	53	131		
		EP071: C29 - C36 Fraction		1714 mg/kg	129	52	132		
EP080/071: Total	Recoverable Hydrocarbons - NEPM 2013 Fr	ractions (QCLot: 1936161)							
ES1826044-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	74.1	70	130		
EP080/071: Total	Recoverable Hydrocarbons - NEPM 2013 Fi	ractions (QCLot: 1937040)							
ES1826547-001	TP101_0.0-0.2	EP071: >C10 - C16 Fraction		860 mg/kg	119	73	137		
		EP071: >C16 - C34 Fraction		3223 mg/kg	124	53	131		
		EP071: >C34 - C40 Fraction		1058 mg/kg	118	52	132		
EP080: BTEXN (C	QCLot: 1936161)								
ES1826044-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	77.6	70	130		
		EP080: Toluene	108-88-3	2.5 mg/kg	78.7	70	130		
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	82.2	70	130		
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	79.9	70	130		
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	84.7	70	130		
		EP080: Naphthalene	91-20-3	2.5 mg/kg	81.2	70	130		



	QA/QC Compliance Assessment to assist with Quality Review						
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Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney				
Contact	: MS ALISON MONKLEY	Telephone	: (02) 8784 8504				
Project	: 2219573	Date Samples Received	: 07-Sep-2018				
Site	:	Issue Date	: 22-Sep-2018				
Sampler	: JULIAN FOWLER	No. of samples received	: 28				
Order number	:	No. of samples analysed	: 11				

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

• <u>NO</u> Quality Control Sample Frequency Outliers exist.

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Outliers : Analysis Holding Time Compliance

	Ex	traction / Preparation			Analysis	
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
TP101_0.5-0.6, TP105_0.6-0.7	19-Sep-2018	13-Sep-2018	6			
	TP101_0.5-0.6, TP105_0.6-0.7	Date extracted TP101_0.5-0.6, 19-Sep-2018	TP101_0.5-0.6, 19-Sep-2018 13-Sep-2018	Date extracted Due for extraction Days overdue TP101_0.5-0.6, 19-Sep-2018 13-Sep-2018 6	Date extracted Due for extraction Days overdue Date analysed TP101_0.5-0.6, 19-Sep-2018 13-Sep-2018 6	Date extracted Due for extraction Days overdue Date analysed Due for analysis TP101_0.5-0.6, 19-Sep-2018 13-Sep-2018 6

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 <u>VOC in soils</u> 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	n: \star = Holding time	e breach ; 🗸 = With	n holding time
Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002)								
TP101_0.0-0.2,	TP101_0.5-0.6,	06-Sep-2018	19-Sep-2018	13-Sep-2018	x	19-Sep-2018	19-Sep-2018	✓
TP105_0.0-0.2,	TP105_0.6-0.7							
EA055: Moisture Content (Dried @ 105-110°	С)							
Soil Glass Jar - Unpreserved (EA055)								
TP101_0.0-0.2,	TP102_0.0-0.2,	06-Sep-2018				18-Sep-2018	20-Sep-2018	✓
TP103_0.0-0.2,	TP104_0.0-0.2,							
TP105_0.0-0.2,	TP106_0.0-0.2,							
FD20								
Soil Glass Jar - Unpreserved (EA055)								
COMP 4,	COMP 5	18-Sep-2018				18-Sep-2018	02-Oct-2018	 ✓
EA200: AS 4964 - 2004 Identification of Asbe	estos in Soils							
Snap Lock Bag - ACM/Asbestos Grab Bag (E	A200)							
TP106_0.0-0.2		06-Sep-2018				19-Sep-2018	05-Mar-2019	✓
ED007: Exchangeable Cations								
Soil Glass Jar - Unpreserved (ED007)								
TP101_0.0-0.2,	TP101_0.5-0.6,	06-Sep-2018	20-Sep-2018	04-Oct-2018	✓	20-Sep-2018	04-Oct-2018	 ✓
TP105_0.0-0.2,	TP105_0.6-0.7							

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Matrix: SOIL					Evaluation	: × = Holding time	breach ; ✓ = With	n holding tim
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
TP101_0.0-0.2,	TP102_0.0-0.2,	06-Sep-2018	20-Sep-2018	05-Mar-2019	\checkmark	20-Sep-2018	05-Mar-2019	✓
TP103_0.0-0.2,	TP104_0.0-0.2,							
TP105_0.0-0.2,	TP106_0.0-0.2,							
FD20								
EG035T: Total Recoverable Mercury by Fl	MS							
Soil Glass Jar - Unpreserved (EG035T)								
TP101_0.0-0.2,	TP102_0.0-0.2,	06-Sep-2018	20-Sep-2018	04-Oct-2018	~	21-Sep-2018	04-Oct-2018	 ✓
TP103_0.0-0.2,	TP104_0.0-0.2,							
TP105_0.0-0.2,	TP106_0.0-0.2,							
FD20								
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)								
COMP 4,	COMP 5	18-Sep-2018	18-Sep-2018	02-Oct-2018	✓	19-Sep-2018	28-Oct-2018	\checkmark
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
COMP 4,	COMP 5	18-Sep-2018	18-Sep-2018	02-Oct-2018	✓	19-Sep-2018	28-Oct-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydro	ocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))								
TP101_0.0-0.2,	TP102_0.0-0.2,	06-Sep-2018	19-Sep-2018	20-Sep-2018	✓	20-Sep-2018	29-Oct-2018	 ✓
TP103_0.0-0.2,	TP104_0.0-0.2,							
TP105_0.0-0.2,	TP106_0.0-0.2,							
FD20								
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)				_				
TP101_0.0-0.2,	TP102_0.0-0.2,	06-Sep-2018	18-Sep-2018	20-Sep-2018	~	19-Sep-2018	20-Sep-2018	 ✓
TP103_0.0-0.2,	TP104_0.0-0.2,							
TP105_0.0-0.2,	TP106_0.0-0.2,							
FD20								
Soil Glass Jar - Unpreserved (EP071)								
TP101_0.0-0.2,	TP102_0.0-0.2,	06-Sep-2018	19-Sep-2018	20-Sep-2018	~	20-Sep-2018	29-Oct-2018	✓
TP103_0.0-0.2,	TP104_0.0-0.2,							
TP105_0.0-0.2,	TP106_0.0-0.2,							
FD20								

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Matrix: SOIL						Evaluation	: × = Holding time	breach ; 🗸 = Withi	n holding time
Method		5	Sample Date	Ex	traction / Preparation		Analysis		
Container / Client Sample ID(s)				Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons -	NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)									
TP101_0.0-0.2,	TP102_0.0-0.2,	0	06-Sep-2018	18-Sep-2018	20-Sep-2018	✓	19-Sep-2018	20-Sep-2018	✓
TP103_0.0-0.2,	TP104_0.0-0.2,								
TP105_0.0-0.2,	TP106_0.0-0.2,								
FD20									
Soil Glass Jar - Unpreserved (EP071)									
TP101_0.0-0.2,	TP102_0.0-0.2,	0	06-Sep-2018	19-Sep-2018	20-Sep-2018	\checkmark	20-Sep-2018	29-Oct-2018	 ✓
TP103_0.0-0.2,	TP104_0.0-0.2,								
TP105_0.0-0.2,	TP106_0.0-0.2,								
FD20									
EP080: BTEXN									
Soil Glass Jar - Unpreserved (EP080)									
TP101_0.0-0.2,	TP102_0.0-0.2,	0	06-Sep-2018	18-Sep-2018	20-Sep-2018	✓	19-Sep-2018	20-Sep-2018	✓
TP103_0.0-0.2,	TP104_0.0-0.2,								
TP105_0.0-0.2,	TP106_0.0-0.2,								
FD20									

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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.

Quality Control Sample Type		С	ount		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation	
aboratory Duplicates (DUP)							
xchangeable Cations	ED007	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
loisture Content	EA055	2	20	10.00	10.00	1	NEPM 2013 B3 & ALS QC Standard
AH/Phenols (SIM)	EP075(SIM)	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
esticides by GCMS	EP068	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
H (1:5)	EA002	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
olychlorinated Biphenyls (PCB)	EP066	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
otal Mercury by FIMS	EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
otal Metals by ICP-AES	EG005T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
RH - Semivolatile Fraction	EP071	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
RH Volatiles/BTEX	EP080	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
aboratory Control Samples (LCS)							
Exchangeable Cations	ED007	1	17	5.88	5.00	1	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	5.00	~	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
olychlorinated Biphenyls (PCB)	EP066	1	3	33.33	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
otal Mercury by FIMS	EG035T	1	20	5.00	5.00	~	NEPM 2013 B3 & ALS QC Standard
otal Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
RH - Semivolatile Fraction	EP071	1	7	14.29	5.00	1	NEPM 2013 B3 & ALS QC Standard
RH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
/ethod Blanks (MB)							
Exchangeable Cations	ED007	1	17	5.88	5.00	 Image: A second s	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	33.33	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
otal Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
otal Metals by ICP-AES	EG005T	1	20	5.00	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
RH - Semivolatile Fraction	EP071	1	7	14.29	5.00		NEPM 2013 B3 & ALS QC Standard
RH Volatiles/BTEX	EP080	1	19	5.26	5.00	~	NEPM 2013 B3 & ALS QC Standard
Aatrix Spikes (MS)	فتقلع الوابعان فالمعاد						
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	33.33	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	33.33	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
Fotal 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
IRH - Semivolatile Fraction	EP071	1	7	14.29	5.00	~	NEPM 2013 B3 & ALS QC Standard
FRH Volatiles/BTEX	EP080	1	19	5.26	5.00	1	NEPM 2013 B3 & ALS QC Standard

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Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons (2011) Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
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 (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. 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 (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Higginson (1992) method 15A1. A 1M NH4CI extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.

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Preparation Methods	Method	Matrix	Method Descriptions
Sample Compositing	* EN020	SOIL	Equal weights of each original soil are taken, then mixed and homogenised. The combined mixture is labelled as a new sample.
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 (2013) Schedule B(3) (Method 202)
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.

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CLIENT: 0	GHD				OUND REQUIREMENTS :	Standard TAT (Li	st due date):			200 CH 10 CH 10 CH 10 CH 10 CH	RATORY USE ON	LY Cinter	
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ORDER NU	MBER:							coc: 1 🗿	3 4 5 6	7 Random Start	ne Temperature on I	Receipt	
PROJECT M	MANAGER: Alison Mo	nkley	CONTACT	PH: 4979999	99			OF: 1 (2)	3 4 5 6	7 Other comme	nt		《 建有 是 并
SAMPLER:	Julian Fowler		SAMPLER	NOBILE: 04	66049181	RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED	BY:	RECEIVED BY	
COC emaile	ed to ALS?(YES / N	0)	EDD FORM	AT (or defau	ult): Esdat	Juhn	Fal					m(_	
Email Repo	rts to (will default to PM	if no other addresses	s are listed): Alison, ghdla	b reports, nt	l.car	DATE/TIME:		DATE/TIME:		DATE/TIME:			7:200
Email Invoid	ce to (will default to PM i	f no other addresses	are listed): ap-fss@ghd.c			7/9/18	1620					719115	1. opi
COMMENTS	S/SPECIAL HANDLING/	STORAGE OR DISP	OSAL:			<i></i>							
ALS USE	in a start and a start and a start a st	SAMPLE DET			CONTAINERINEC	RMATION	ANALYSIS Where Metals are	REQUIRED including required, specify Tota	SUITES (NB. Suite Cod I (unfiltered bottle require	es muster sted to attra b of Dissolved (field filt	ict suite price) ered bottle required).	Additional l	nformation
LABID	SAMPL	E ID	DATE / TIME	MATRIX	TYPE & PRESERVATI (refer to codes below)				AB OF C NEWCI	RIGIN:		Comments on likely cont dilutions, or samples requ analysis etc.	aminant levels, iring specific QC
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V = VOA Vial	HCI Preserved; VB = VOA V	/ial Sodium Bisulphate P	reserved; VS = VOA Vial Sul	furic Preserver	RC; SH = Sodium Hydroxide/Cd Prese d; AV = Airfreight Unpreserved Vial SG cid Sulphate Soils; B = Unpreserved B	= Sulfuric Preserved Amb	le Preserved Plastic; A er Glass; H = HCl pr	AG = Amber Glass Unp eserved Plastic; HS =	reserved; AP - Airfreight HCI preserved Speciation	Unpreserved Plastic bottle; SP = Sulfuric Pre	eserved Plastic; F = F	ormaldehyde Preserved (Glass;

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	CHAIN OF CUSTODY ALS Laboratory: please tick >	Fh 60 3243 7272 E Har	Tood Pennaka SA 5055 Halagi asa obst enan Sheet Halagan (ALO 4055 Sheet Halagan (ALO 4055 Sheet San (ALO 4055) Hanagi asa (ALO 4055)	UMACKAY 73 Harhour Road N BN 97 4944.0127 E. markar.9 UMELBOURHE 2-4 Westak Ro Ph 73 5549 (200 E. santartish UMUPALE 2-1 S-santar Rom Ch 73(5)273 6/732 E. marges	alitykowa pola gó Opergiwa e MiC 3171 istopranejikalegi pilat per i Muogee NRW (2010	קס את וע יה -	 CASTLE SEGS MA 4614 2000 E I SAN 40WPA.4000 C An 1 024423 2050 E I 31M 10 1653 Way V 8 9200 7855 E I SM 	ars ne acastlaige. • Place North No remoi@a stillaiai	vikglebal dom wijn (ISW 75 1) rem	FB- 02 B704 85 OFCWRSVIEU PD-07 472605 OWDELONGO	ALEO COCIS
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RDER NUMBER:							3 4	56	7 Random	Sancie Competence of	~~ Э ©, ⁶
ROJECT MANAGER: Alison Monk	icy	CONTACT.PH: 4979				OF: 1 (2		5 6		mouri.	<u> </u>
AMPLER: Julian Fowler		SAMPLER MOBILE:	·····	Tulim	Forter	RECEIVED BY:		>	RELINQUISH	ED BY:	RECEIVED BY:
OC emailed to ALS? (YES / NO) mail Reports to (will default to PM if i		EDD FORMAT (or de listed): Alison, abdieb reports		DATE/TIME:	1000	DATE/TIME	JT 4	-17d			DATE/TIME:
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ALS AND	SAMPLE DETAILS	RIM	CONTAINERINE		Where Metals are	REQUIRED includ required, specify To	ing SUITES (NB tal (unlikered bo	. Suite Codes r tile required) o	nust be listed to Dissolved (fie	atiract stâte price) Id filtered bottle required).	Additional Information
			L runcast		TEXN TEXN	A 23,6		ি ৰ			
LAB ID SAMPLE I	n	CATER WORN THE	NW CAST TYPE & PRESERVAT	CONTAINERS	100 M	Manuelal	40	S Z	CE		Comments on likely contaminant levels, dilutions, or samples requiring specific QC
SAMPLE I		K. Alla	(refer to codes below	0 OT OT		<u>्</u> र्य	omp	on p april			androns, of samples requiring specific QC analysis etc.
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CLIENT: GHD		TURNAROUND REQUIREMENTS :	Standard TAT [Liz	t due date):			FOR LABORA	TORYOUSEIQ	NLYs (Circle) and the state	
OFFICE: Newcastle		Standard TAT may be longer for some tests Xira Trace Organics)	Non Standard or U	rgent TAT (List du	e date):		Custody Seal int	id? T. T. A.	Yas No	
PROJECT: 2219573		ALS QUOTE NO.:			COC SEC	UENCE NUMBER (CI	rcle) Free ice / frozen	ice pricke prase	il lupon i r	
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PROJECT MANAGER: Alison Monkley	CONTACT PH	49799999	· · · · · · · · · · · · · · · · · · ·		OF: 1 2) 3 4 5	6 7 Other comment.			
SAMPLER: Julian Fowler	SAMPLER MC	BILE: 0465049181	RELINQUISHED BY:	_	RECEIVED BY:		RELINQUISHED BY	:	RECEIVED BY:	
COC emailed to ALS? (YES / NO)	EDD FORMAT	(or default): Esdat	- Juhn	Fal	-					
Email Reports to (will default to PM if no other	addresses are listed); Alison, ghdfab r	aports, nil.car	DATE/TIME:	11 -	DATE/TIME:		DATE/TIME		DATE/TIME:	
Email Invoice to (will do/ault to PM if no other	addresses are isted): ap-fss@ghd.con	۱ ــــــــــــــــــــــــــــــــــــ	7/9/18	1620		·				
COMMENTS/SPECIAL HANDLING/STORAGE	OR DISPOSAL;		<i>·</i> · ·							
ALS USE MATRIX SAM	IFLE DETAILS		FORMATION				indes must be listed to attract a ired) or Dissolved (field filtered		Additional Informat	tion
LAG ID SAMPLE ID	DATE / TIME	Y TYPE & PRESERV		1 mg	Art Scoul Jun 200	"(cenp 4"	(201) 2 CEC		Comments on likely contaminant dituïons, or samples recurring spe analysis etc.	ievels, :e≆ic QC
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CERTIFICATE OF ANALYSIS Work Order : ES1826738 Page : 1 of 4 Amendment :1 GHD PTY LTD Client Laboratory Environmental Division Sydney Contact : MR BRIAN OBERDORF Contact : Brenda Hong Address Address 277-289 Woodpark Road Smithfield NSW Australia 2164 : PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302 Telephone Telephone : (02) 8784 8504 ____ **Date Samples Received** Project 2219573 : 11-Sep-2018 08:37 Order number 2219573 Date Analysis Commenced : 12-Sep-2018 C-O-C number ssue Date ____ : 26-Sep-2018 18:38 Sampler D.COOPER Quote number : EN/005/18 Accreditation No. 825 No. of samples received : 7 Accredited for compliance with ISO/IEC 17025 - Testing No. of samples analysed : 7

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

Site

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

Signatories	Position	Accreditation Category
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

Page	3 of 4
Work Order	ES1826738 Amendment 1
Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	TP103 0.5-0.6M	TP103 1.0-1.1M	BH303 2.5-2.95M	BH304 0.5-0.95M	BH302 4.0-4.45M
	Cli	ent sampli	ng date / time	06-Sep-2018 00:00	06-Sep-2018 00:00	03-Sep-2018 00:00	03-Sep-2018 00:00	30-Aug-2018 00:00
Compound	CAS Number	LOR	Unit	ES1826738-001	ES1826738-002	ES1826738-003	ES1826738-004	ES1826738-005
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value		0.1	pH Unit	6.5	5.7	6.2	5.6	5.6
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C		1	µS/cm	41	106	116	24	60
EA055: Moisture Content (Dried @ 105-1	10°C)							
Moisture Content		0.1	%	28.4	14.6	18.8	7.8	32.6
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	460	130	60	10	80
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	30	20	320	20	130

Page	: 4 of 4
Work Order	ES1826738 Amendment 1
Client	: GHD PTY LTD
Project	2219573



Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID		BHA302 1.0-1.45M	BH201 4.0-4.45M	 		
	Cl	ent sampli	ng date / time	30-Aug-2018 00:00	03-Sep-2018 00:00	 	
Compound	CAS Number	LOR	Unit	ES1826738-006	ES1826738-008	 	
				Result	Result	 	
EA002: pH 1:5 (Soils)							
pH Value		0.1	pH Unit	4.5	5.8	 	
EA010: Conductivity (1:5)							
Electrical Conductivity @ 25°C		1	µS/cm	84	21	 	
EA055: Moisture Content (Dried @ 105-11	0°C)						
Moisture Content		0.1	%	18.1	18.7	 	
ED040S : Soluble Sulfate by ICPAES							
Sulfate as SO4 2-	14808-79-8	10	mg/kg	100	20	 	
ED045G: Chloride by Discrete Analyser							
Chloride	16887-00-6	10	mg/kg	40	20	 	



QUALITY CONTROL REPORT : ES1826738 Work Order Page : 1 of 3 :1 Amendment Client GHD PTY LTD Laboratory Environmental Division Sydney MR BRIAN OBERDORF Contact Contact Brenda Hong Address Address 277-289 Woodpark Road Smithfield NSW Australia 2164 : PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302 Telephone Telephone . -----: (02) 8784 8504 Project 2219573 Date Samples Received : 11-Sep-2018 Date Analysis Commenced Order number 2219573 : 12-Sep-2018 ssue Date 26-Sep-2018 C-O-C number -----Sampler D.COOPER Site Quote number : EN/005/18 Accreditation No. 825 No. of samples received : 7 Accredited for compliance with ISO/IEC 17025 - Testing No. of samples analysed : 7 This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL						Laboratory I	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA002: pH 1:5 (Soil	s) (QC Lot: 1926568)								
ES1826782-003	Anonymous	EA002: pH Value		0.1	pH Unit	6.3	6.3	0.00	0% - 20%
ES1826738-001	TP103 0.5-0.6M	EA002: pH Value		0.1	pH Unit	6.5	6.5	0.00	0% - 20%
EA010: Conductivity	y (1:5) (QC Lot: 1926570)								
ES1826782-003	Anonymous	EA010: Electrical Conductivity @ 25°C		1	µS/cm	50	53	6.41	0% - 20%
ES1826738-001	TP103 0.5-0.6M	EA010: Electrical Conductivity @ 25°C		1	μS/cm	41	40	4.44	0% - 20%
EA055: Moisture Co	ntent (Dried @ 105-110°C) (QC Lot: 1927153)							
ES1826724-024	Anonymous	EA055: Moisture Content		0.1	%	4.7	5.1	8.58	No Limit
ES1826738-008	BH201 4.0-4.45M	EA055: Moisture Content		0.1	%	18.7	18.6	0.00	0% - 20%
ED040S: Soluble Ma	ajor Anions (QC Lot: 192656	9)							
ES1826782-003	Anonymous	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	20	30	0.00	No Limit
ES1826738-001	TP103 0.5-0.6M	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	460	500	9.28	0% - 20%
ED045G: Chloride b	y Discrete Analyser (QC Lot	: 1926571)							
ES1826807-003	Anonymous	ED045G: Chloride	16887-00-6	10	mg/kg	620	620	0.00	0% - 20%
ES1826738-001	TP103 0.5-0.6M	ED045G: Chloride	16887-00-6	10	mg/kg	30	40	0.00	No Limit



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

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

Sub-Matrix: SOIL			Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	pike Recovery (%) Recovery Limi	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010: Conductivity (1:5) (QCLot: 1926570)								
EA010: Electrical Conductivity @ 25°C		1	μS/cm	<1	1412 µS/cm	96.4	92	108
ED040S: Soluble Major Anions (QCLot: 1926569)								
ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	150 mg/kg	98.5	80	120
ED045G: Chloride by Discrete Analyser (QCLot: 1920	6571)							
ED045G: Chloride	16887-00-6	10	mg/kg	<10	50 mg/kg	110	75	125
				<10	5000 mg/kg	101	79	117

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			
					SpikeRecovery(%)	Recovery L	imits (%)
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride	ED045G: Chloride by Discrete Analyser (QCLot: 1926571)						
ES1826738-001	TP103 0.5-0.6M	ED045G: Chloride	16887-00-6	1250 mg/kg	118	70	130



	QA/QC Compliance Assessment to assist with Quality Review							
Work Order	ES1826738	Page	: 1 of 5					
Amendment	: 1							
Client		Laboratory	: Environmental Division Sydney					
Contact	MR BRIAN OBERDORF	Telephone	: (02) 8784 8504					
Project	: 2219573	Date Samples Received	: 11-Sep-2018					
Site	:	Issue Date	: 26-Sep-2018					
Sampler	D.COOPER	No. of samples received	: 7					
Order number	: 2219573	No. of samples analysed	: 7					

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

• <u>NO</u> Quality Control Sample Frequency Outliers exist.

Page	: 2 of 5
Work Order	ES1826738 Amendment 1
Client	: GHD PTY LTD
Project	2219573



Outliers : Analysis Holding Time Compliance

Matrix: SOIL	-	

Method		Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days	Date analysed	Due for analysis	Days
				overdue			overdue
EA002: pH 1:5 (Soils)							
Snap Lock Bag							
BH303 2.5-2.95M,	BH304 0.5-0.95M,	12-Sep-2018	10-Sep-2018	2			
BH201 4.0-4.45M							
Snap Lock Bag							
BH302 4.0-4.45M,	BHA302 1.0-1.45M	12-Sep-2018	06-Sep-2018	6			
EA010: Conductivity (1:5)							
Snap Lock Bag							
BH303 2.5-2.95M,	BH304 0.5-0.95M,	12-Sep-2018	10-Sep-2018	2			
BH201 4.0-4.45M							
Snap Lock Bag							
BH302 4.0-4.45M,	BHA302 1.0-1.45M	12-Sep-2018	06-Sep-2018	6			

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 ; ✓ = Withi	n holding time
Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)								
Snap Lock Bag (EA002) BH303 2.5-2.95M,	BH304 0.5-0.95M,	03-Sep-2018	12-Sep-2018	10-Sep-2018	×	12-Sep-2018	12-Sep-2018	✓
BH201 4.0-4.45M Snap Lock Bag (EA002)								
TP103 0.5-0.6M,	TP103 1.0-1.1M	06-Sep-2018	12-Sep-2018	13-Sep-2018	✓	12-Sep-2018	12-Sep-2018	\checkmark
Snap Lock Bag (EA002) BH302 4.0-4.45M,	BHA302 1.0-1.45M	30-Aug-2018	12-Sep-2018	06-Sep-2018	×	12-Sep-2018	12-Sep-2018	1



Matrix: SOIL					Evaluation	n: 🗴 = Holding time	e breach ; ✓ = With	in holding time
Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)	lient Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA010: Conductivity (1:5)								
Snap Lock Bag (EA010) BH303 2.5-2.95M, BH201 4.0-4.45M	BH304 0.5-0.95M,	03-Sep-2018	12-Sep-2018	10-Sep-2018	×	12-Sep-2018	10-Oct-2018	~
Snap Lock Bag (EA010) TP103 0.5-0.6M,	TP103 1.0-1.1M	06-Sep-2018	12-Sep-2018	13-Sep-2018	~	12-Sep-2018	10-Oct-2018	~
Snap Lock Bag (EA010) BH302 4.0-4.45M,	BHA302 1.0-1.45M	30-Aug-2018	12-Sep-2018	06-Sep-2018	×	12-Sep-2018	10-Oct-2018	✓
EA055: Moisture Content (Dried @ 105-110°	°C)							
Snap Lock Bag (EA055) BH303 2.5-2.95M, BH201 4.0-4.45M	BH304 0.5-0.95M,	03-Sep-2018				12-Sep-2018	17-Sep-2018	~
Snap Lock Bag (EA055) TP103 0.5-0.6M,	TP103 1.0-1.1M	06-Sep-2018				12-Sep-2018	20-Sep-2018	✓
Snap Lock Bag (EA055) BH302 4.0-4.45M,	BHA302 1.0-1.45M	30-Aug-2018				12-Sep-2018	13-Sep-2018	~
ED040S : Soluble Sulfate by ICPAES								
Snap Lock Bag (ED040S) BH303 2.5-2.95M, BH201 4.0-4.45M	BH304 0.5-0.95M,	03-Sep-2018	12-Sep-2018	01-Oct-2018	~	12-Sep-2018	10-Oct-2018	~
Snap Lock Bag (ED040S) TP103 0.5-0.6M,	TP103 1.0-1.1M	06-Sep-2018	12-Sep-2018	04-Oct-2018	1	12-Sep-2018	10-Oct-2018	✓
Snap Lock Bag (ED040S) BH302 4.0-4.45M,	BHA302 1.0-1.45M	30-Aug-2018	12-Sep-2018	27-Sep-2018	~	12-Sep-2018	10-Oct-2018	~
ED045G: Chloride by Discrete Analyser								
Snap Lock Bag (ED045G) BH303 2.5-2.95M, BH201 4.0-4.45M	BH304 0.5-0.95M,	03-Sep-2018	12-Sep-2018	01-Oct-2018	~	12-Sep-2018	10-Oct-2018	~
Snap Lock Bag (ED045G) TP103 0.5-0.6M,	TP103 1.0-1.1M	06-Sep-2018	12-Sep-2018	04-Oct-2018	~	12-Sep-2018	10-Oct-2018	1
Snap Lock Bag (ED045G) BH302 4.0-4.45M,	BHA302 1.0-1.45M	30-Aug-2018	12-Sep-2018	27-Sep-2018	~	12-Sep-2018	10-Oct-2018	~



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				Evaluatio	n: 🗴 = Quality Co	ontrol frequency	not within specification ; \checkmark = Quality Control frequency within specification.
Quality Control Sample Type		Co	ount		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Chloride Soluble By Discrete Analyser	ED045G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	2	20	10.00	10.00	\checkmark	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chloride Soluble By Discrete Analyser	ED045G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride Soluble By Discrete Analyser	ED045G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride Soluble By Discrete Analyser	ED045G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
рН (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Major Anions - Soluble	ED040S	SOIL	In house: Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Chloride Soluble By Discrete Analyser	ED045G	SOIL	In house: Referenced to APHA 4500-CI- E. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm. Analysis is performed on a 1:5 soil / water leachate.
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.

	ALS Laboratory	Ph: 07		E: gladstone@alsglobal.com			mail@alsglobal.com	Ph:-	RTH 10 Hod Way 8 9209 7655 E:sa	mples.perth@a	1/101		GONG 99 Kenny Street Wollongong NSW 2500 3125 E: portkembla@alsglobal.com
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2	BH303,	1.5-2.95	3/09/2018	S	В		1	x					
Ý	BH304, 0.5 - 0.95m		3/09/2018	5	В		1	x					
5	BH302, 4.0 - 4.45 m,		30/08/2018	s	В		1	x				ntal Division	
6	BHA302, 1.0-1.45 m	·	30/08/2018	s	В		1	x			Work Ord	er Reference 826738	2
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CERTIFICATE OF ANALYSIS

Work Order	ES1827112	Page	: 1 of 2
Amendment	:1		
Client	: GHD PTY LTD	Laboratory	Environmental Division Sydney
Contact	: DEMETRIUS COOPER	Contact	: Brenda Hong
Address	: PO BOX 5403	Address	277-289 Woodpark Road Smithfield NSW Australia 2164
	NEWCASTLE WEST NSW, AUSTRALIA 2302		
Telephone		Telephone	: (02) 8784 8504
Project	: 2219573	Date Samples Received	: 13-Sep-2018 13:23
Order number	: 2219573	Date Analysis Commenced	14-Sep-2018
C-O-C number	:	Issue Date	26-Sep-2018 18:36
Sampler			IC-MRA NATA
Site	:		
Quote number	: EN/005/18		The Ochet
No. of samples received	: 1		Accredited for compliance with
No. of samples analysed	: 1		ISO/IEC 17025 - Testing

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Clie	ent sample ID	BH202 2.5-2.95M	 	
	Cl	ient sampli	ng date / time	03-Sep-2018 00:00	 	
Compound	CAS Number	LOR	Unit	ES1827112-001	 	
				Result	 	
EA002: pH 1:5 (Soils)						
pH Value		0.1	pH Unit	5.0	 	
EA010: Conductivity (1:5)						
Electrical Conductivity @ 25°C		1	µS/cm	90	 	
EA055: Moisture Content (Dried @ 105-11	l0°C)					
Moisture Content		1.0	%	21.2	 	
ED040S : Soluble Sulfate by ICPAES						
Sulfate as SO4 2-	14808-79-8	10	mg/kg	120	 	
ED045G: Chloride by Discrete Analyser						
Chloride	16887-00-6	10	mg/kg	20	 	



QUALITY CONTROL REPORT : ES1827112 Work Order Page : 1 of 3 :1 Amendment GHD PTY LTD Laboratory Environmental Division Sydney DEMETRIUS COOPER Contact Brenda Hong Address 277-289 Woodpark Road Smithfield NSW Australia 2164 : PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302 Telephone : -----: (02) 8784 8504 2219573 Date Samples Received : 13-Sep-2018 Date Analysis Commenced Order number 2219573 : 14-Sep-2018 C-O-C number ssue Date 26-Sep-2018 ____ DEMETRIUS COOPER Quote number : EN/005/18 Accreditation No. 825 No. of samples received : 1 Accredited for compliance with ISO/IEC 17025 - Testing No. of samples analysed : 1

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

This Quality Control Report contains the following information:

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

Signatories

Client

Contact

Address

Telephone

Project

Sampler

Site

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL						Laboratory I	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA002: pH 1:5 (Soils	s) (QC Lot: 1938769)								
ES1827179-010	Anonymous	EA002: pH Value		0.1	pH Unit	7.6	7.5	1.32	0% - 20%
ES1826826-002	Anonymous	EA002: pH Value		0.1	pH Unit	7.9	7.8	1.65	0% - 20%
EA010: Conductivity	(1:5) (QC Lot: 193877	70)							
ES1827179-010	Anonymous	EA010: Electrical Conductivity @ 25°C		1	µS/cm	531	438	19.2	0% - 20%
ES1826826-002	Anonymous	EA010: Electrical Conductivity @ 25°C		1	µS/cm	279	328	16.1	0% - 20%
EA055: Moisture Co	ntent (Dried @ 105-110	^o °C) (QC Lot: 1931161)							
ES1827143-001	Anonymous	EA055: Moisture Content		0.1	%	26.8	26.7	0.394	0% - 20%
ED040S: Soluble Ma	jor Anions (QC Lot: 1	938771)							
ES1827490-002	Anonymous	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	70	70	0.00	No Limit
ES1827105-001	Anonymous	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	50	70	31.3	No Limit
ED045G: Chloride b	y Discrete Analyser(C	QC Lot: 1938772)							
WN1805183-003	Anonymous	ED045G: Chloride	16887-00-6	10	mg/kg	2.09 %	21000	0.354	0% - 20%
ES1827105-001	Anonymous	ED045G: Chloride	16887-00-6	10	mg/kg	70	70	0.00	No Limit



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

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

Sub-Matrix: SOIL				Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Recovery Limits (%)		
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EA010: Conductivity (1:5) (QCLot: 1938770)									
EA010: Electrical Conductivity @ 25°C		1	μS/cm	<1	1412 µS/cm	105	92	108	
ED040S: Soluble Major Anions (QCLot: 1938771)									
ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	750 mg/kg	94.6	80	120	
ED045G: Chloride by Discrete Analyser (QCLot: 1	938772)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	50 mg/kg	99.5	75	125	
				<10	5000 mg/kg	104	79	117	

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	SpikeRecovery(%)	Recovery L	imits (%)
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride	by Discrete Analyser (QCLot: 1938772)						
ES1827105-001	Anonymous	ED045G: Chloride	16887-00-6	1250 mg/kg	117	70	130



	QA/QC Compliance Assessment to assist with Quality Review							
Work Order	ES1827112	Page	: 1 of 4					
Amendment	:1							
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney					
Contact	: DEMETRIUS COOPER	Telephone	: (02) 8784 8504					
Project	: 2219573	Date Samples Received	: 13-Sep-2018					
Site	:	Issue Date	: 26-Sep-2018					
Sampler	: DEMETRIUS COOPER	No. of samples received	:1					
Order number	: 2219573	No. of samples analysed	: 1					

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

• <u>NO</u> Quality Control Sample Frequency Outliers exist.



Outliers : Analysis Holding Time Compliance

Matrix: SOIL							
Method	Ex	traction / Preparation		Analysis			
Container / Client Sample ID(s)	Date extracted	Due for extraction	Days	Date analysed	Due for analysis	Days	
			overdue			overdue	
EA002: pH 1:5 (Soils)							
Snap Lock Bag							
BH202 2.5-2.95M	19-Sep-2018	10-Sep-2018	9				
EA010: Conductivity (1:5)							
Snap Lock Bag							
BH202 2.5-2.95M	19-Sep-2018	10-Sep-2018	9				

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.

		Evaluation:	× = Holding	time breach ;	√ =	Within holding time.
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Matrix: SOIL				Evaluation	: × = Holding time	breach ; 🗸 = Withi	n holding time.
Method	Sample Date	Ex	traction / Preparation	Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Snap Lock Bag (EA002) BH202 2.5-2.95M	03-Sep-2018	19-Sep-2018	10-Sep-2018	×	19-Sep-2018	19-Sep-2018	✓
EA010: Conductivity (1:5)							
Snap Lock Bag (EA010) BH202 2.5-2.95M	03-Sep-2018	19-Sep-2018	10-Sep-2018	¥	19-Sep-2018	17-Oct-2018	~
EA055: Moisture Content (Dried @ 105-110°C)							
Snap Lock Bag (EA055) BH202 2.5-2.95M	03-Sep-2018				14-Sep-2018	17-Sep-2018	✓
ED040S : Soluble Sulfate by ICPAES							
Snap Lock Bag (ED040S) BH202 2.5-2.95M	03-Sep-2018	19-Sep-2018	01-Oct-2018	1	19-Sep-2018	17-Oct-2018	✓
ED045G: Chloride by Discrete Analyser							
Snap Lock Bag (ED045G) BH202 2.5-2.95M	03-Sep-2018	19-Sep-2018	01-Oct-2018	1	19-Sep-2018	17-Oct-2018	1



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				Evaluatio	n: \star = Quality Co	ontrol frequency	not within specification ; \checkmark = Quality Control frequency within specification	
Quality Control Sample Type		С	ount		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation		
Laboratory Duplicates (DUP)								
Chloride Soluble By Discrete Analyser	ED045G	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Electrical Conductivity (1:5)	EA010	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Major Anions - Soluble	ED040S	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Moisture Content	EA055	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
pH (1:5)	EA002	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Laboratory Control Samples (LCS)								
Chloride Soluble By Discrete Analyser	ED045G	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Electrical Conductivity (1:5)	EA010	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Major Anions - Soluble	ED040S	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Method Blanks (MB)								
Chloride Soluble By Discrete Analyser	ED045G	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Electrical Conductivity (1:5)	EA010	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Major Anions - Soluble	ED040S	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Matrix Spikes (MS)								
Chloride Soluble By Discrete Analyser	ED045G	1	10	10.00	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
рН (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Major Anions - Soluble	ED040S	SOIL	In house: Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Chloride Soluble By Discrete Analyser	ED045G	SOIL	In house: Referenced to APHA 4500-CI- E. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm. Analysis is performed on a 1:5 soil / water leachate.
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.

Eras		CHAIN OF CUSTODY ALS Laboratory: please tick →	Ph: 08 8359 ⊐BRISBANI Ph: 07 3243 □GLADSTC	0890 E: add E 32 Shand 7222 E: sar NE 46 Calle	Road Poorska SA 5095 slaida@alsglobal.com Street Stafford QLD 4053 nples brisbane@alsglobal.com smondah Drive Clinton QLD 4580 dstone@alsglobal.com	□MACKAY 78 H Ph: 07 4944 017 □MELBOURNE Ph: 03 8549 960 □MUDGEE 27 9 Ph: 02 6372 673	7 E: mackay@a 2-4 Westall Ro 30 E: samples.m Sydnev Road Mu	lsglobaf.com ad Springvale VIC elbourne@alsgloba idgee NSW 2850	Ph: 02 401- 3171 ONOWRA al.com Ph: 024423 OPERTH 1	STLE 5/585 Maitland Rd May 4 2500 E: samples, newcastli 4/13 Geary Place North Nov 8 2063 E: nowra@alsglobal.ct 10 Hod Way Mafaga WA 609 9 7855 E: samples, perth@al	:@alsglobal.com /ra NSW 2541 om 00	Ph: 02 8784 DTOWNSV Ph: 07 4796 DWOLLON	277-289 Waodpark Road Smithfield NSW 2164 8555 E: samples sydney@alsglobal.com ILLE 14-15 Desma Court Bohle QLD 4818 0600 E: townswile environmental@alsglobal.com GONG 98 Kenny Street Wolfongong NSW 2500 3125 E: portkembla@alsglobal.com
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✓ = VOA Vial	HCI Preserved; VB = VOA	Vial Sodium Bisulphate	e Preserved; VS = VOA Vial	Sulfuric P	erved ORC; SH = Sodium Hydroxide/ reserved; AV = Airfreight Unpreserved ag for Acid Sulphate Solis; B = Unpres	Vial SG = Sulf	S = Sodium F	1 Iydroxide Prese d Amber Glass;	rved Plastic; AG = Amber ; H = HCI preserved Plas	Glass Unpreserved; AP	- Airfreight Unpreserved	I Plastic Sulfuric Preser	ved Plastic; F = Formaldehyde Preserved Glas

GHD

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https://projects.ghd.com/oc/newcastle1/cs0865hwctemporaryde/Delivery/Documents/2219573_REP_ Contamination Assessment Report.docx

Rev	ent Status Author	Reviewer		Approved for Issue					
No.		Name	Signature	Name	Signature	Date			
0	E Griffin	A Monkley		N Malcolm		11/10/2019			
1	E Griffin	A Monkley	AC	N Malcolm	1. hlel	05/11/2019			

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