



APPENDIX L

LAND CONTAMINATION ASSESSMENT

FINAL

FINAL REPORT

**Wilpinjong Extension Project
Land Contamination Assessment**

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Wilpinjong Extension Project Land Contamination Assessment

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EXECUTIVE SUMMARY

The Wilpinjong Coal Mine is an existing open cut coal mining operation situated in the Western Coalfield approximately 40 kilometres north-east of Mudgee, within the Mid-Western Regional Local Government Area, in central New South Wales (NSW).

Wilpinjong Coal Pty Limited (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Limited (Peabody Energy), is the owner and operator of the Wilpinjong Coal Mine.

WCPL is seeking development consent to extend the Wilpinjong Coal Mine, including both physical extensions to the mine footprint to gain access to additional run-of-mine coal reserves, and an extension to the approved life of the mine. The proposal is herein referred to as the Wilpinjong Extension Project (the Project).

A Land Contamination Assessment is required as part of the Environmental Impact Statement in accordance with clause 7 of the *State Environmental Planning Policy No 55 – Remediation of Land* (SEPP 55). This Land Contamination Assessment was undertaken in the form of a Stage 1 Preliminary Investigation as detailed in the *Managing Land Contamination, Planning Guidelines, SEPP 55 – Remediation of Land*.

For the purposes of this Land Contamination Assessment, the Site is the Project Development Application area. The Project Development Application area includes Mining Lease 1573, the Project Mining Lease Application areas and other surrounding areas. It is noted that the Project would not result in a change of use for the Mining Lease 1573 component of the Site as it is currently used for coal mining.

The objectives of the Stage 1 Preliminary Investigation of the Site were to identify any past or present potentially contaminating activities and to determine if the Site is suitable for the proposed land use (i.e. the Project).

As part of the Stage 1 Preliminary Investigation the following scope of work was undertaken:

- A review of the Site's environmental setting, history and records in order to identify potentially contaminating historical activities (both on-site and off-site). This comprised:
 - review of available natural environment information (e.g. geology, groundwater resources, surface water resources);
 - available land use information;
 - local government records;
 - zoning; and
 - historical and current aerial photos.

- Interviews with Project personnel/former local resident.
- An initial site inspection to identify potentially contaminated areas.
- Preliminary Risk Assessment of the potentially contaminated areas on Site.
- Sampling and analysis of potentially contaminated areas.
- Review of laboratory documentation.
- Reporting of results and performing a Quality Assurance and Quality Control review.
- Recommending management measures where required.
- Assessment of the suitability of the Site for the Project.

The Preliminary Risk Assessment identified that all but one of the potentially contaminated areas at the Site posed a low risk to the environment and human health. The historical Shale Oil Mine at Slate Gully was assessed to pose a medium risk to the environment and/or human health and therefore further investigations were required.

Based on the results of the site inspection, a soil sampling and analysis program for the historical Shale Oil Mine was considered necessary.

A total of 30 soil samples (including four Quality Assurance/Quality Control samples) were collected from five (5) locations (BH1 to BH5).

As the proposed use is mining/extraction the National Environment Protection (Assessment of Site Contamination) Measure, Health-based Investigation Levels (Commercial/Industrial) and National Environment Protection (Assessment of Site Contamination) Measure Environmental Investigation Levels were adopted as Site Acceptance Criteria.

Following an analysis of the field and laboratory Quality Assurance/Quality Control the results contained within this report are suitable for reporting purposes.

There were no exceedances of the Site Acceptance Criteria for any of the analytes tested for. There were some minor total petroleum hydrocarbon and polycyclic aromatic hydrocarbons levels recorded in surface material, which did not exceed the Site Acceptance Criteria. All samples tested for organochlorine pesticides/organophosphorous pesticides and polychlorinated biphenyls were below the laboratory's limit of reporting.

The outcomes of the Preliminary Risk Assessment were reviewed in consideration of the soil analysis results. Given there were no exceedances of the Site Acceptance Criteria at the historical Shale Oil Mine at Slate Gully, the historical Shale Oil Mine is considered to pose a low risk to the environment and/or human health.

No further investigations are therefore considered to be required.

On the basis of the results of the Stage 1 Preliminary Investigation, it is considered that the Site is suitable for the land use proposed by the Project (including those areas outside of Mining Lease 1573 where a change of land use is proposed).

1 INTRODUCTION

The Wilpinjong Coal Mine is an existing open cut coal mining operation situated in the Western Coalfield approximately 40 kilometres (km) north-east of Mudgee, within the Mid-Western Regional Local Government Area, in central New South Wales (NSW) (**Figure 1**).

Wilpinjong Coal Pty Limited (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Limited (Peabody Energy), is the owner and operator of the Wilpinjong Coal Mine.

WCPL is seeking development consent to extend the Wilpinjong Coal Mine, including both physical extensions to the mine footprint to gain access to additional run-of-mine coal reserves, and an extension to the approved life of the mine. The application also includes the existing approved operations of the Wilpinjong Coal Mine. The proposal is herein referred to as the Wilpinjong Extension Project (the Project).

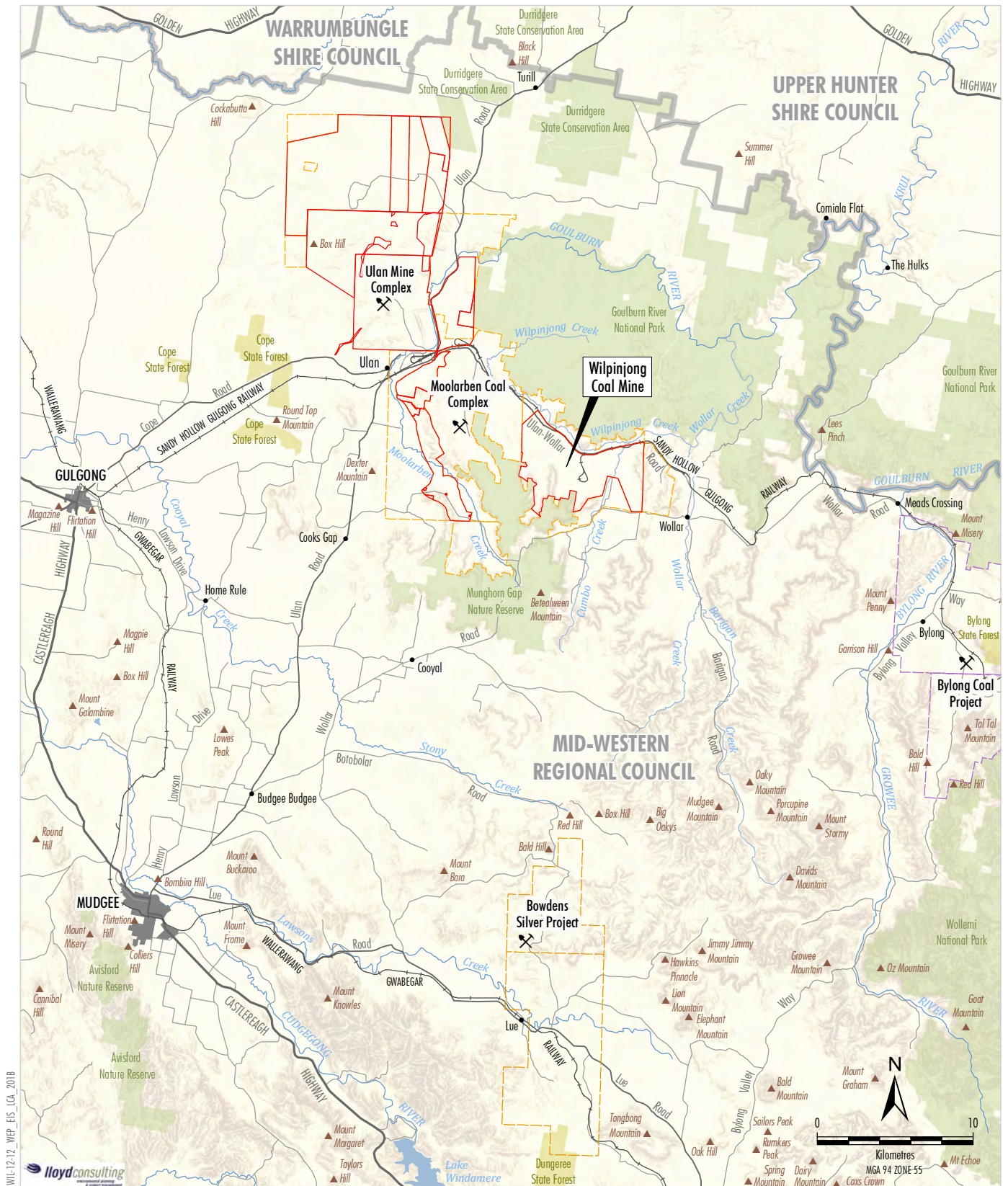
A detailed description of the Project is provided in Section 2 of the Main Report of the Project Environmental Impact Statement (EIS) (WCPL, 2015).

A Land Contamination Assessment is required as part of the EIS in accordance with clause 7 of the *State Environmental Planning Policy No 55 – Remediation of Land* (SEPP 55). This Land Contamination Assessment was undertaken in the form of a Stage 1 Preliminary Investigation as detailed in the *Managing Land Contamination, Planning Guidelines, SEPP 55 – Remediation of Land* (NSW Department of Urban Affairs and Planning/Environmental Protection Authority [DUAP/EPA], 1998).

This Land Contamination Assessment has been prepared for the Project Development Application area (the Site) (**Figure 2**).

1.1 Objectives

The objectives of the Stage 1 Preliminary Investigation of the Site were to identify any past or present potentially contaminating activities and to provide a preliminary assessment of any contamination to determine if the Site is suitable for the proposed land use (i.e. the Project).



Peabody
WILPINJONG EXTENSION PROJECT
Project Location

Figure 1

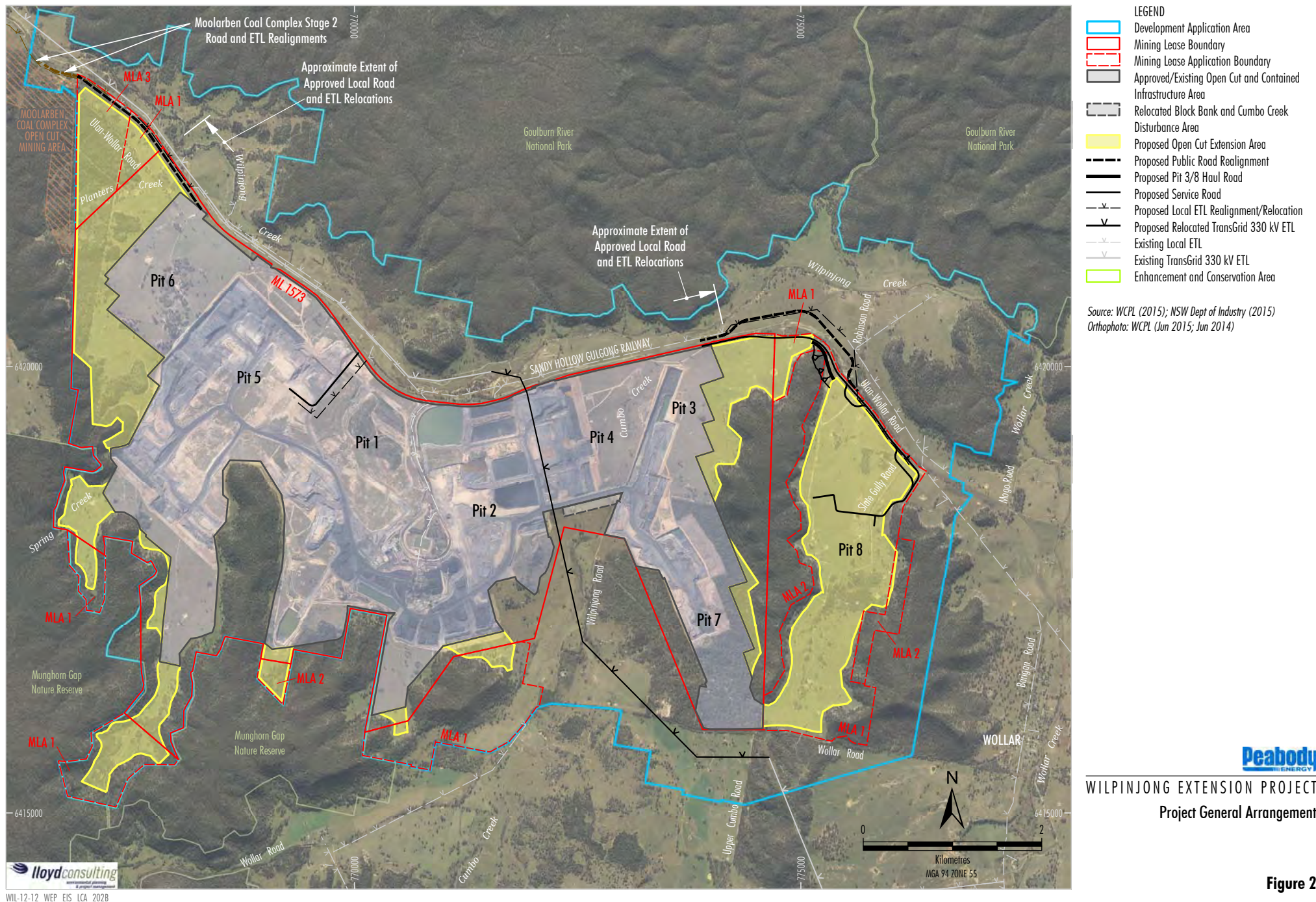


Figure 2

1.2 Scope of Works

The scope of work conducted for the Stage 1 Preliminary Investigation is as follows:

- A review of the Site's environmental setting, history and records in order to identify potentially contaminating historical activities (both on-site and off-site). This comprised:
 - review of available natural environment information (e.g. geology, groundwater resources, surface water resources);
 - available land use information;
 - local government records;
 - zoning; and
 - historical and current aerial photos.
- Interviews with Project personnel/former local resident.
- An initial site inspection to identify potentially contaminated areas.
- Preliminary Risk Assessment of the potentially contaminated areas on Site.
- Sampling and analysis of potentially contaminated areas.
- Review of laboratory documentation.
- Reporting of results and performing a Quality Assurance (QA) and Quality Control (QC) review.
- Recommending management measures where required.
- Assessment of the suitability of the Site for the Project.

1.3 Methodology

The Land Contamination Assessment was undertaken in general accordance with the following guidance documents:

- *Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land* (DUAP/EPA, 1998);
- *Guidelines for Consultants Reporting on Contaminated Sites* (NSW Office of Environment and Heritage, 2011); and
- *National Environmental Protection (Assessment of Site Contamination) Measure (NEPM) 1999* (as amended) (National Environment Protection Council, 2013).

The *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites* (Australian and New Zealand Environment and Conservation Council and National Health and Medical Research Council, 1992) was rescinded in March 2002.

2 SITE DESCRIPTION

This section provides a description of the Site. A more detailed description of the Project area (including the Site) is provided in Sections 2 and 4 of the Main Report of the EIS.

2.1 Site Details

The Project is located approximately 40 km north-east of Mudgee in central NSW.

For the purposes of this Land Contamination Assessment, the Site is the Project Development Application area (**Figure 2**). The Project Development Application area includes ML 1573, the Project Mining Lease Application areas and other surrounding areas (**Figure 2**).

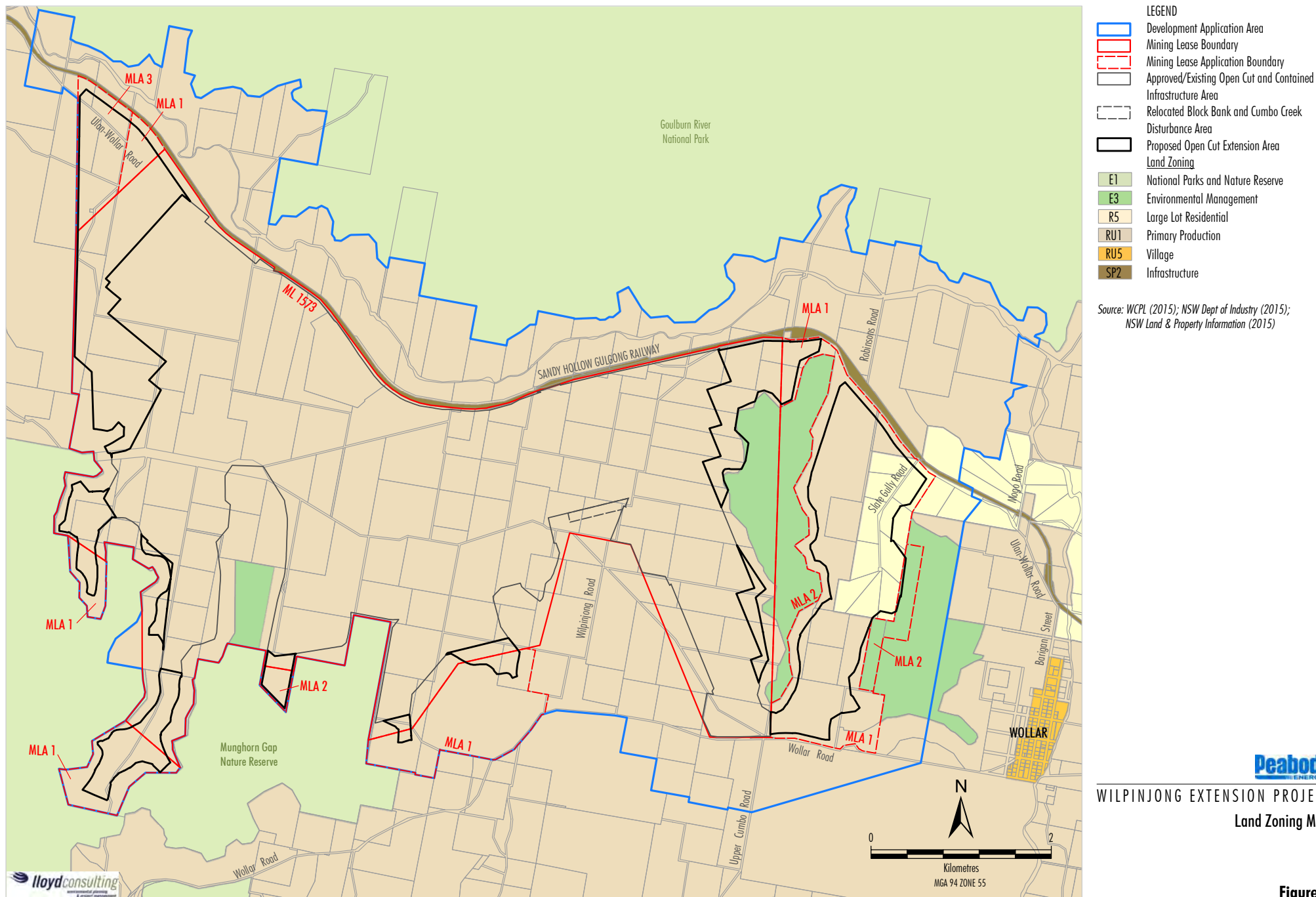
The majority of the Site is currently cleared and predominately used for coal mining (i.e. ML 1573), agriculture (cattle and sheep grazing), vegetated areas and also contains a number of houses, buildings, yards, dams and sheds. It is noted that the Project would not result in a change of use for the ML 1573 component of the Site as it is currently used for coal mining.

This Site is situated within the Mid-Western Regional Council Local Government Area on land zoned Zone RU1 (Primary Production), Zone R5 (Large Lot Residential) and Zone E3 (Environmental Management) under the *Mid-Western Regional Local Environmental Plan 2012* (**Figure 3**). Further detail on the zoning of the Project area is provided in Section 6 of the Main Report of the EIS. The property information for the Site is provided in **Appendix A**.

Land ownership in the Site is shown on **Figure 4**.

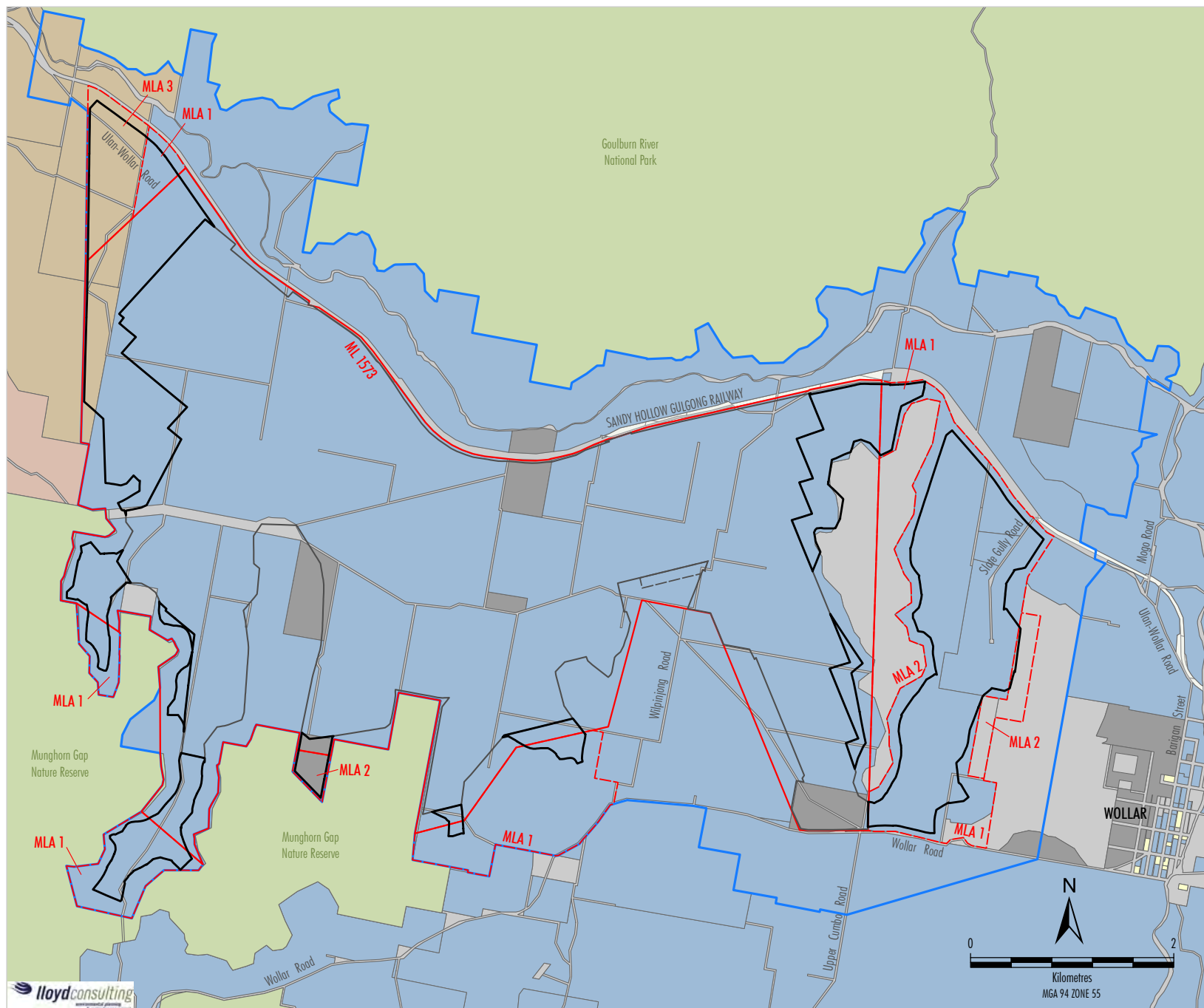
2.2 Surrounding Land Uses

The Goulburn River National Park is located to the north of the Site and the Munghorn Gap Nature Reserve is located to the south-west of the Site. The Moolarben Coal Complex is located to the west of the Site. The village of Wollar is located to the east of the Site. Areas of Crown land are also located to the east of and within the Site (**Figure 4**).



Peabody
 WILPINJONG EXTENSION PROJECT
 Land Zoning Map

Figure 3



- LEGEND
- Development Application Area
 - Mining Lease Boundary
 - Mining Lease Application Boundary
 - Approved/Existing Open Cut and Contained Infrastructure Area
 - Relocated Block Bank and Cumbo Creek Disturbance Area
 - Proposed Open Cut Extension Area
- Land Ownership
- Peabody Energy
 - Moolarben Coal Mine
 - Ulan Coal Mine
 - Crown Land (Special Lease)
 - Crown Land
 - Relevant Private Landholders
 - National Parks and Wildlife Service
- Source: WCPL (2015); NSW Trade & Investment (2013) and NSW Land & Property Information (2015)

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ENERGY

WILPINJONG EXTENSION PROJECT
Land Ownership

Figure 4

Existing development immediately surrounding the Site include (**Figure 2**):

- Moolarben Coal Complex;
- Ulan-Wollar Road;
- Wollar Road;
- electrical infrastructure (330 kilovolts [kV], 66 kV and low voltage powerlines);
- telecommunications infrastructure (buried fibre optic cable and copper cables); and
- residential and rural buildings and farm dams.

2.3 Regional Geology

The Site is located within the Western Coalfield along the north western edge of the Sydney Basin. The basement rocks in this area comprise Early Permian Rylstone Volcanics of the Lachlan Foldbelt. The basin deposits include conglomerates, sandstones and siltstones of the Late Permian Shoalhaven Group which are overlain by sandstones, claystones and coal deposits of the Illawarra Coal Measures. The Illawarra Coal Measures contains all of the prospective coal seams, and this formation is overlain by conglomerates and sandstones of the Triassic Narrabeen Group. The rocks of the Narrabeen Group have since been eroded to form the present day landscape, dominated by cliffs and extensive plateaus to the north and south of the mine area (Geo-Environmental Management, 2015).

Quaternary alluvial deposits occur throughout the region and in some parts of the Project area palaeochannels occur within the coal measures that have been in-filled with deposits, consisting predominantly of sand and clay (Geo-Environmental Management, 2015).

2.4 Site Topography

The topography of the area in the vicinity of the Site comprises narrow flood plains associated with the tributaries of the Goulburn River, undulating foothills, ridges and escarpments of the Great Dividing Range and the dissected landforms of the Goulburn River National Park.

Local elevations range from approximately 350 metres (m) Australian Height Datum (AHD) on Wilpinjong Creek, to approximately 610 m AHD to the south of the Site along the Great Dividing Range. Within the Site, elevations generally range from 350 to 500 m AHD.

2.5 Regional Hydrogeology

Two distinct groundwater systems have been identified by HydroSimulations (2013) in the Site area:

- alluvial groundwater system – associated primarily with Wilpinjong Creek; and
- porous rock groundwater system – primarily the Illawarra Coal Measures.

An assessment of the potential impacts of the Project on groundwater resources (including identification of groundwater users) has been conducted and is included in Appendix C of the EIS.

2.6 Surface Waters

The Site is located in the greater Wollar Creek catchment which drains to the Goulburn River approximately 12 km to the north-east of the Site. The greater Wollar Creek catchment consists of a number of tributaries including Wilpinjong Creek, Spring Flat Creek and Barigan Creek).

At a local level, the Site lies in the Wilpinjong Creek catchment and is drained by a number of local tributary watercourses. Wilpinjong Creek flows into Wollar Creek approximately 4 km downstream of the confluence of Cumbo and Wilpinjong Creeks.

The tributaries of Wilpinjong Creek within the Site range from small ephemeral and semi-perennial spring fed streams in the upper reaches near the Munghorn Gap Nature Reserve to wide ill-defined ephemeral creeks in the lower reaches near Wilpinjong Creek.

An assessment of the potential impacts of the Project on surface water resources (including identification of surface water users) has been conducted and is included in Appendix D of the EIS.

3 SITE HISTORY

3.1 Historical Aerial Photograph Review

Historical aerial photographs were obtained from NSW Department of Land and Property Information, and are shown on **Figures 5 and 6**. Information obtained from the review of these photographs is provided in **Table 3-1**. A number of areas of interest (AOI) are discussed below and shown on **Figure 7**. These AOIs were further investigated during the site inspection (**Section 4.2**).

Table 3-1 Historical Aerial Photograph Review

Photograph Details	Observations	
	Site	Surrounding Land
1955	The Site mostly consists of cleared agricultural areas and vegetated areas. Scattered water storage dams are present within the cleared agricultural areas. Ephemeral water courses traverse through a number of these areas. Two AOI were identified to the east of the Site (AOI-1 and AOI-2). It is possible that AOI-1 was previously used for waste disposal as it appears that a disturbed mound of soil is present. AOI-2 appears to contain temporary fencing, which may have been used for spraying sheep or cattle.	North: To the north of the Site is large vegetated area. South, East and West: The land has been cleared for agriculture in some areas with the rest remaining as vegetated areas. There are some ephemeral creeks.
1964	The Site had no significant changes other than some additional minor infrastructure present. AOI-3 appears to be a small water storage dam or shed, with AOI-4 appearing to be a small storage shed. Disturbed soil and a mound are present at AOI-5 and may contain waste materials. The mound identified in AOI-1 is no longer visible in this photograph. AOI-6 and AOI-7 contain a farmhouse and associated sheds.	No significant changes.
1980	The Site has no significant changes, apart from farm houses and associated sheds and water storage dams being constructed. It would appear that the location of AOI-1, AOI-3, AOI-4 and AOI-5 are now water storage areas. And that AOI-2 now contains a mound, possible buried infrastructure from previous years. It appears that holding yards are present in AOI-8, with a farmhouse present in AOI-9. These two areas may form part of AOI-6 and AOI-7. At AOI-10 disturbed soil is present and may be a possible waste disposal site. At AOI-11 and AOI-12 it appears there may be some storage sheds present.	The only significant change is to the north west where extensive clearing has occurred along Ulan-Wollar Road and Wilpinjong Creek.
1998	The Site has no significant changes, apart from farm houses and associated sheds and water storage dams being constructed. There appears to be a refuse area at AOI-13. There is no visible infrastructure or evidence of infrastructure left at AOI-6, 7 and 8. There is a water storage dam present at AOI-9. AOI-14 and AOI-15 contain possible chemical storage sheds. No sheds are visible at AOI-11 however further north are possible chemical storage sheds and a homestead (AOI-16). There is a mound of disturbed soil present at AOI-17 that may be a possible waste disposal site. AOI-18 contains a numerous vehicles and may be a vehicle disposal site. AOI-19 contains possible chemical storage sheds. AOI-1, 3, 4 and 5 are water storage dams. A number of unknown objects are present at AOI-20.	The area has developed further with additional farmhouses being constructed. Additional dams for water storage have been constructed. The surrounding vegetated area has not changed significantly.

Photograph Details	Observations	
	Site	Surrounding Land
2013	The Wilpinjong Coal Mine has been developed in the centre of the Site. AOI-13 is covered by trees and no longer visible. An aboveground storage tank appears to be present at AOI-21 . Two homesteads with possible chemical storage have been constructed at AOI-22, AOI-23, AOI-24 and AOI-26 . Remnants of a historical Shale Oil Mine Complex (Section 3.3) are visible at AOI-25 .	The surrounding land uses have not changed significantly since 1998.

3.2 Previous Land Contamination Assessment

As described in **Section 2.1**, the Site includes ML 1573. A Stage 1 Preliminary Investigation focussed on ML 1573 was prepared by Australasian Groundwater & Environmental (AGE) (2005) for the Wilpinjong Coal Mine. AGE (2005) concluded that *...the study area is considered suitable for the landuse change from agriculture to the development of the Wilpinjong Coal Project.*

3.3 Local Government Records

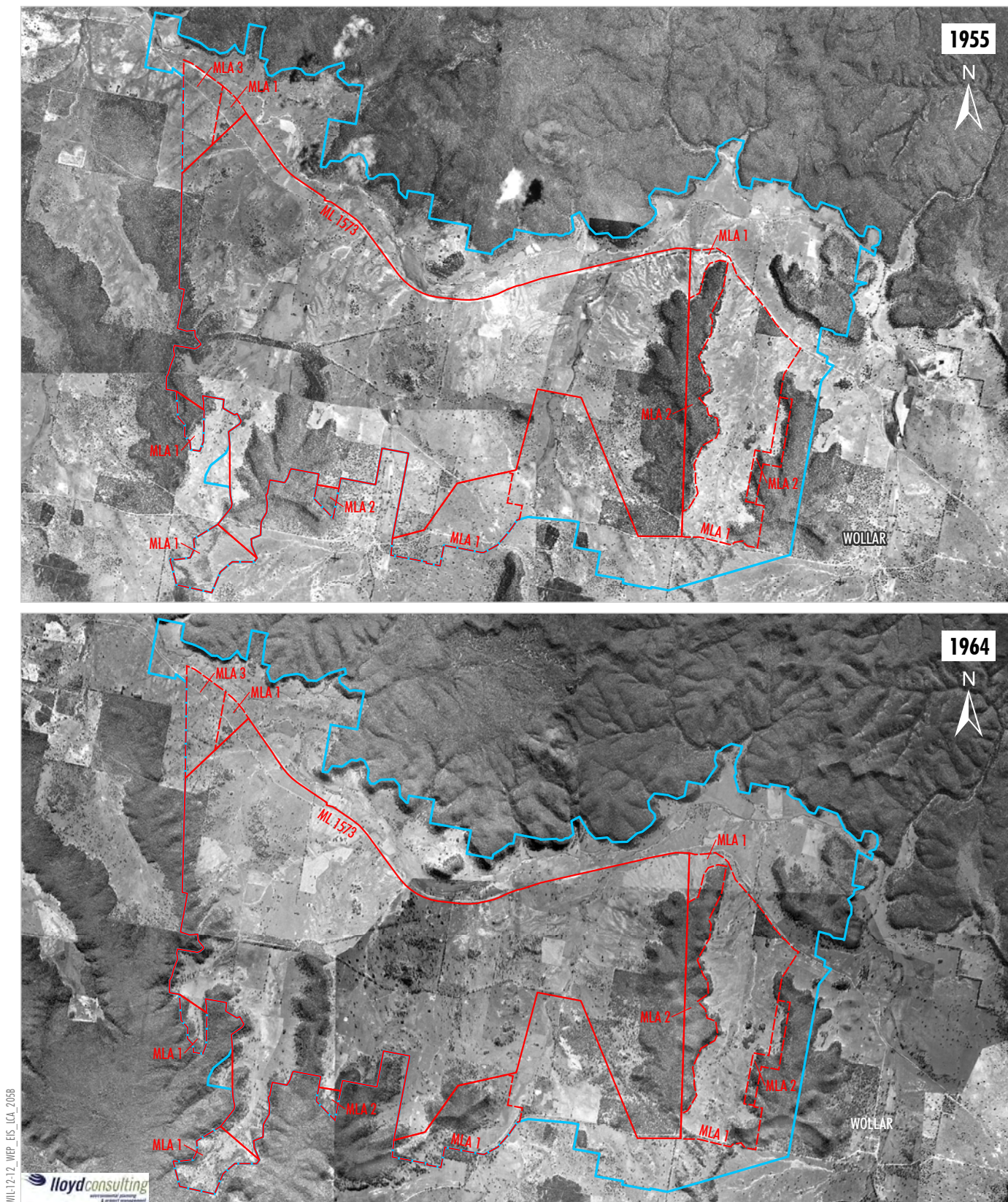
The Project area is located in the Mid-Western Regional Council Local Government area (**Figure 1**). A contaminated land search query for the allotments located in the Site was sent to the Mid-Western Regional Council. The Mid-Western Regional Council advised in reply that it did not maintain a contaminated land register.

A copy of the letter from the Mid-Western Regional Council is provided in **Appendix B**.

3.4 Heritage Items

Items of historic heritage recorded at the Project include the historical Shale Oil Mine at Slate Gully (**AOI-25**) (**Figure 7**), cottage and shed ruins, a road embankment and the remnants of the former St James Church (Niche Environment and Heritage, 2015).

The historical Shale Oil Mine was operated from approximately 1929 to 1933. In c1933 the Shale Oil Mine was closed as the costs of setting up the mine (including the purchase of machinery) and the operation and production of the mine were too great. Drums of oil were abandoned in the paddock for sometime after as they were unable to be sold (Niche Environment and Heritage, 2015).



LEGEND

- Development Application Boundary
- Mining Lease Boundary
- Mining Lease Application Boundary

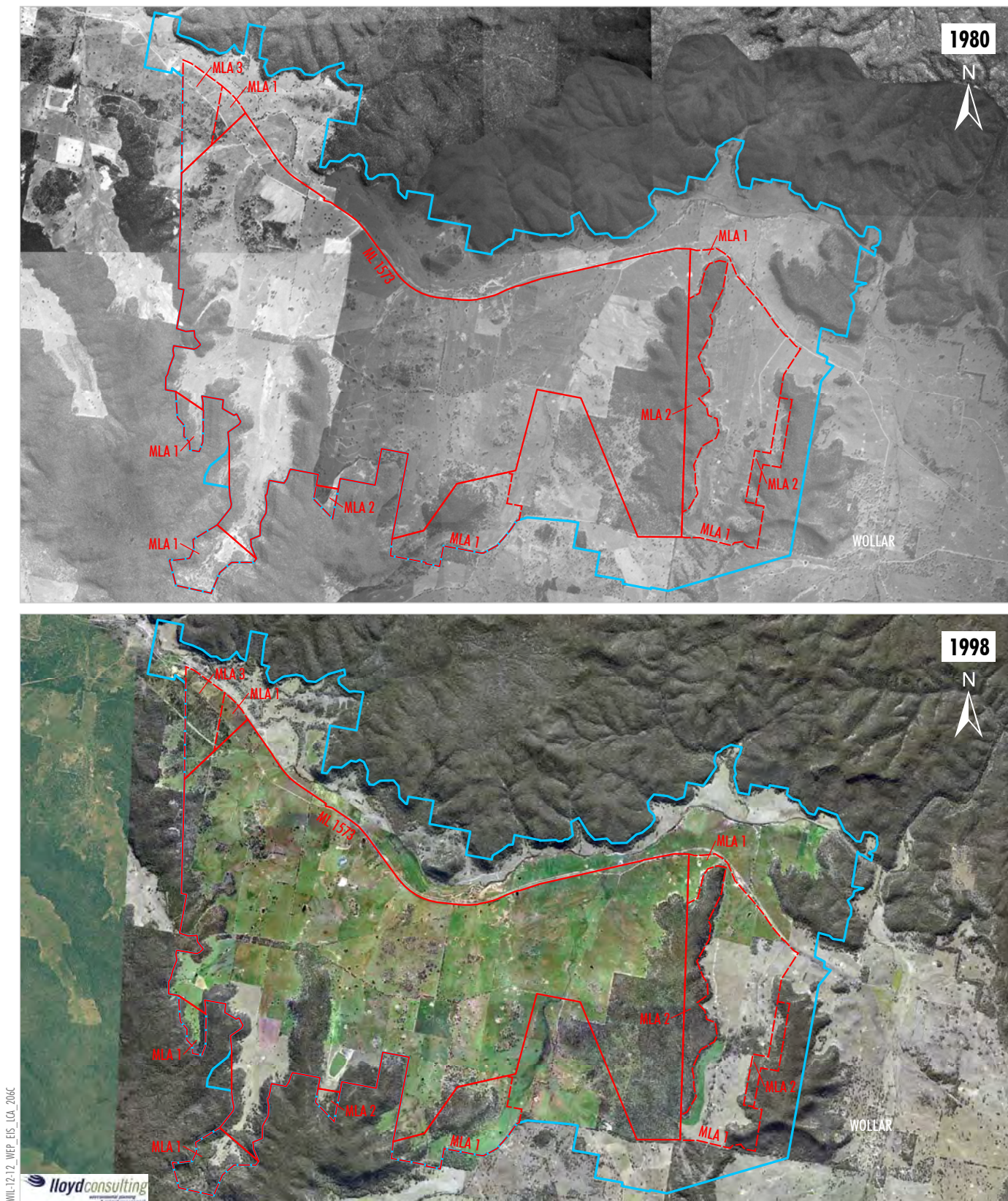
Source: WCPL (2015)

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WILPINJONG EXTENSION PROJECT

Historical Aerial Photographs
1955 and 1964

Figure 5



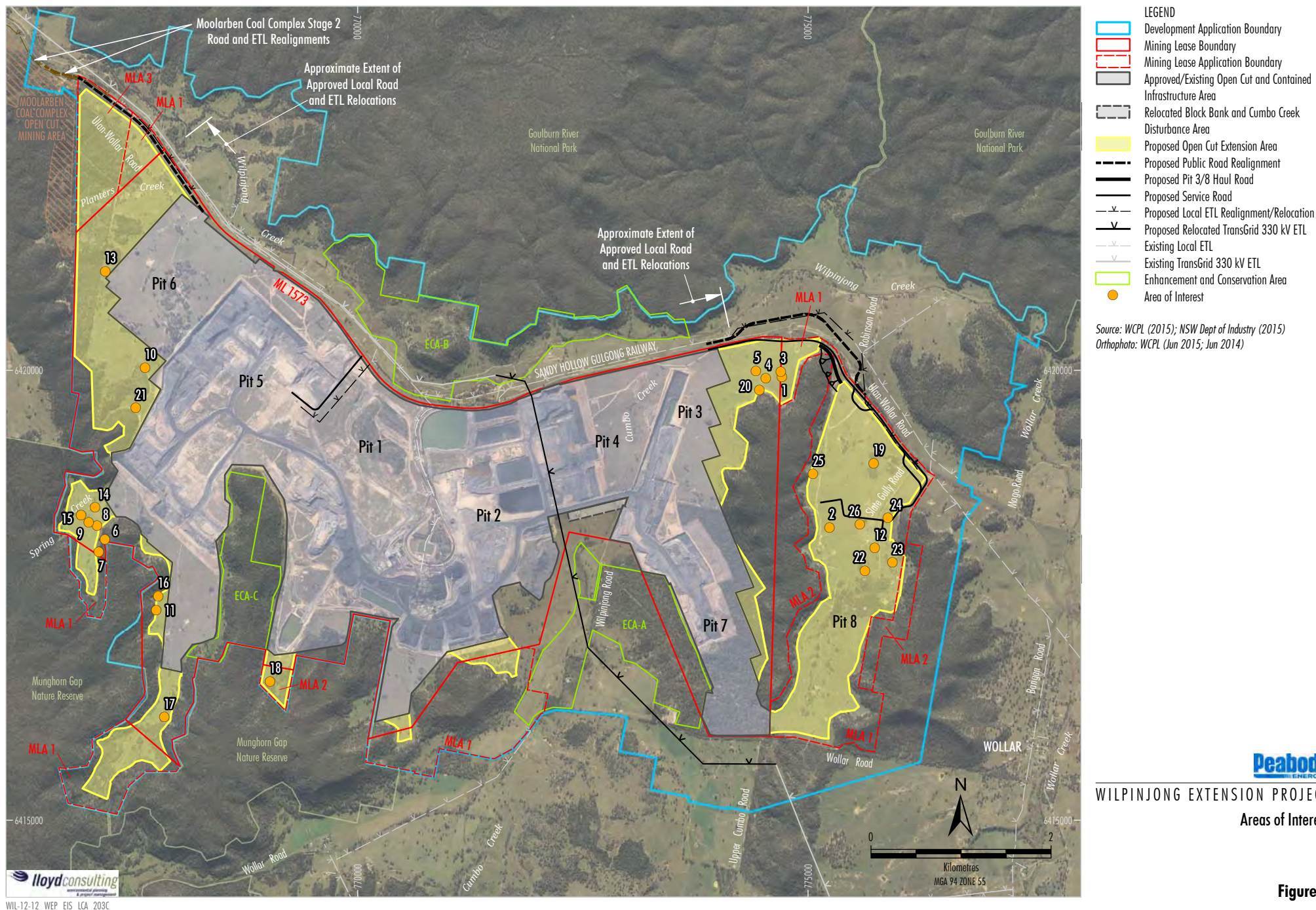


Figure 7

The layout of the historical Shale Oil Mine complex (**AOI-25**) consists of the following components (Niche Environment and Heritage, 2015) (**Figure 8**):

- Historical mine adit;
- retort ruins;
- chimney remains;
- ramp leading to retort;
- ventilation shaft;
- caretaker's residence (potential location);
- post and rail fence remains; and
- timber slabs.

The historical mine adit is located at the base of the slope associated with the ridgeline that separates Slate Gully from the existing Wilpinjong Coal Mine. Remnant post and rail fencing, a cart ramp and a ventilation shaft are all located on the lower slopes of the ridgeline. The remains of the retort are located on the valley floor. Evidence of the caretaker's hut is located on a rise within the valley. A stockpile of hardwood timber planks is located on the valley floor near the historical mine adit (Niche Environment and Heritage, 2015).

Large concrete blocks, lying next to a concrete slab are the ruins of the shale oil retort. Remnant identifiable items include a furnace and some metal posts (Niche Environment and Heritage, 2015).

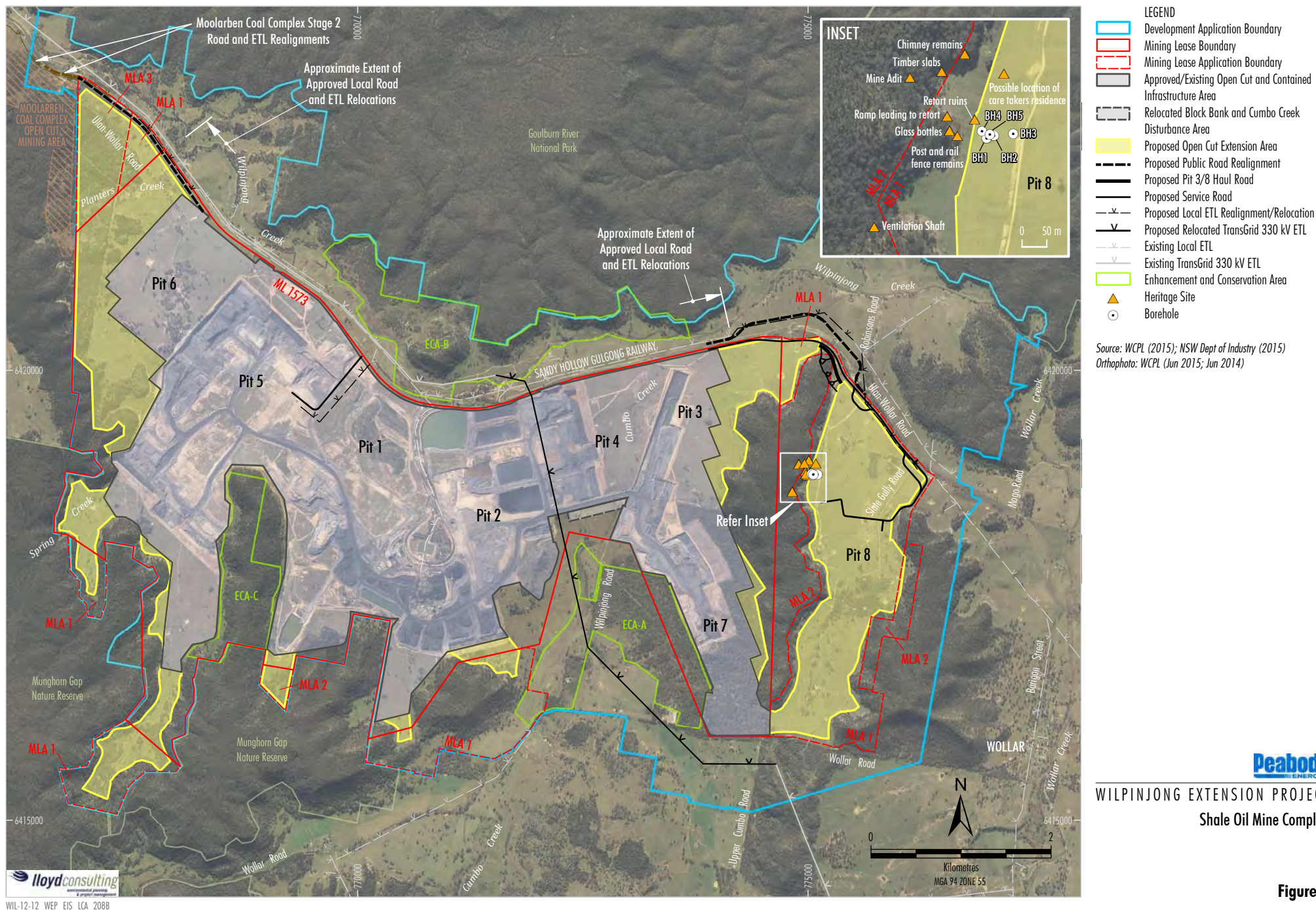
The shale was heated in the retort to extract shale oil. Shale waste from the retort was disposed in the adjacent paddock.

3.5 Historical Organisations

A review of the following online historical organisations located in the Mid-Western Regional Council local government area was undertaken:

- Colonial Inn Museum and Mudgee Historical Society Inc. (2010);
- Mudgee District Local History (2012); and
- Gulgong Pioneers Museum (n.d.).

The review focused on possible contaminating activities at the Site. The review indicated that sheep farming commenced in the region around 1830 and gold mining occurred in the 1850s. There was no mention of the historical Shale Oil Mine at Slate Gully.



4 SITE INSPECTION

The Site history review (**Section 3**) identified the majority of the allotments within the Site appeared to have been used for agriculture (cattle and sheep grazing).

4.1 Site Interviews

A Lloyd Consulting senior environmental consultant interviewed Mr Lloyd Coleman, a previous landholder in the Site area who is currently employed by Peabody Energy. The interview related to the historical land uses on and off the Site and in particular any potential contaminating activities. The interview identified that historically the land was generally used for agriculture (sheep and cattle grazing). Cattle tick was not prevalent in the area and therefore cattle tick treatment for sheep and cattle was in general not used. Pesticides were however used to eradicate weeds. These were stored in small quantities in storage sheds.

Mr Coleman identified the historical Shale Oil Mine at Slate Gully, which he said was established for a brief amount of time due to the lack of shale oil produced from the mine. Further information regarding the historical Shale Oil Mine was sought from Niche Environment and Heritage (2015) and this is summarised in **Section 3.4**.

4.2 Site Inspection

Based on the results of the Site history review a Lloyd Consulting senior environmental consultant undertook a Site inspection on 1 April 2014. The AOIs identified during the Site history review (**Section 3**) were inspected. AOIs identified in the Site history review that contained no infrastructure or evidence of past activities are not included in the photographic log below as only vacant cleared land remained. AOIs that contained some evidence of infrastructure are shown and discussed in the photographic log (**Table 4-1**). AOIs are shown on **Figure 7**.

Table 4-1 Photographic Log

Area and Description	Photograph
AOI-11 This AOI may have been used for disposal of materials or been a shed that had been demolished. Old drums and chemical storage containers were present.	 Photo 1 Dumping Area
AOI-12 Cattle yards were present. There was no evidence of a cattle dip or spray race present.	 Photo 2 Holding Yards
AOI-13 This AOI was previously used for logging.	 Photo 3 Remnants From Logging

Area and Description	Photograph
AOI-14 There was an old shed present which contained some old drums as well as an aboveground storage tank. There were no visible signs of staining around the aboveground storage tank or spills in the old shed.	 Photo 4 Old Shed  Photo 5 Aboveground Storage Tank
AOI-15 There was an old storage shed present that contained a 44 gallon drum. Yards were adjacent to the shed. There was no evidence of a cattle dip or spray race present.	 Photo 6 Storage Shed

Area and Description	Photograph
AOI-16 A storage shed was present that contained a number of empty chemical drums. A room within the shed also contained some herbicides and other chemicals (it is noted that Peabody Energy was in the process of removing the containers). A pump room was also present that contained surface staining from diesel and oils. A woodwork workshop was also present, along with a farmhouse.	 Photo 7 Chemical Storage Drums  Photo 8 Pump Room  Photo 9 Area Outside the Pump Room

Area and Description	Photograph
<i>AOI-16 (continued)</i>	 Photo 10 Woodwork Shed
<i>AOI-17</i> There were no visible signs of waste disposal present, with only a 44 gallon drum used for shooting practice present.	 Photo 11 44 Gallon Drum

Area and Description	Photograph
AOI-18 Vehicles that were previously present on the aerial photograph have been removed from the AOI, with the only evidence remaining being a bonnet from an old vehicle used for shooting practice and a machinery tyre. It is understood that the previous owner of the site stored vehicle parts at this AOI.	 Photo 12 Bonnet Used for Shooting  Photo 13 Old Tyre
AOI-19 The AOI contained an old car as well as a water storage dam.	 Photo 14 Old Car & Dam Present to the Rear of the Photograph

Area and Description	Photograph
AOI-20 The suspected storage sheds viewed in the aerial photograph were actually large rocks that had dislodged from the mountain top.	 Photo 15 Boulders Located at the Foot of the Hill
AOI-22 A small house was present with no evidence of chemical storage.	 Photo 16 Farmhouse
AOI-23 Holding yards were present however no signs of any cattle dips or spray races were evident. A farmhouse was also present on site.	 Photo 17 Holding Yards

Area and Description	Photograph
AOI-24 A groundwater bore was present as well as piping leading up to the farmhouse. Cattle loading yards were present adjacent to the bore. A storage shed was present which contained a small slab of concrete that may have been used for machinery storage.	 Photo 18 Groundwater Bore  Photo 19 Pipeline & Loading Yards  Photo 20 Storage Shed

Area and Description	Photograph
AOI-25 Remains of the historical Shale Oil Mine were present. An area of possible shale waste disposal near the retort ruins is present with obvious surface staining. There are concrete blocks from the retort are also present.	 Photo 21 Historical Shale Oil Mine Complex Area  Photo 22 Large Cement Blocks from Retort  Photo 23 Possible Shale Waste Disposal Area

Area and Description	Photograph
<i>AOI-25 (continued)</i>	 Photo 24 Possible Shale Waste Disposal Area  Photo 25 Possible Location of a Drainage Line that leads to the Paddock for Shale Waste Disposal
AOI-26 A small farmhouse was present. There were no storage sheds.	 Photo 26 Small Farmhouse

4.3 Potential Contamination

Following the site inspection, AOIs identified as containing possible contaminated areas were then assessed using a preliminary risk assessment based on the Australia and New Zealand Standard (AS/NZS) ISO 31000:2009 *Risk management – Principles and guidelines*, which considers the source, the likelihood of exposure and the potential receptors.

4.3.1 Preliminary Risk Assessment

Using the available information, the preliminary risk assessment identifies the likelihood of the hazard causing harm or injury and the severity of that harm or injury. To do this, the following activities were undertaken:

1. An evaluation of the likelihood of an injury or environmental damage occurring and the likely severity of that injury or environmental damage, using the risk matrix to assign a risk rating (see **Table 4-2**). The following risk matrix assigns a risk category from 1 to 5 (Minor to Catastrophic) to indicate the potential risk to human health or the environment.
2. Identify the factors that may be contributing to the risk (i.e. spills, poor housekeeping, age of structures, etc).
3. Where applicable, review health and safety information that is relevant to the particular hazard (such as Material Safety Data Sheets, etc).

The preliminary risk assessment considered the potentially contaminating activity, the quantities of potentially contaminating materials observed, and the condition of the AOIs. **Section 4.2** provides a description of the AOIs that contained potentially contaminated areas. Further, consideration of the likelihood of exposure or environmental damage from the possible contamination and the potential receptors (e.g. mine workers, local residents, local waterways, and groundwater aquifers) was also given. The contaminant/pathway/receptor model shown on **Figure 9** was used to inform preliminary risk assessment.

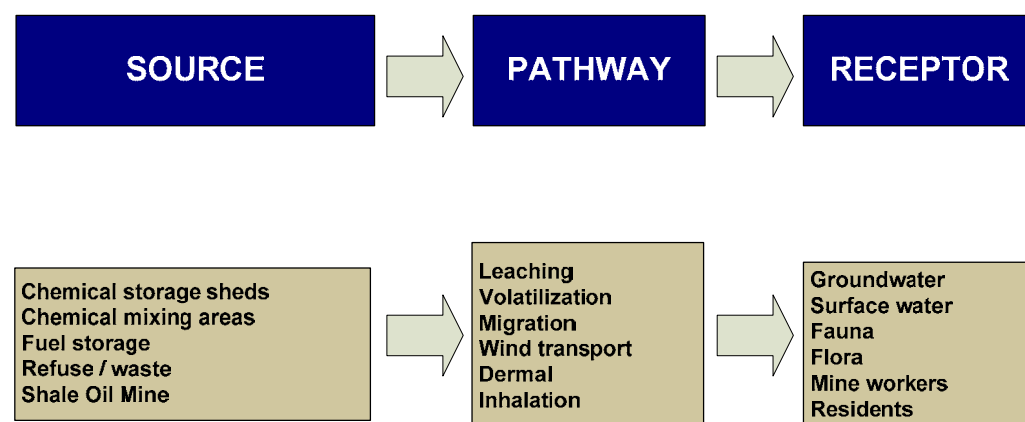


Figure 9 Contaminant/Pathway/Receptor Model

The following risk matrix generally based on AS/NZ ISO 31000:2009 was used to determine the risk ratings for the preliminary risk assessment (**Table 4-2**).

Table 4-2 Risk Matrix

Potential Consequences or Impacts		Likelihood				
		Almost Certain (A)	Highly Likely (B)	Likely (C)	Possible (D)	Very Unlikely (E)
Hazard Severity		Several times per month	Once per month	Once per year	Once every 10–20 years	Once every 100 years
(1) Minor	Near miss with minor potential consequence.	Medium	Medium	Low	Low	Low
(2) Significant	Doctor treatment injury. Short term environmental damage.	High/Med	Medium	Medium	Low	Low
(3) Serious	Lost time injury or non-life threatening health issue. Serious environmental damage.	High	High/Med	Medium	Medium	Low
(4) Major	Single fatality or extreme injury or permanent health issue. High level environmental damage.	High	High	High/Med	Medium	Medium
(5) Catastrophic	Multiple fatalities, long term environmental damage. High level prosecution expected.	High	High	High	High/Med	Medium

Potentially contaminating activities, the relevant chemicals for the Site and potential risks were identified in **Table 4-3**.

Table 4-3 Risk Assessment

Activity	AOI	Chemical	Description	Consequence	Likelihood	Risk Rating
Agriculture – minor pesticide storage and use	11, 16	Pesticides/ Herbicides	Persistent organochlorine (OC) and organophosphorous (OP) pesticides and herbicides were likely to have been used in earlier farming practices. These were generally stored in low quantities and on a concrete sealed surface.	2 – Significant	E – Very unlikely	Low
Agriculture – minor fertiliser storage and use	11	Fertilisers	Nutrient contamination of groundwater may occur when over applied to soils. These were generally stored in low quantities and on concrete or low permeability clay surfaces.	2 – Significant	E – Very unlikely	Low
Agriculture – minor fuel storage and use	11, 14, 15, 16, 17, 24	Hydrocarbons	Fuel spills may cause Total Petroleum Hydrocarbon (TPH), Benzene, Toluene, Ethylbenzene, Xylenes, Naphthalene (BTEXN), and Polycyclic Aromatic Hydrocarbons (PAH) contamination to soils, groundwater and surface water. One aboveground storage tank was present (AOI-14), however, there were no visible signs of spillage or odours present.	3 – Serious	E – Very unlikely	Low
Historical shale oil mining	25	Hydrocarbons, Polychlorinated Biphenyls (PCBs), metals, OC/OPs, BTEXN and PAHs	Shale waste disposed to an adjacent paddock from the shale that was burned in the retort is likely to have caused TPH and BTEXN contamination of soils and possibly groundwater over time. The presence of surface staining is visible on site.	3 – Serious	D – Possible	Medium

4.3.2 Summary of Potential Risks

The Preliminary Risk Assessment identified that all but one of the potentially contaminated areas at the Site posed a low risk to the environment and human health. The historical Shale Oil Mine at Slate Gully (**AOI-25**) was assessed to pose a medium risk to the environment and/or human health and therefore further investigations were required (**Section 5**).

5 SOIL SAMPLING AND ANALYSIS

Based on the results of the site inspection (**Section 4**), a soil sampling and analysis program for the historical Shale Oil Mine at Slate Gully (**AOI-25**) was considered necessary.

5.1 Methodology

An inspection of the historical Shale Oil Mine (**AOI-25**) was conducted on 2 February 2015. The site inspection was used to confirm proposed soil sampling locations.

Samples were collected in accordance with the principles described in *Australian Standard (AS) 4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds* and *AS 4482.2-1999 Guide to the sampling and investigation of potentially contaminated soil Part 2: Volatile substances*.

Sample collection included sufficient QC duplicate and triplicate samples to satisfy the requirements of the *National Environment Protection Council Schedule B(2) – Guideline on Data Collection, Sample Design and Reporting* (NEPM). A rinsate sample was not collected as samples were collected directly from the flight of the auger.

Samples were selected from each soil investigation borehole for laboratory analysis such that they target the maximum impact indicated by known historical land-uses (i.e. surface soils), and attempt to achieve the inferred vertical extent of impact. Samples were collected on a judgemental basis.

Samples were collected directly from the flight of the auger using a stainless steel trowel and disposable nitrile gloves. Decontamination of sampling equipment was not required due to sample collection methodology. New nitrile gloves were used for each sample collected to avoid cross contamination. Soil profiles were logged during sampling (**Appendix C**).

Where hydrocarbons were suspected a Photo Ionization Detector (PID) was used to assist in sample selection for laboratory analysis (for the determination of hydrocarbon contamination). Results from the PID are available in the Borelogs (**Appendix C**).

Upon the completion of the investigation auger holes were backfilled and the site was returned to its previous condition.

5.2 Inspection

An inspection of the historical Shale Oil Mine Complex (**AOI-25**) was conducted on 2 February 2015.

A description of the historical Shale Oil Mine Complex is provided in **Section 3.4**.

The site sloped down from the hills in the west to the east. To the south-east of the retort ruins was a shale waste disposal area (Photos 23 and 24). The retort ruins contained concrete slabs and old building waste (Photos 21 and 22). No visual signs of contamination were evident at the time of the inspection. A drainage line (Photo 25) appeared to extend from the retort ruins to the shale waste disposal area.

Areas that were identified as being potentially contaminated were:

- downslope of the retort ruins (BH4 and BH5);
- shale waste disposal area (BH1); and
- downslope of the shale waste disposal area (BH2 and BH3).

The soil sample locations in each of these areas are shown on **Figure 8**.

Soil samples were not collected in the immediate vicinity of the retort ruins to avoid disturbing these potential heritage sites.

5.3 Soil Collection

Samples were collected at the surface (0.2 m), 0.5 m and then 1 m intervals to a maximum depth of 4 m below ground level in accordance with the guidelines outlined in **Section 5.1**.

A total of 30 soil samples (including four QA/QC samples) were collected from five (5) locations (BH1 to BH5).

Samples were analysed for a combination of the following analytes:

- Hydrocarbons (TPH, PAH and BTEXN);
- Metals (Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc);
- OC/OP; and
- PCBs.

5.4 Site Acceptance Criteria

The Site Acceptance Criteria adopted for soils at the Site is listed in **Table 5-1**. The Site Acceptance Criteria were selected considering potential exposure pathways through activities such as surface works, construction or land clearing.

As the proposed use is mining/extraction the NEPM, Health-based Investigation Levels (HIL-D) (Commercial/Industrial) are to be considered with the level of protection considering final site end use.

Environmental Investigation Levels (EILs) were also considered. EILs are only used for the top 2 m of soil.

Table 5-1 Site Acceptance Criteria

Parameter	NEPM - HILs	NEPM - EILs
	Commercial and Industrial (HIL-D)	Commercial and Industrial
Petroleum Hydrocarbons (Health Screening Levels [HSL] and Ecological Screening Levels [ESL])*		
C ₆ -C ₁₀	260	215
>C ₁₀ -C ₁₆	1,000	170
>C ₁₆ -C ₃₄	3,500	1,700
>C ₃₄ -C ₄₀	10,000	3,300
BTEXN (Health Screening Levels [HSL] and Ecological Screening Levels [ESL])*		
Toluene	99,000	135
Ethyl benzene	27,000	165
Xylenes	81,000	95
Naphthalene	11,000	370
Benzene	3	75
Benzo(a)Pyrene (as BaP TEQ)	40	0.7
Total PAH	4,000	-
Metals		
Arsenic	3,000	160
Cadmium	900	-
Copper	240,000	85-1,200 ^x
Chromium (Total)	-	-
Lead**	1,500	1,800
Mercury***	730	-
Nickel	6,000	55-960 ^x
Zinc	400,000	110-2,000 ^x

Parameter	NEPM - HILs	NEPM - EILs
	Commercial and Industrial (HIL-D)	Commercial and Industrial
Organochlorine Pesticides		
DDT+DDE+DDD	3,600	640
Aldrin and dieldrin	45	-
Chlordane	530	-
Endosulfan	2,000	-
Endrin	100	-
Heptachlor	50	-
HCB	80	-
Methoxychlor	2,500	-
Mirex	100	-
Toxaphene	160	-
Herbicides		
2,4,5-T	5,000	-
2,4-D	9,000	-
MCPA	5,000	-
MCPB	5,000	-
Mecoprop	5,000	-
Picloram	35,000	-
2,4,5-T	5,000	-
Other Pesticides		
Atrazine	2,500	-
Chlopyrifos	2,000	-
Bifenthrin	4,500	-
Other Organics		
PCBs	7	-

Note: All parameters are measured in mg/kg.

* HSLs presented are the lower values relevant for direct contact, vapour intrusion (based on shallow soil impacts in sandy materials) or management limits as outlined in the NEPM. Other, less conservative, ESLs based on most conservative soil type (coarse soil). HSLs and ESLs may be relevant to a specific site (depending on the soil type and depth) and the NEPM should be consulted to select these criteria.

** Lead: HIL is based on blood lead models (IEUBK for HILs A, B and C and adult lead model) for HIL-D where 50% oral bioavailability has been considered. Site-specific bioavailability may be important and should be considered where appropriate.

*** Assuming inorganic Mercury.

x EIL presented is a range of added concentration limits – the value relevant for the area assessed will depend on site specific information such as pH and/or cation exchange capacity. Refer to the NEPM for detail.

5.5 Soil Analysis Results

The soils analysis results are presented in **Tables 5-2 to 5-4**.

There were no exceedances of the Site Acceptance Criteria for any of the analytes tested for. There were some minor TPH and PAH levels recorded in surface material, which did not exceed the site investigation criteria. All samples tested for OC/OPs and PCBs were below the laboratory's limit of reporting.

Appendix D contains the laboratory certificates.

5.6 Review of Preliminary Risk Assessment Outcomes

The outcomes of the Preliminary Risk Assessment (**Section 4.3.1**) were reviewed in consideration of the soil analysis results. Given there were no exceedances of the Site Acceptance Criteria at the historical Shale Oil Mine at Slate Gully, the consequence of potential injury or environmental damage from the historical Shale Oil Mine is considered to reduce from "3 – Serious" to "2 – Significant". Considering a "D – Possible" likelihood, the historical Shale Oil Mine is considered to pose a low risk to the environment and/or human health.

No further investigations are therefore considered to be required.

Table 5-2 Soil Analysis Results - Metals

Sample ID	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Mercury
SG-BH1-01	10	<1	7	9	30	11	39	<0.1
SG-BH1-0.5	7	<1	10	6	16	6	11	<0.1
SG-BH1-2.0	15	<1	7	7	11	7	12	<0.1
SG-BH2-0.1	10	<1	9	8	20	11	31	<0.1
SG-BH2-0.5	8	<1	10	6	16	9	17	<0.1
SG-BH2-0.1A	10	<1	8	9	19	10	28	<0.1
SG-BH2-0.1B	9	<1	7	9	20	10	33	<0.2
SG-BH2-2.0	45	<1	14	8	14	6	19	<0.1
SG-BH3-0.1	14	<1	11	15	23	13	45	<0.1
SG-BH3-0.5	8	<1	12	7	17	7	11	<0.1
SG-BH3-1.0	19	<1	10	6	11	5	12	<0.1
SG-BH4-2.0	40	<1	5	12	15	60	77	<0.1
SG-BH4-0.1	10	<1	8	8	45	10	112	<0.1
SG-BH4-0.5	5	<1	6	<5	17	6	20	<0.1
SG-BH4-1.0	11	<1	11	7	27	8	23	<0.1
SG-BH4-2.0	8	<1	14	10	18	6	17	<0.1
SG-BH5-0.1	8	<1	10	6	19	12	26	<0.1
SG-BH5-0.1A	10	<1	11	6	23	11	20	<0.1
SG-BH5-0.1B	9	<1	9	6	24	10	22	<0.1
SG-BH5-0.5	7	<1	10	7	16	10	16	<0.1
SG-BH5-1.0	10	<1	10	7	19	9	19	<0.1
SG-BH5-2.0	50	<1	14	13	17	24	42	<0.1
Site Acceptance Criteria								
NEPM HIL-D	3,000	900	-	240,000	1,500	6,000	400,000	730
NEPM EIL Commercial	160	-	-	85-1,200	1,800	55-960	110-2,000	-

Table 5-3 Soil Analysis Results – Polynuclear Aromatic Hydrocarbons

Sample ID	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b+j)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	Sum of polycyclic aromatic hydrocarbons	Benzo(a)pyrene TEQ (zero)	Benzo(a)pyrene TEQ (half LOR)	Benzo(a)pyrene TEQ (LOR)
SG-BH1-01	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2
SG-BH2-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2
SG-BH2-0.1A	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	0.6	1.2
SG-BH2-0.1B	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2
SG-BH3-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	0.9	<0.5	0.5	<0.5	<0.5	<0.5	2.0	0.6	0.9	1.2
SG-BH4-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	0.6	1.2
SG-BH5-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2
SG-BH5-0.1A	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2
SG-BH5-0.1B	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2
SG-BH5-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2
Site Acceptance Criteria																				
NEPM HIL-D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,000	40	-	-
NEPM EIL Commercial	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7	-	-

Table 5-4 Soil Analysis Results – PCBs and Total Polychlorinated Biphenyls

	Sample ID		Site Acceptance Criteria	
	SG-BH1-01	SG-BH4-0.1	NEPM HIL-D	NEPM EIL Commercial
PCBs				
Total polychlorinated biphenyls	<0.1	<0.1	7	-
Total Polychlorinated biphenyls				
alpha-BHC	<0.05	<0.05	-	-
Hexachlorobenzene (HCB)	<0.05	<0.05	80	-
beta-BHC	<0.05	<0.05	-	-
gamma-BHC	<0.05	<0.05	-	-
delta-BHC	<0.05	<0.05	-	-
Heptachlor	<0.05	<0.05	50	-
Aldrin	<0.05	<0.05	-	-
Heptachlor epoxide	<0.05	<0.05	-	-
Total Chlordane (sum)	<0.05	<0.05	530	-
trans-Chlordane	<0.05	<0.05	-	-
alpha-Endosulfan	<0.05	<0.05	-	-
cis-Chlordane	<0.05	<0.05	-	-
Dieldrin	<0.05	<0.05	-	-
4,4'-DDE	<0.05	<0.05	-	-
Endrin	<0.05	<0.05	100	-
Endosulfan (sum)	<0.05	<0.05	2,000	-
beta-Endosulfan	<0.05	<0.05	-	-
4,4'-DDD	<0.05	<0.05	-	-
Endrin aldehyde	<0.05	<0.05	-	-
Endosulfan sulfate	<0.05	<0.05	-	-
4,4'-DDT	<0.20	<0.20	-	-
Endrin ketone	<0.05	<0.05	-	-
Methoxychlor	<0.20	<0.20	-	-
Sum of DDD + DDE + DDT	<0.05	<0.05	3,600	640
Sum of Aldrin + Dieldrin	<0.05	<0.05	45	-
Dichlorvos	<0.05	<0.05	-	-
Demeton-S-methyl	<0.05	<0.05	-	-
Monocrotophos	<0.20	<0.20	-	-
Dimethoate	<0.05	<0.05	-	-
Diazinon	<0.05	<0.05	-	-
Chlorpyrifos-methyl	<0.05	<0.05	-	-
Parathion-methyl	<0.20	<0.20	-	-
Malathion	<0.05	<0.05	-	-
Fenthion	<0.05	<0.05	-	-
Chlorpyrifos	<0.05	<0.05	2,000	-
Parathion	<0.20	<0.20	-	-
Pirimphos-ethyl	<0.05	<0.05	-	-
Chlorfenvinphos	<0.05	<0.05	-	-
Bromophos-ethyl	<0.05	<0.05	-	-
Fenamiphos	<0.05	<0.05	-	-
Prothiofos	<0.05	<0.05	-	-
Ethion	<0.05	<0.05	-	-
Carbophenothion	<0.05	<0.05	-	-
Azinphos Methyl	<0.05	<0.05	-	-

6 QUALITY ASSURANCE AND QUALITY CONTROL

6.1 QA/QC Results

A summary of the Data Quality Objectives (DQOs) are provided in **Table 6-1**.

Table 6-1 Data Quality Objectives Completion

Data Quality Objectives	Description	Achieved
Documentation Completeness	ALS QA/QC procedures such as calibration standards, laboratory control samples, surrogates, reference materials, sample duplicates and matrix spikes are included in Appendix E . All necessary documentation has been provided by the laboratory following analysis including Chain of Custody forms, Certificate of Analysis, and QC Report(s) and included within Appendix E .	✓
Data Completeness	Targeted sampling was undertaken within those areas of concern at the site in accordance with the relevant DUAP/EPA's (1998) <i>Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land</i> for potential contaminants of concern.	✓
Data Comparability	All sampling was undertaken in accordance with the DUAP/EPA's (1998) <i>Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land</i> . Samples were stored in an Esky packed with ice, transported to the laboratory and extracted/analysed within the necessary holding times. ALS is a NATA certified laboratory using NEPM procedures (Schedule B[3]).	✓
Data Representativeness	Appropriate sampling coverage at the site undertaken. Representative samples were also collected.	✓
Precision and accuracy for sampling and analysis	Properly trained and qualified field personnel were used to undertake the Land Contamination Assessment. Blind field duplicates and split field triplicates were collected at a minimum rate of 1 per 20 samples. Relative Percentage Differences (RPDs) to be less than 30% for inorganic and 50% for organic analyses. (RPD Calculations table is available in Appendix D). Achieve laboratory QC criteria.	✓

6.2 Discussion of Data Quality Objective Completion

6.2.1 Field RPDs

All field RPD results met the DQOs. Field RPDs are available in **Appendix D**.

6.2.2 Laboratory Documentation

There were no laboratory QA/QC outliers for laboratory certificate no. EB1512062.

There were three outliers for matrix spike recoveries for metals for laboratory certificate ES1502483. Matrix spike recoveries were not determined for chromium, nickel and zinc. As there were no reported exceedances for these analytes, it is unlikely that these results will affect the outcome of the report.

6.3 Data Suitability

Following an analysis of the field and laboratory QA/QC the results contained within this report are suitable for reporting purposes.

6.4 Data Quality Objectives

The DQOs of the investigation were to obtain sufficient data to allow for a basic understanding of any potentially contaminated areas that may have occurred on the site, by assessing:

- The likelihood of impacted soil quality at the site;
- If there may be a risk posed to the environment;
- The adequacy and completeness of all information available;
- The requirements for any further investigative works; and
- To a standard consistent with generally accepted and current professional consulting practice for such an investigation.

The evaluation criteria adopted by the investigation are summarised below in **Table 6-2**.

Table 6-2 Evaluation Criteria

Protocol	Description
Documentation completeness	Completion of field calibration records, chain of custody documentation, laboratory test certificates from National Association of Testing Authority, Australia (NATA)-accredited laboratories.
Data completeness	Targeted sampling in accordance with NSW EPA's Managing Land Contamination Guideline for potential contaminants of concern at all areas of environmental concern.
Data comparability	Use of appropriate techniques for the sampling, storage and transportation of samples. Use of NATA certified laboratory using NEPM procedures.
Data representation	Good sampling coverage of main areas of environmental concern at the site, and selection of representative samples.
Precision and accuracy for sampling and analysis	Use properly trained and qualified field personnel Blind and Split field duplicates and triplicates to be collected at a minimum rate of 1 in 20. RPDs to be less than 30% for inorganic and 50% for organic analyses. Achieve laboratory QC criteria.

6.5 Field and Laboratory Quality Assurance and Quality Control

The QA/QC adopted for the fieldwork and laboratory is described in **Appendix E**.

7 RECOMMENDED MANAGEMENT MEASURES

7.1 Historical Shale Oil Mine Complex

No exceedances of the Site Acceptance Criteria for any of the analytes tested for were identified (**Section 5.5**). No specific management measures are therefore proposed for the shale waste material associated with the historical Shale Oil Mine.

The shale waste material would however be excavated as part of the Project mining operations and co-disposed with waste rock in either the backfilled pit or waste rock emplacements.

7.2 Unexpected Contamination

In the event that unexpected contamination is uncovered during the Project, work in that area would cease immediately and the area would be made safe. The unexpected contamination should be assessed by a suitably qualified person and remediation strategies put in place to manage this contamination if necessary after approval by the appropriate authority.

8 SUMMARY AND CONCLUSION

The objectives of the Stage 1 Preliminary Investigation of the Site were to identify any past or present potentially contaminating activities and to provide a preliminary assessment of any contamination to determine if the Site is suitable for the proposed land use (i.e. the Project).

As part of the investigation the following scope of work was undertaken:

- A review of the Site's environmental setting, history and records in order to identify potentially contaminating historical activities (both on-site and off-site). This comprised:
 - review of available natural environment information (e.g. geology, groundwater resources, surface water resources);
 - available land use information;
 - local government records;
 - zoning; and
 - historical and current aerial photos.
- Interviews with Project personnel/former local resident.
- An initial site inspection to identify potentially contaminated areas.
- Preliminary Risk Assessment of the potentially contaminated areas on Site.
- Sampling and analysis of potentially contaminated areas.
- Review of laboratory documentation.
- Reporting of results and performing a QA/QC review.
- Recommending management measures where required.

The Preliminary Risk Assessment identified that all but one of the potentially contaminated areas at the Site posed a low risk to the environment and human health. The historical Shale Oil Mine at Slate Gully (**AOI-25**) was assessed to pose a medium risk to the environment and/or human health and therefore further investigations were required.

Based on the results of the site inspection, a soil sampling and analysis program for the historical Shale Oil Mine (**AOI-25**) was considered necessary.

A total of 30 soil samples (including four QA/QC samples) were collected from five (5) locations (BH1 to BH5) at the historical Shale Oil Mine Complex.

As the proposed use is mining/extraction the NEPM Health-based Investigation Levels HIL-D (Commercial/Industrial) and NEPM EILs were adopted as Site Acceptance Criteria.

Following an analysis of the field and laboratory QA/QC the results contained within this report are suitable for reporting purposes.

There were no exceedances of the Site Acceptance Criteria for any of the analytes tested for. There were some minor TPH and PAH levels recorded in surface material, which did not exceed the Site Acceptance Criteria. All samples tested for OC/OPs and PCBs were below the laboratory's limit of reporting.

The outcomes of the Preliminary Risk Assessment were reviewed in consideration of the soil analysis results. Given there were no exceedances of the Site Acceptance Criteria at the historical Shale Oil Mine at Slate Gully, the historical Shale Oil Mine is considered to pose a low risk to the environment and/or human health.

No further investigations are therefore considered to be required.

On the basis of the results of the Stage 1 Preliminary Investigation, it is considered that the Site is suitable for the land use proposed by the Project (including those areas outside of Mining Lease 1573 where a change of land use is proposed).

9 REFERENCES

Australia and New Zealand Environment and Conservation Council and National Health and Medical Research Council (1992) *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*. Accessed 7 October 2015. Available: www.nhmrc.gov.au/-files-nhmrc/publications/attachments/eh17.pdf

Australasian Groundwater & Environmental (2005) *Wilpinjong Coal Project Land Contamination Assessment*.

Colonial Inn Museum and Mudgee Historical Society Inc (2010) *History of Mudgee Town and District*. Accessed 12 March 2014. Available: www.mudgeemuseum.com.

Department of Urban Affairs and Planning/Environment Protection Authority (1998) *Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land*.

Geo-Environmental Management (2015) *Wilpinjong Extension Project Environmental Geochemistry Assessment of Overburden, Interburden and Coal Rejects*.

Gulgong Pioneers Museum (n.d.) *Gulgong Pioneers Museum*. Accessed 12 March 2014. Available: www.gulgongmuseum.com.

HydroSimulations (2013) *Wilpinjong Coal Mine Modification Groundwater Assessment*.

Mudgee District Local History (2012) *Mudgee District History*. Accessed 12 March 2014. Available: www.mudgeehistory.com.au.

National Environment Protection Council (2013) *National Environment Protection (Assessment of Site Contamination) Measure 1999* As amended 2013.

Niche Environment and Heritage (2015) *Wilpinjong Extension Project Historical Heritage Impact Assessment*.

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

Wilpinjong Coal Pty Ltd (2015) *Wilpinjong Coal Project Environmental Impact Statement*.

APPENDIX A

PROPERTY INFORMATION

Table - Areas of Investigation

Tenure Type	Lot Number	Deposited Plan Number
Freehold	49	DP755454
Freehold	9	DP755454
Freehold	5	DP755454
Freehold	109	DP755454
Freehold	72	DP755454
Freehold	48	DP755454
Freehold	184	DP755425
Freehold	68	DP755454
Freehold	5	DP703225
Freehold	6	DP755454
Freehold	2	DP720305
Freehold	17	DP755454
Freehold	1	DP653565
Freehold	114	DP42127
Freehold	11	DP703223
Freehold	31	DP755454
Freehold	26	DP755454
Freehold	123	DP755425
Freehold	10	DP755454
Freehold	6	DP703225
Freehold	47	DP755454
Freehold	19	DP755454
Freehold	37	DP755454
Freehold	1	DP703224
Freehold	183	DP755425
Freehold	12	DP703223
Freehold	182	DP755425
Freehold	23	DP755454
Freehold	18	DP755454
Freehold	45	DP755454
Freehold	87	DP755425
Freehold	27	DP755454
Freehold	13	DP703223
Freehold	15	DP755454
Freehold	196	DP755425
Freehold	13	DP755454

Tenure Type	Lot Number	Deposited Plan Number
Freehold	95	DP755425
Freehold	46	DP755454
Freehold	12	DP755454
Freehold	88	DP755425
Crown	91	DP755425
Freehold	1	DP112124
Freehold	90	DP755425
Freehold	122	DP755425
Freehold	24	DP755454
Freehold	124	DP755425
Freehold	3	DP755454
Freehold	14	DP755454
Freehold	156	DP755425
Freehold	22	DP755454
Freehold	104	DP755454
Freehold	1	DP727117
Freehold	10	DP703223
Freehold	94	DP755425
Freehold	1	DP728756
Freehold	195	DP755425
Freehold	1	DP724617
Freehold	93	DP755425
Freehold	11	DP755454
Freehold	69	DP755454
Freehold	43	DP583255
Freehold	35	DP755454
Freehold	122	DP724655
Freehold	44	DP583255
Freehold	42	DP583255
Freehold	59	DP755454
Freehold	100	DP755454
Freehold	50	DP755454
Freehold	30	DP755454
Freehold	41	DP583255
Crown	123	DP724655
Freehold	92	DP755425
Crown	7302	DP1138926

Tenure Type	Lot Number	Deposited Plan Number
Crown	115	DP42127
Freehold	3	DP583254
Freehold	71	DP755425
Freehold	55	DP755425
Freehold	56	DP755425
Freehold	4	DP122991
Freehold	6	DP250053
Freehold	58	DP755425
Freehold	125	DP755425
Freehold	139	DP755425
Freehold	34	DP755425
Freehold	187	DP755425
Freehold	57	DP755425
Freehold	146	DP755455
Freehold	141	DP755425
Freehold	7	DP122991
Freehold	116	DP755425
Freehold	54	DP755425
Freehold	11	DP122991
Freehold	5	DP122991
Freehold	149	DP755425
Freehold	83	DP755425
Freehold	188	DP755425
Freehold	161	DP755425
Freehold	78	DP755425
Freehold	107	DP755425
Freehold	105	DP755425
Freehold	18	DP755425
Freehold	5	DP250053
Freehold	2	DP122991
Freehold	85	DP755455
Freehold	26	DP755425
Freehold	6	DP122991
Freehold	152	DP755425
Freehold	9	DP122991
Freehold	132	DP755425
Crown	233	DP723412

Tenure Type	Lot Number	Deposited Plan Number
Freehold	79	DP755425
Freehold	138	DP755455
Freehold	160	DP723767
Freehold	14	DP755425
Freehold	3	DP122991
Freehold	53	DP755425
Freehold	7	DP250053
Freehold	40	DP755425
Freehold	151	DP755425
Freehold	8	DP122991
Freehold	153	DP755425
Freehold	4	DP250053
Freehold	1	DP431744
Freehold	150	DP755425
Freehold	106	DP755425
Freehold	13	DP755425
Freehold	3	DP250053
Freehold	49	DP755425
Freehold	157	DP755425
Freehold	80	DP755425
Freehold	148	DP755425
Freehold	25	DP755425
Freehold	52	DP755425
Freehold	76	DP755425
Freehold	27	DP755425
Freehold	10	DP122991
Freehold	2	DP250053
Freehold	46	DP755425
Freehold	50	DP755425
Freehold	75	DP755425
Freehold	9	DP755425
Freehold	59	DP755425
Freehold	144	DP755425
Freehold	73	DP755455
Freehold	35	DP755425
Freehold	1	DP250053
Freehold	136	DP755425

Tenure Type	Lot Number	Deposited Plan Number
Freehold	134	DP755425
Freehold	135	DP755425
Freehold	142	DP755425
Freehold	145	DP755425
Freehold	140	DP755425
Freehold	137	DP755425
Freehold	86	DP755455
Freehold	51	DP755455
Freehold	160	DP755425
Freehold	186	DP755425
Freehold	44	DP755425
Freehold	110	DP755454
Freehold	1	DP583254
Freehold	37	DP755425
Freehold	3	DP755425
Freehold	128	DP755425
Freehold	45	DP755425
Freehold	1	DP1078866
Crown	161	DP723767
Crown	147	DP755425
Crown	77	DP755425
Freehold	12	DP755425
Crown	234	DP723412
Crown	97	DP755425
Freehold	66	DP654143
Freehold	1	DP122991
Crown	235	DP723412
Freehold	70	DP755425
Crown	1	DP1139913
Freehold	140	DP755455
Crown	7318	DP1141391
Freehold	146	DP755425
Crown	7008	DP1095457
Freehold	143	DP755425
Freehold	69	DP755455
Freehold	89	DP755455
Freehold	138	DP755425

Tenure Type	Lot Number	Deposited Plan Number
Freehold	52	DP755455
Crown	159	DP721237
Freehold	96	DP755455
Freehold	11	DP250053
Freehold	94	DP755455
Freehold	12	DP250053
Crown	151	DP755455
Freehold	97	DP755455
Freehold	12	DP122991
Freehold	95	DP755455
Freehold	3	DP430668
Freehold	13	DP122991
Freehold	78	DP755455
Freehold	1	DP430668
Freehold	50	DP755455
Freehold	2	DP1071177
Freehold	4	DP755455
Freehold	116	DP755455
Freehold	10	DP250053
Freehold	57	DP755455
Freehold	2	DP430668
Freehold	59	DP755455
Freehold	133	DP755425
Freehold	194	DP755425
Freehold	237	DP724588
Freehold	130	DP755425
Freehold	158	DP755425
Freehold	8	DP755455
Crown	236	DP724588
Crown	63	DP755455
Freehold	99	DP755455
Freehold	9	DP250053
Freehold	131	DP755425
Freehold	8	DP250053
Freehold	1	DP755455
Freehold	155	DP755425
Crown	158	DP721237

Tenure Type	Lot Number	Deposited Plan Number
Crown	7304	DP1141384
Freehold	108	DP755425
Freehold	42	DP755425
Freehold	109	DP755425
Freehold	60	DP755425
Freehold	67	DP755454
Crown	52	DP755454
State Rail Authority (Crown)	Railway lands located between or adjacent to the above parcels of land	
Mid-Western Regional Council or Department of Lands (Crown)	Other roads located between or adjacent to the above parcels of land	
Crown	Creeks or streams located between or adjacent to the above parcels of land	

APPENDIX B

REVIEW OF COUNCIL RECORDS OF CONTAMINATING ACTIVITIES



PO BOX 156
MUDGEE NSW 2850

86 Market Street MUDGEE
109 Herbert Street GULGONG
77 Louee Street RYLSTONE

Ph: 1300 765 002 or (02) 6378 2850

Fax: (02) 6378 2815

email: council@midwestern.nsw.gov.au

ML: A0420169

6 May 2015

Ian Flood
Locked Bag 2005
MUDGEE NSW 2850

Dear Mr Flood

WILPINJONG EXTENSION PROJECT – LAND CONTAMINATION RECORDS

Council does not have a Contaminated Lands Register and as such cannot provide confirmation on whether any potential for contamination might exist on any of the properties mentioned in the Schedule of Lands.

If you would like Council to review each individual property file within the provisional development area to determine previous land uses, this will necessitate the payment of a Planning Enquiry Fee of \$87 for the first hour and \$100 for every additional hour, in accordance with Councils' *Fees and Charges 2014-2015*.

Should you have any queries in relation to this matter please contact Mark Lyndon on (02) 6378 2850.

Yours faithfully

A handwritten signature in black ink, appearing to read "Catherine Van Laeren", with a stylized flourish at the end.

**CATHERINE VAN LAEREN
DIRECTOR DEVELOPMENT
DEVELOPMENT DIRECTORATE**

APPENDIX C

BORELOGS

Soil Bore/Monitoring Well # SG-BH1										Sheet 1 of 1		F-1-55-b	
Job Number: 1415-019										Logged by: _LK_____			
Client: WCML													
Project: Wipinjong Stage 2 Preliminary Detailed Site Investigation													
Site Location: Slate Gully (SG)				Drilling Company: Barnson				Easting: -32.3336		Checked by: _TL_____			
						Northing: 149.92207							
						Elevation: 406m							
Surface Cover: Concrete: () mm Bitumen: () mm Gravel: () mm Roadbase: () mm Other: () mm													
Drilling Method:		Augers (100) mm dia. Hand Auger () mm dia. Push Tube () mm dia. Other e.g. Test Pit () Size (m)											
Profile Depth in (m bgl)		Sampled Collected	Soil Type	Colour	Consistency		Particle / Soil Description	Plasticity	Moisture	Observations and Comments	Well Construction Sketch		
Note: Record the depth that groundwater is encountered, depth of any fill			C = CLAY M = SILT S = SAND G = GRAVEL R = ROCK F = FILL	e.g. black, red, grey, orange, yellow, dark, pale, mottled.	CLAY	SAND	Particles Very Angular Sub-Angular Well Rounded Matrix Poorly Sorted Well Sorted	V.High High Medium Low	S = Saturated V = Very Moist M = Moist SM = Slightly Moist D = Dry	e.g. report the presence of shells, organic matter, staining, odour mottling PID / FID reading in (ppm)			
			v. soft (vs) soft (s) m. stiff (ms) stiff (st) v.stiff (v.st) hard (h)		v.loose loose m.dense dense v.dense								
0.2		X	Fill	Black	Loose			Low	Dry	Black waste product, some coal present PID = 0			
0.5		X	Sand	Yellow / Brown	Loose			Low	Slightly Moist	PID = 0			
1		X	Sand	Yellow / Brown	Loose			Low	Dry				
2		X	Clay	White / Orange / Brown mottle	Very Stiff			High	Dry	PID = 0			
3		X	Clay	White / Orange / Brown mottle	Very Stiff			High	Dry				
4		X	Rock	Light brown					Dry	Light Brown Sandstone			
Borehole Abandonment: (x) Backfilled & Compacted () Resurfaced (Concrete/Bitumen) () Monitoring Well Installed													
Well Construction Details											Soil _____		
Total depth: _____(m)											Water _____		
Casing diameter: () 50mm () 100mm													
Screened from: _____(m) to _____(m)											Quality Control Samples () Yes (x) No		
Blank pipe from: _____(m) to _____(m)											List: _____		
Well Development Method											_____		

Soil Bore/Monitoring Well # SG-BH2								Sheet 1 of 1			
Job Number: 1415-019 Client: WCML Project: Wilpinjong Stage 2 Preliminary Detailed Site Investigation								Easting -32.33355 Northing 149.92223 Elevation 406m		Logged by: _LK_ Checked by: _TL_	
Site Location: Slate Gully (SG)		Drilling Company Barnson									
Surface Cover: Concrete: () mm Bitumen: () mm Gravel: () mm Roadbase: () mm Other: () mm											
Drilling Method:		Augers (100) mm dia. Hand Auger () mm dia. Push Tube () mm dia. Other e.g. Test Pit () Size (m)									
Profile Depth in (m bgl) Note: Record the depth that groundwater is encountered, depth of any fill		Sampled Collected Mark (X)	Soil Type	Colour	Consistency		Particle / Soil Description	Plasticity	Moisture	Observations and Comments	Well Construction Sketch
C = CLAY M = SILT S = SAND G = GRAVEL R = ROCK F= FILL	e.g. black, red, grey, orange, yellow, dark, pale, mottled.		v. soft (vs) soft (s) m. stiff (ms) v.stiff (v.st) hard (h)	SAND v.loose loose m.dense dense v.dense	Particles Very Angular Sub-Angular Well Rounded Matrix Poorly Sorted Well Sorted	V.High High Medium Low	S = Saturated V = Very Moist M = Moist SM = Slightly Moist D = Dry	e.g. report the presence of shells, organic matter, staining, odour mottling PID / FID reading in (ppm)			
0.2 X	Fill / sand		Black fill / Brown sand	Loose			Low	Dry	Black waste product, some coal present PID = 0		
0.5 X	Sand		Light Brown	Loose			Low	Slightly Moist	PID = 0		
1 X	Sand		Light Brown	Loose			Low	Slightly Moist	PID = 0		
2 X	Sand		Light Brown	Loose			Low	Slightly Moist			
3 X	Sand		Light Brown	Loose			Low	Slightly Moist	Hit rock at base of sample - REFUSAL		
Borehole Abandonment: (x) Backfilled & Compacted () Resurfaced (Concrete/Bitumen) () Monitoring Well Installed											Waste Management/Disposal: (Describe)
Well Construction Details Gravel pack from: ____ (m) to ____ (m) Grout from: ____ (m) to ____ (m) Total depth: ____ (m) Gravel pack - type: _____ Grout type: _____ Casing diameter: () 50mm () 100mm Bentonite seal from: ____ (m) to ____ (m) Flush mounted cover: () Screened from: ____ (m) to ____ (m) Bentonite - type: _____ Monument: () Blank pipe from: ____ (m) to ____ (m) Backfill used? from: ____ (m) to ____ (m) Locked/Secured: ()											Soil _____ Water _____
Well Development Method _____ Volume Purged: _____											Quality Control Samples (X) Yes () No List: SG-BH2-0.1A _____ SG-BH2-0.1B _____

Soil Bore/Monitoring Well # SG-BH3								Sheet 1 of 1			
Job Number: 1415-019								Logged by: _LK_____			
Client: WCML											
Project: Wilpinjong Stage 2 Preliminary Detailed Site Investigation											
Site Location: Slate Gully (SG)		Drilling Company Barnson				Easting -32.33351		Checked by: _TL_____			
						Northing 149.92264					
						Elevation 409m					
Surface Cover: Concrete: () mm Bitumen: () mm Gravel: () mm Roadbase: () mm Other: () mm											
Drilling Method:		Augers (100) mm dia. Hand Auger () mm dia. Push Tube () mm dia. Other e.g. Test Pit () Size (m)									
Profile Depth in (m bgl) Note: Record the depth that groundwater is encountered, depth of any fill		Sampled Collected Mark (X)	Soil Type	Colour	Consistency		Particle / Soil Description	Plasticity	Moisture	Observations and Comments	Well Construction Sketch
C = CLAY M = SILT S = SAND G = GRAVEL R = ROCK F= FILL	e.g. black, red, grey, orange, yellow, dark, pale, mottled.		v. soft (vs) soft (s) m. stiff (ms) stiff (st) v.stiff (v.st) hard (h)	SAND v.loose loose m.dense dense v.dense	Particles Very Angular Sub-Angular Well Rounded Matrix Poorly Sorted Well Sorted	V.High High Medium Low	S = Saturated V = Very Moist M = Moist SM = Slightly Moist D = Dry	e.g. report the presence of shells, organic matter, staining, odour mottling PID / FID reading in (ppm)			
0.2 X	Fill / sand		Black fill / Brown sand	Loose			Low	Dry	Black waste product, some coal present PID = 0		
0.5 X	Sand		Brown / Black	Loose			Low	Slightly Moist	High level of sand content		
1 X	Sand / Clay		Orange / Black	Soft and loose			Low	Slightly Moist	Some clay fraction		
2 X	Sand		Yellow / brown	Loose			Low	Dry	Loose sand		
3 X	Rock		Grey / brown					Dry	Weathered Rock		
Borehole Abandonment: (X) Backfilled & Compacted () Resurfaced (Concrete/Bitumen) () Monitoring Well Installed											
Waste Management/Disposal: (Describe)											
Well Construction Details						Gravel pack from: ____ (m) to ____ (m) Grout from: ____ (m) to ____ (m)					
Total depth: ____ (m)						Gravel pack - type: _____ Grout type: _____					
Casing diameter: () 50mm () 100mm						Bentonite seal from: ____ (m) to ____ (m) Flush mounted cover: ()					
Screened from: ____ (m) to ____ (m)						Bentonite - type: _____ Monument: ()					
Blank pipe from: ____ (m) to ____ (m)						Backfill used? from: ____ (m) to ____ (m) Locked/Secured: ()					
Well Development Method _____						Volume Purged: _____					
						Quality Control Samples () Yes (X) No					
						List: _____					

Soil Bore/Monitoring Well # SG-BH4								Sheet 1 of 1		F-1-55-b	
Job Number: 1415-019								Logged by: _LK_			
Client: WCML								Easting -32.33348			
Project: Wilpinjong Stage 2 Preliminary Detailed Site Investigation								Northing 149.92197			
Site Location: Slate Gully (SG)				Drilling Company Bamson				Elevation 416m		Checked by: _TL_	
Surface Cover: Concrete: () mm Gravel: () mm Roadbase: () mm Other: () mm											
Drilling Method: Augers (100) mm dia. Hand Auger () mm dia. Push Tube () mm dia. Other e.g. Test Pit () Size (m)											
Profile Depth in (m bgl) Note: Record the depth that groundwater is encountered, depth of any fill		Sampled Collected	Soil Type C = CLAY M = SILT S = SAND G = GRAVEL R = ROCK F = FILL	Colour e.g. black, red, grey, orange, yellow, dark, pale, mottled.	Consistency		Particle / Soil Description Particles Very Angular Sub-Angular Well Rounded Matrix Poorly Sorted Well Sorted	Plasticity V.High High Medium Low	Moisture S = Saturated V = Very Moist M = Moist SM = Slightly Moist D = Dry	Observations and Comments e.g. report the presence of shells, organic matter, staining, odour mottling PID / FID reading in (ppm)	Well Construction Sketch
					CLAY v. soft (vs) soft (s) m. stiff (ms) stiff (st) v.stiff (v.st) hard (h)	SAND v.loose loose m.dense dense v.dense					
0.2	X		Clay / Silt / Sand	Black / brown	Soft and Loose			Low	Slightly Moist	Grass present on surface PID = 0	
0.5	X		Clay / Silt / Sand	Black / brown	Soft and Loose			Low	Slightly Moist	Less black mottle throughout	
1	X		Clay / Silt / Sand	Black / brown	Stiff			Medium	Slightly Moist	Higher clay fraction	
2	X		Clay / Silt / Sand	Black / brown	Stiff			Medium	Slightly Moist		
3	X		Sand	Yellow	Soft			High	Slightly Moist	Yellow clay	
Borehole Abandonment: (x) Backfilled & Compacted () Resurfaced (Concrete/Bitumen) () Monitoring Well Installed											
Well Construction Details Gravel pack from: (m) to (m) Grout from: (m) to (m) Total depth: (m) Gravel pack - type: Grout type: Casing diameter: () 50mm () 100mm Bentonite seal from: (m) to (m) Flush mounted cover: () Screened from: (m) to (m) Bentonite - type: Monument: () Blank pipe from: (m) to (m) Backfill used? from: (m) to (m) Locked/Secured: () Well Development Method Volume Purged:										Waste Management/Disposal: (Describe) Soil Water Quality Control Samples () Yes (X) No List: 	

Soil Bore/Monitoring Well # SG-BH5										Sheet 1 of 1		F-1-55-b						
Job Number: 1415-019										Logged by: _LK_____								
Client: WCML																		
Project: Wipinjong Stage 2 Preliminary Detailed Site Investigation																		
Site Location: Slate Gully (SG)				Drilling Company: Barnson				Easting: -32.33353		Checked by: _TL_____								
								Northing: 149.92214										
								Elevation: 407m										
Surface Cover: Concrete: () mm Bitumen: () mm Gravel: () mm Roadbase: () mm Other: () mm																		
Drilling Method:		Augers (100) mm dia. Hand Auger () mm dia. Push Tube () mm dia. Other e.g. Test Pit () Size (m)																
Profile Depth in (m bgl)		Sampled Collected	Soil Type		Colour		Consistency		Particle / Soil Description		Plasticity		Moisture		Observations and Comments		Well Construction Sketch	
			C = CLAY M = SILT S = SAND G = GRAVEL R = ROCK F = FILL		e.g. black, red, grey, orange, yellow, dark, pale, mottled.		CLAY v. soft (vs) soft (s) m. stiff (ms) stiff (st) v.stiff (v.st) hard (h)		SAND v.loose loose m.dense dense v.dense		Particles Very Angular Sub-Angular Well Rounded Matrix Poorly Sorted Well Sorted		V.High High Medium Low		S = Saturated V = Very Moist M = Moist SM = Slightly Moist D = Dry			
Note: Record the depth that groundwater is encountered, depth of any fill		Mark (X)	Clay / Sand / Silt		Brown / Yellow		Loose				Low		Slightly Moist		Black waste product, some coal present PID = 0			
			Clay / Sand / Silt		Brown		Loose				Low		Slightly Moist		Uniform colour			
			Sand		Brown		Loose				Low		Dry					
			Sand		Brown / Pink		Loose				Low		Dry					
			Rock		Pink								Dry		Rock			
Borehole Abandonment: (X) Backfilled & Compacted () Resurfaced (Concrete/Bitumen) () Monitoring Well Installed														Waste Management/Disposal: (Describe)				
Well Construction Details														Soil _____				
Total depth: _____(m)														Water _____				
Casing diameter: () 50mm () 100mm Bentonite seal from: _____(m) to _____(m) Flush mounted cover: ()																		
Screened from: _____(m) to _____(m) Bentonite - type: _____ Monument: ()														Quality Control Samples (X) Yes () No				
Blank pipe from: _____(m) to _____(m) Backfill used? from: _____(m) to _____(m) Locked/Secured: ()														List: SG-BH5-01A _____				
Well Development Method _____ Volume Purged: _____														SG-BH5-01B _____				

APPENDIX D

LABORATORY REPORTS

		Metals							
Sample ID	Date Sampled	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Mercury
SG-BH1-01	02/02/2015	10	<1	7	9	30	11	39	<0.1
SG-BH1-05	02/02/2015	7	<1	10	6	16	6	11	<0.1
SG-BH1-2.0	02/02/2015	15	<1	7	7	11	7	12	<0.1
SG-BH2-01	02/02/2015	10	<1	9	8	20	11	31	<0.1
SG-BH2-05	02/02/2015	8	<1	6	6	16	9	17	<0.1
SG-BH2-0.1A	02/02/2015	10	<1	8	9	19	10	28	<0.1
SG-BH2-0.1B	02/02/2015	9	<1	7	9	20	10	33	<0.2
SG-BH2-2.0	02/02/2015	45	<1	14	8	14	6	19	<0.1
SG-BH3-0.1	02/02/2015	14	<1	11	15	23	13	45	<0.1
SG-BH3-0.5	02/02/2015	8	<1	12	7	17	7	11	<0.1
SG-BH3-1.0	02/02/2015	19	<1	10	6	11	5	12	<0.1
SG-BH4-2.0	02/02/2015	40	<1	5	12	15	60	77	<0.1
SG-BH4-0.1	02/02/2015	10	<1	8	8	45	10	112	<0.1
SG-BH4-0.5	02/02/2015	5	<1	6	<5	17	6	20	<0.1
SG-BH4-1.0	02/02/2015	11	<1	11	7	27	9	23	<0.1
SG-BH4-2.0	02/02/2015	9	<1	14	10	18	6	17	<0.1
SG-BH5-0.1	02/02/2015	8	<1	10	6	19	12	26	<0.1
SG-BH5-0.1A	02/02/2015	10	<1	11	6	23	11	20	<0.1
SG-BH5-0.1B	02/02/2015	9	<1	9	6	24	10	22	<0.1
SG-BH5-0.5	02/02/2015	7	<1	10	7	16	10	16	<0.1
SG-BH5-1.0	02/02/2015	10	<1	10	7	19	9	19	<0.1
SG-BH5-2.0	02/02/2015	50	<1	14	13	17	24	42	<0.1
NEPM HIL-D		3,000	900	NA	240,000	1,500	6,000	400,000	730
NEPM EIL Commercial		160	-	-	85-1,200	1,800	55-960	110-2,000	-

[illegible][illegible]

		Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Mercury
SG-BH2-0.1	02/02/2015	10	<1	9	8	20	11	31	<0.1
SG-BH2-0.1A	02/02/2015	10	<1	8	9	19	10	28	<0.1
Duplicate %		0	0	12	12	5	10	10	0
SG-BH2-0.1B	02/02/2015	9	<1	7	9	20	10	33	<0.2
Triplicate %		11	0	25	12	0	10	6	0
SG-BH5-0.1	02/02/2015	8	<1	10	6	19	12	26	<0.1
SG-BH5-0.1A	02/02/2015	10	<1	11	6	23	11	20	<0.1
Duplicate %		22	0	10	0	19	9	26	0
SG-BH5-0.1B	02/02/2015	9	<1	9	6	24	10	22	<0.1
Triplicate %		12	0	11	0	23	18	17	0

		Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b+)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	Sum of polycyclic aromatic hydrocarbons	Benzo(a)pyrene TEQ (zero)	Benzo(a)pyrene TEQ (half LOR)	Benzo(a)pyrene TEQ (LOR)
SG-BH2-0.1	02/02/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2
SG-BH2-0.1A	02/02/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	0.6	1.2
Duplicate %		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SG-BH2-0.1B	02/02/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2
Triplicate %		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SG-BH5-0.1	02/02/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2
SG-BH5-0.1A	02/02/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2
Duplicate %		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SG-BH5-0.1B	02/02/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2
Triplicate %		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

		C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 Fraction (sum)	C6 - C10 Fraction	C6 - C10 Fraction minus BTEX (F1)	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	>C10 - C16 Fraction minus Naphthalene (F2)	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Sum of BTEX	Naphthalene
SG-BH2-0.1	02/02/2015	<10	<50	<100	<100	<50	<10	<10	<50	100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SG-BH2-0.1A	02/02/2015	<10	<50	<100	<100	<50	<10	<10	<50	130	<100	130	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
Duplicate %		0	0	0	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0
SG-BH2-0.1B	02/02/2015	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
Triplicate %		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SG-BH5-0.1	02/02/2015	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SG-BH5-0.1A	02/02/2015	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
Duplicate %		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SG-BH5-0.1B	02/02/2015	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
Triplicate %		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Numbers highlighted in yellow have been adjusted to whole numbers from LORs for calculation purposes

APPENDIX E

QUALITY ASSURANCE AND QUALITY CONTROL

Field Quality Assurance and Quality Control

The QA/QC protocols used during the fieldwork for the assessment are shown in **Table E-1**.

Table E-1 QA/QC Field Work Protocols

Protocol	Description
Sampling team	Site personnel will comprise of professionally qualified environmental scientists and engineers trained in conducting site contamination investigations.
QA/QC system	All fieldwork will be conducted in accordance with an approved Lloyd Consulting Field Work Plan.
Chain of Custody forms	All samples will be logged and transferred under appropriately completed Chain of Custody Forms.
Preservation	All samples will be sent to and received at the laboratory in appropriately preserved containers, with preservation including packing samples with ice packs in eskies. Blind and Split field duplicates and triplicates will be prepared in accordance with procedures given in <i>Section 8 of Australian Standard AS4482.1-1997</i> . The frequency of duplicate testing will be least 20% for all soil samples.
Blind and Spit Field Duplicates and Triplicates	Blind duplicates are split field samples, which are both sent to the laboratory for individual analyses. The accepted RPD for non-volatiles is 30% and 50% for volatiles.

All samples were preserved with ice and placed in an esky until and during transport to the NATA accredited laboratory. Chain of custody forms were completed at the time of sample collection and accompanied the samples to the laboratory for the analyses undertaken.

Field blind (duplicate) and Split (triplicate) samples were collected at a rate of 1 per 20 samples at a minimum in accordance with the requirements of the *Australian Standard AS4482.1 (2005) Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil – Part 1 Non-Volatile and Semi-Volatile Compounds*.

Laboratory Quality Assurance and Quality Control

The laboratory that will be used for chemical analysis of the soil samples collected from the sites will be sent to a NATA accredited laboratory. A data validation process will be used to assess the effectiveness of the overall analytical process and to assess the use of data.

Table E-2 outlines the data validation criteria, qualifications to the data and the overall QA/QC procedures used for the laboratory testing program.

Table E-2 Laboratory QA/QC

Protocol	Description
Holding Times	Holding times are the maximum permissible elapsed time in days from the collection of the sample to its extraction and/or analysis.
Reagent Blanks	The reagent blank sample is a laboratory prepared sample containing the reagents used to prepare the sample for final analysis. The purpose of this procedure is to identify contamination in the reagent materials and assess potential bias in the sample analysis due to contaminated reagents. The QC criteria are no detectable contamination in the reagents.
Laboratory Duplicates	Laboratory duplicates are field samples that are split in the laboratory and subsequently analysed a number of times in the same batch. These subsamples are selected by the laboratory to assess the accuracy and precision of the analytical method. ALS Laboratories undertakes QA/QC procedures such as calibration standards, laboratory control samples, surrogates, reference materials, sample duplicates and matrix spikes. The QC criteria are 50% RPD.
Matrix Spikes/Matrix Spike Duplicates (MS/MSD)	MS/MSDs are field samples to which a predetermined stock solution of known concentration has been added. The samples are then analysed for recovery of the known addition. Recoveries should be within the stated laboratory control limits of 70 to 130% and duplicates should have RPDs of less than 50%.

Laboratory and Field Duplicates

Precision is a measure of the ability to reproduce results, and is assessed on the basis of agreement between a set of replicate results obtained from duplicate analyses. The precision of a set of duplicates can be measured as RPD, and is calculated from the following equation:

$$RPD = \left[\frac{X1 - X2}{\frac{X1 + X2}{2}} \right] \times 100$$

Where: X1 is the first duplicate value
X2 is the second duplicate value

B

Chain of Custody

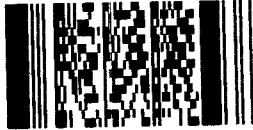


Laboratory Details	ALS Brisbane
Lab Quote Ref.	28 Skand St, Stafford QLD 4053
BN / 299 / 10	Ph: 07 3243 7222
	Email: samples.brisbane@alsenviro.com

CLIENT: Lloyd Consulting	TURNAROUND REQUIRED: Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: 30 Heather Street, Wilston, Q, 4051.	Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: 1415-019	QUOTE NO.: BNBB-157-14	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Leona Kopitke	CONTACT PH: 07 3352 7300	Other comment:
SAMPLER: LR	SAMPLER MOBILE:	RECEIVED BY: J. Hillier 8:15
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	RELINQUISHED BY:
Email Reports to leona@lloydconsulting.com.au; trevor@lloydconsulting.com.au	DATE/TIME: 3.2.15 1045	DATE/TIME:
Email Invoice to catherine@lloydconsulting.com.au		DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:															
ALS USE ONLY		SAMPLE DETAILS		MATRIX: Solid(S)		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price)									
		Water(W)				Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	Total Bottles											
					S-26	S-13	S-5	S-2							
1	SG-BH1-0.1	2.2.15	S	1	X	X									
2	SG-BH1-0.5	2.2.15	S	1			X								
3	SG-BH1-1.0	2.2.15	S	1										ON HOLD	
4	SG-BH1-2.0	"	"	1			X								
5	SG-BH1-3.0	"	"	1										ON HOLD	
6	SG-BH2-0.1	"	"	1	X										
7	SG-BH2-0.5	"	"	1				X							
8	SG-BH2-1.0	"	"	1										ON HOLD	
9	SG-BH1-4.0	"	"	1										ON HOLD	
10	SG-BH2-0.1A	"	"	1	X										
11	SG-BH2-2.0	"	"	1				X							
12	SG-BH2-3.0	"	"	1										ON HOLD	
				TOTAL	12										

Environmental Division
Brisbane
Work Order Reference
EB1512062



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Work Order Reference
EB1512062

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



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



Laboratory Details	ALS Brisbane
Lab Quote Ref.	28 Shand St, Stafford QLD 4053
BN / 299 / 10	Ph:07 3243 7222
	Email: samples.brisbane@alsenviro.com

CLIENT: Lloyd Consulting		TURNAROUND REQUIRE: Standard TAT (List due date): _____		FOR LABORATORY USE ONLY (Circle)			
OFFICE: 30 Heather Street, Wilston, Q, 4051.		Non Standard or urgent TAT (List due date): _____		Custody Seal Intact? Yes No N/A			
PROJECT:		QUOTE NO.: BNBQ-157-14	COC SEQUENCE NUMBER (Circle)			Free ice / frozen ice bricks present upon receipt? Yes No N/A	
ORDER NUMBER:			COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C			
PROJECT MANAGER: Leona Kopittke		CONTACT PH: 07 3352 7300	OF: 1 2 3 4 5 6 7	Other comment:			
SAMPLER:		SAMPLER MOBILE:	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):		DATE/TIME:	DATE/TIME:	DATE/TIME:	
Email Reports to leona@lloydconsulting.com.au; trevor@lloydconsulting.com.au			DATE/TIME:		DATE/TIME:		
Email Invoice to catherine@lloydconsulting.com.au							

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

[illegible]

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

CERTIFICATE OF ANALYSIS

Work Order	: EB1512062	Page	: 1 of 18
Client	: LLOYD CONSULTING	Laboratory	: Environmental Division Brisbane
Contact	: MS LEONA KOPITKE	Contact	: Customer Services EB
Address	: PO BOX 320	Address	: 2 Byth Street Stafford QLD Australia 4053
	WILSTON QLD, AUSTRALIA 4057		
E-mail	: leona@lloydconsulting.com.au	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 33527300	Telephone	: +61-7-3243 7222
Facsimile	: ----	Facsimile	: +61-7-3243 7218
Project	: 1415-019	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 04-Feb-2015 08:15
C-O-C number	: ----	Date Analysis Commenced	: 05-Feb-2015
Sampler	: LEONA KOPITKE	Issue Date	: 11-Feb-2015 17:11
Site	: ----		
Quote number	: ----	No. of samples received	: 28
		No. of samples analysed	: 20

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Ryan Story	2IC Organic Instrument Chemist	Brisbane Organics
Satishkumar Trivedi	2 IC Acid Sulfate Soils Supervisor	Brisbane Inorganics



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.

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.

- 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.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH1-01	SG-BH1-0.5	SG-BH1-2.0	SG-BH2-0.1	SG-BH2-0.5
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-001	EB1512062-002	EB1512062-004	EB1512062-006	EB1512062-007
					Result	Result	Result	Result	Result
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1	%		12.1	10.1	14.5	9.7	9.9
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		10	7	15	10	8
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		7	10	7	9	10
Copper	7440-50-8	5	mg/kg		9	6	7	8	6
Lead	7439-92-1	5	mg/kg		30	16	11	20	16
Nickel	7440-02-0	2	mg/kg		11	6	7	11	9
Zinc	7440-66-6	5	mg/kg		39	11	12	31	17
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
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	----	----	----	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SG-BH1-01	SG-BH1-0.5	SG-BH1-2.0	SG-BH2-0.1	SG-BH2-0.5
Client sampling date / time				[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit	EB1512062-001	EB1512062-002	EB1512062-004	EB1512062-006	EB1512062-007
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
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	----	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	----	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	----	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	<0.5	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	<0.5	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	<0.5	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	<0.5	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	<0.5	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	<0.5	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH1-01	SG-BH1-0.5	SG-BH1-2.0	SG-BH2-0.1	SG-BH2-0.5
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-001	EB1512062-002	EB1512062-004	EB1512062-006	EB1512062-007
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	----	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	----	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	----	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	----	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	----	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	----	<0.5	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	----	----	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	----	----	<0.5	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	----	----	0.6	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	----	----	1.2	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<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 Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	----
>C10 - C16 Fraction	>C10_C16	50	mg/kg		<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg		110	<100	<100	<100	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		110	<50	<50	<50	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	----
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	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH1-01	SG-BH1-0.5	SG-BH1-2.0	SG-BH2-0.1	SG-BH2-0.5
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-001	EB1512062-002	EB1512062-004	EB1512062-006	EB1512062-007
					Result	Result	Result	Result	Result
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		61.2	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		105	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		85.4	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		88.2	----	----	93.5	----
2-Chlorophenol-D4	93951-73-6	0.5	%		68.7	----	----	81.7	----
2,4,6-Tribromophenol	118-79-6	0.5	%		82.7	----	----	60.9	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		67.5	----	----	77.3	----
Anthracene-d10	1719-06-8	0.5	%		86.5	----	----	91.1	----
4-Terphenyl-d14	1718-51-0	0.5	%		66.1	----	----	100	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		91.7	98.9	97.7	87.8	----
Toluene-D8	2037-26-5	0.2	%		98.9	100	98.4	73.9	----
4-Bromofluorobenzene	460-00-4	0.2	%		92.8	97.7	97.2	80.9	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH2-0.1A	SG-BH2-2.0	SG-BH3-0.1	SG-BH3-0.5	SG-BH3-1.0
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-010	EB1512062-011	EB1512062-013	EB1512062-014	EB1512062-015
					Result	Result	Result	Result	Result
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1	%		11.6	9.0	10.8	11.3	10.8
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		10	45	14	8	19
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		8	14	11	12	10
Copper	7440-50-8	5	mg/kg		9	8	15	7	6
Lead	7439-92-1	5	mg/kg		19	14	23	17	11
Nickel	7440-02-0	2	mg/kg		10	6	13	7	5
Zinc	7440-66-6	5	mg/kg		28	19	45	11	12
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	0.1	mg/kg		----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg		----	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg		----	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg		----	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg		----	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg		----	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		----	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg		----	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		----	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		----	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		----	----	----	----	----
4,4'-DDE	72-55-9	0.05	mg/kg		----	----	----	----	----
Endrin	72-20-8	0.05	mg/kg		----	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		----	----	----	----	----
4,4'-DDD	72-54-8	0.05	mg/kg		----	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	----	----	----	----
4,4'-DDT	50-29-3	0.2	mg/kg		----	----	----	----	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SG-BH2-0.1A	SG-BH2-2.0	SG-BH3-0.1	SG-BH3-0.5	SG-BH3-1.0
Client sampling date / time				[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit	EB1512062-010	EB1512062-011	EB1512062-013	EB1512062-014	EB1512062-015
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Endrin ketone	53494-70-5	0.05	mg/kg	----	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	----	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	----	----	----	----
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg	----	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	----	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	----	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	----	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	----	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	----	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	----	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	----	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	----	----	----	----
Parathion	56-38-2	0.2	mg/kg	----	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	----	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	----	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	----	----	----	----	----
Ethion	563-12-2	0.05	mg/kg	----	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	----	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	0.6	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	<0.5	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH2-0.1A	SG-BH2-2.0	SG-BH3-0.1	SG-BH3-0.5	SG-BH3-1.0
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-010	EB1512062-011	EB1512062-013	EB1512062-014	EB1512062-015
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		0.5	----	0.9	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		0.5	----	2.0	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	----	0.6	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	----	0.9	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	----	1.2	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	<10	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	<50	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	----	140	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	----	130	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	----	270	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	<10	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	----	<10	----	----
>C10 - C16 Fraction	>C10_C16	50	mg/kg		<50	----	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg		130	----	230	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		130	----	230	----	----
^ >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	1330-20-7	0.5	mg/kg		<0.5	----	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	<1	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH2-0.1A	SG-BH2-2.0	SG-BH3-0.1	SG-BH3-0.5	SG-BH3-1.0
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-010	EB1512062-011	EB1512062-013	EB1512062-014	EB1512062-015
					Result	Result	Result	Result	Result
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		94.3	----	91.2	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		80.1	----	99.2	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%		71.8	----	58.1	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		95.7	----	73.0	----	----
Anthracene-d10	1719-06-8	0.5	%		97.6	----	93.3	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		105	----	93.0	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		87.8	----	82.9	----	----
Toluene-D8	2037-26-5	0.2	%		73.8	----	77.5	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		80.1	----	78.2	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH4-2.0	SG-BH4-0.1	SG-BH4-0.5	SG-BH4-1.0	SG-BH4-2.0
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-016	EB1512062-018	EB1512062-019	EB1512062-020	EB1512062-021
					Result	Result	Result	Result	Result
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1	%		7.2	15.4	10.7	12.2	11.6
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		40	10	5	11	8
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		5	8	6	11	14
Copper	7440-50-8	5	mg/kg		12	8	<5	7	10
Lead	7439-92-1	5	mg/kg		15	45	17	27	18
Nickel	7440-02-0	2	mg/kg		60	10	6	8	6
Zinc	7440-66-6	5	mg/kg		77	112	20	23	17
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	0.1	mg/kg		----	<0.1	----	----	----
EP068A: Organochlorine Pesticides (OC)									
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	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH4-2.0	SG-BH4-0.1	SG-BH4-0.5	SG-BH4-1.0	SG-BH4-2.0
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-016	EB1512062-018	EB1512062-019	EB1512062-020	EB1512062-021
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
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	----	0.05	mg/kg		----	<0.05	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		----	<0.05	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		----	<0.05	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		----	<0.2	----	----	----
Dimethoate	60-51-5	0.05	mg/kg		----	<0.05	----	----	----
Diazinon	333-41-5	0.05	mg/kg		----	<0.05	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		----	<0.05	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		----	<0.2	----	----	----
Malathion	121-75-5	0.05	mg/kg		----	<0.05	----	----	----
Fenthion	55-38-9	0.05	mg/kg		----	<0.05	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		----	<0.05	----	----	----
Parathion	56-38-2	0.2	mg/kg		----	<0.2	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		----	<0.05	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		----	<0.05	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		----	<0.05	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		----	<0.05	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg		----	<0.05	----	----	----
Ethion	563-12-2	0.05	mg/kg		----	<0.05	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg		----	<0.05	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		----	<0.05	----	----	----
EP075(SIM)B: Polynuclear Aromatic 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		----	<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	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH4-2.0	SG-BH4-0.1	SG-BH4-0.5	SG-BH4-1.0	SG-BH4-2.0
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-016	EB1512062-018	EB1512062-019	EB1512062-020	EB1512062-021
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		----	0.5	----	----	----
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 hydrocarbons	----	0.5	mg/kg		----	0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		----	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		----	0.6	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		----	1.2	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
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 Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		----	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		----	<10	----	----	----
>C10 - C16 Fraction	>C10_C16	50	mg/kg		----	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		----	130	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		----	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		----	130	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		----	<50	----	----	----
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	1330-20-7	0.5	mg/kg		----	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		----	<1	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH4-2.0	SG-BH4-0.1	SG-BH4-0.5	SG-BH4-1.0	SG-BH4-2.0
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-016	EB1512062-018	EB1512062-019	EB1512062-020	EB1512062-021
					Result	Result	Result	Result	Result
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	60.8	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	56.1	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	69.3	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		----	88.6	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		----	58.0	----	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%		----	58.0	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		----	82.2	----	----	----
Anthracene-d10	1719-06-8	0.5	%		----	98.8	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		----	99.8	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		----	88.7	----	----	----
Toluene-D8	2037-26-5	0.2	%		----	73.4	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		----	73.7	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH5-0.1	SG-BH5-0.1A	SG-BH5-0.5	SG-BH5-1.0	SG-BH5-2.0
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-023	EB1512062-024	EB1512062-025	EB1512062-026	EB1512062-027
					Result	Result	Result	Result	Result
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1	%		11.5	12.2	15.2	8.8	8.1
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		8	10	7	10	50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		10	11	10	10	14
Copper	7440-50-8	5	mg/kg		6	6	7	7	13
Lead	7439-92-1	5	mg/kg		19	23	16	19	17
Nickel	7440-02-0	2	mg/kg		12	11	10	9	24
Zinc	7440-66-6	5	mg/kg		26	20	16	19	42
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	0.1	mg/kg		----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg		----	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg		----	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg		----	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg		----	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg		----	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		----	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg		----	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		----	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		----	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		----	----	----	----	----
4,4'-DDE	72-55-9	0.05	mg/kg		----	----	----	----	----
Endrin	72-20-8	0.05	mg/kg		----	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		----	----	----	----	----
4,4'-DDD	72-54-8	0.05	mg/kg		----	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	----	----	----	----
4,4'-DDT	50-29-3	0.2	mg/kg		----	----	----	----	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SG-BH5-0.1	SG-BH5-0.1A	SG-BH5-0.5	SG-BH5-1.0	SG-BH5-2.0
Client sampling date / time				[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit	EB1512062-023	EB1512062-024	EB1512062-025	EB1512062-026	EB1512062-027
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Endrin ketone	53494-70-5	0.05	mg/kg	----	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	----	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	----	----	----	----
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg	----	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	----	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	----	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	----	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	----	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	----	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	----	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	----	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	----	----	----	----
Parathion	56-38-2	0.2	mg/kg	----	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	----	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	----	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	----	----	----	----	----
Ethion	563-12-2	0.05	mg/kg	----	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	----	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
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	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH5-0.1	SG-BH5-0.1A	SG-BH5-0.5	SG-BH5-1.0	SG-BH5-2.0
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-023	EB1512062-024	EB1512062-025	EB1512062-026	EB1512062-027
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	0.6	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	1.2	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	----	----
>C10 - C16 Fraction	>C10_C16	50	mg/kg		<50	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	----	----
EP080: BTEXN									
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	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SG-BH5-0.1	SG-BH5-0.1A	SG-BH5-0.5	SG-BH5-1.0	SG-BH5-2.0
Client sampling date / time					[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]	[02-Feb-2015]
Compound	CAS Number	LOR	Unit		EB1512062-023	EB1512062-024	EB1512062-025	EB1512062-026	EB1512062-027
					Result	Result	Result	Result	Result
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		89.0	81.2	69.6	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		56.6	56.5	91.4	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%		42.2	33.9	82.4	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		93.2	91.4	77.2	----	----
Anthracene-d10	1719-06-8	0.5	%		88.5	88.3	91.8	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		88.3	99.7	83.8	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		93.6	86.0	85.5	----	----
Toluene-D8	2037-26-5	0.2	%		74.8	76.5	73.0	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		74.9	78.7	79.9	----	----

QUALITY CONTROL REPORT

Work Order	: EB1512062	Page	: 1 of 11
Client	: LLOYD CONSULTING	Laboratory	: Environmental Division Brisbane
Contact	: MS LEONA KOPITKE	Contact	: Customer Services EB
Address	: PO BOX 320 WILSTON QLD, AUSTRALIA 4057	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: leona@lloydconsulting.com.au	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 33527300	Telephone	: +61-7-3243 7222
Facsimile	: ----	Facsimile	: +61-7-3243 7218
Project	: 1415-019	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 04-Feb-2015
C-O-C number	: ----	Date Analysis Commenced	: 05-Feb-2015
Sampler	: LEONA KOPITKE	Issue Date	: 11-Feb-2015
Site	: ----	No. of samples received	: 28
Quote number	: ----	No. of samples analysed	: 20

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

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



NATA Accredited
Laboratory 825

Accredited for
compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Ryan Story	2IC Organic Instrument Chemist	Brisbane Organics
Satishkumar Trivedi	2 IC Acid Sulfate Soils Supervisor	Brisbane Inorganics



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 Content (QC Lot: 61295)									
EB1512062-004	SG-BH1-2.0	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	14.5	14.0	3.93	0% - 50%
EB1512062-016	SG-BH4-2.0	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	7.2	6.9	4.12	No Limit
EA055: Moisture Content (QC Lot: 61778)									
EB1512050-023	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	44.6	44.6	0.00	0% - 20%
EB1512062-011	SG-BH2-2.0	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	9.0	9.0	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 61265)									
EB1511981-004	Anonymous	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	12	10	18.9	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	24	19	20.7	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	16	12	26.8	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	30	26	13.6	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	269	283	4.91	0% - 20%
EB1512062-001	SG-BH1-01	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	7	7	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	11	8	25.6	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	10	8	27.9	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	9	8	15.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	30	19	41.9	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	39	32	20.5	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 61268)									
EB1512062-018	SG-BH4-0.1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	8	7	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	10	10	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	10	8	17.6	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	8	8	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	45	33	29.7	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	112	111	1.16	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 61896)									
EB1512018-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	101	110	9.18	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	47	53	10.9	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	5	5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	38	64	49.7	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	12	15	19.4	No Limit

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 Work Order : EB1512062
 Client : LLOYD CONSULTING
 Project : 1415-019



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 (%)
EG005T: Total Metals by ICP-AES (QC Lot: 61896) - continued									
EB1512018-001	Anonymous	EG005T: Zinc	7440-66-6	5	mg/kg	52500	52500	0.00	0% - 20%
EB1512246-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	11	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	<5	5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	12	10	9.55	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	25	17	37.7	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	22	22	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 61266)									
EB1511981-004	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EB1512062-001	SG-BH1-01	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 61267)									
EB1512062-018	SG-BH4-0.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 61897)									
EB1512062-011	SG-BH2-2.0	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 61272)									
EB1512062-001	SG-BH1-01	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 61269)									
EB1512062-001	SG-BH1-01	EP068: 4,4'-DDD	72-54-8	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: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-BHC	319-84-6	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: beta-BHC	319-85-7	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: cis-Chlordane	5103-71-9	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: Dieldrin	60-57-1	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	72-20-8	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: Endrin ketone	53494-70-5	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: Heptachlor	76-44-8	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: Hexachlorobenzene (HCB)	118-74-1	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: 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



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 (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 61269)									
EB1512062-001	SG-BH1-01	EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 61271)									
EB1512062-001	SG-BH1-01	EP075(SIM): Acenaphthene	83-32-9	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): Anthracene	120-12-7	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): Benzo(a)pyrene	50-32-8	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
		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(g,h,i)perylene	191-24-2	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): Chrysene	218-01-9	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): Fluoranthene	206-44-0	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): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	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): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 61249)									
EB1512062-001	SG-BH1-01	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EB1512086-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit

Page : 6 of 11
 Work Order : EB1512062
 Client : LLOYD CONSULTING
 Project : 1415-019



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 61270)									
EB1512062-001	SG-BH1-01	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 Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 61249)									
EB1512062-001	SG-BH1-01	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EB1512086-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 61270)									
EB1512062-001	SG-BH1-01	EP071: >C16 - C34 Fraction	----	100	mg/kg	110	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 61249)									
EB1512062-001	SG-BH1-01	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	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: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EB1512086-001	Anonymous	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
		EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	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: Toluene	108-88-3	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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit			Result	LCS	Low
EG005T: Total Metals by ICP-AES (QCLot: 61265)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	111	84	123
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	106	88	117
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	116	83	125
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	112	86	122
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	103	84	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	115	89	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	112	87	127
EG005T: Total Metals by ICP-AES (QCLot: 61268)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	110	84	123
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	106	88	117
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	119	83	125
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	114	86	122
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	108	84	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	116	89	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	117	87	127
EG005T: Total Metals by ICP-AES (QCLot: 61896)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	108	84	123
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	102	88	117
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	122	83	125
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	111	86	122
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	101	84	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	113	89	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	110	87	127
EG035T: Total Recoverable Mercury by FIMS (QCLot: 61266)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	99.0	78	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 61267)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	102	78	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 61897)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	103	78	122
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 61272)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	79.7	63	118
EP068A: Organochlorine Pesticides (OC) (QCLot: 61269)								
EP068: 4,4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	91.4	60	123
EP068: 4,4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	81.6	62	121

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP068A: Organochlorine Pesticides (OC) (QCLot: 61269) - continued								
EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	106	80	142
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	91.2	70	130
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	93.0	54	121
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	75.4	51	125
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	77.1	49	121
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	78.6	61	122
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	84.2	57	118
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	81.5	61	122
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	95.3	67	129
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	81.3	55	125
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	84.7	60	137
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	91.6	52	125
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	89.5	55	129
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	85.5	55	129
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	126	65	130
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	88.3	58	118
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	94.6	54	112
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	76.6	53	136
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	86.0	56	119
EP068B: Organophosphorus Pesticides (OP) (QCLot: 61269)								
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	48.9	35	127
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	86.2	80	130
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	109	57	124
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	99.7	62	127
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	73.4	66	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	91.8	70	130
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	78.7	25	120
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	88.0	70	131
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	94.2	41	114
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	62.2	44	131
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	94.7	61	123
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	99.4	55	106
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	86.3	69	115
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	85.5	64	125
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	38.0	35	135
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	97.2	57	118
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	87.0	70	130
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	89.2	80	134
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 61271)								



Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 61271) - continued								
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	1.5 mg/kg	88.1	83	121
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	1.5 mg/kg	86.0	74	118
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.5 mg/kg	91.0	72	115
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	1.5 mg/kg	83.7	64	120
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	1.5 mg/kg	88.1	76	121
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	1.5 mg/kg	79.4	59	129
	205-82-3							
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	1.5 mg/kg	93.6	64	131
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	1.5 mg/kg	96.9	70	129
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	1.5 mg/kg	89.1	66	119
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	1.5 mg/kg	94.4	45	134
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	1.5 mg/kg	88.7	70	116
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	1.5 mg/kg	90.8	81	116
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	1.5 mg/kg	79.9	53	135
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	1.5 mg/kg	74.0	74	119
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	1.5 mg/kg	90.2	72	117
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	1.5 mg/kg	90.1	70	134
EP080/071: Total Petroleum Hydrocarbons (QCLot: 61249)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	16 mg/kg	81.1	66	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 61270)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	318 mg/kg	101	79	123
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	531 mg/kg	97.0	77	123
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 61249)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	18.5 mg/kg	80.1	66	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 61270)								
EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	428 mg/kg	103	81	122
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	395 mg/kg	92.0	74	122
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
EP080: BTEXN (QCLot: 61249)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	76.4	73	105
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	84.5	67	104
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	79.7	66	106
	106-42-3							
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	85.2	72	115
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	81.3	68	105
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	74.8	73	105



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**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 61265)							
EB1511981-002	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	97.2	70	130
		EG005T: Cadmium	7440-43-9	25 mg/kg	106	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	110	70	130
		EG005T: Copper	7440-50-8	50 mg/kg	108	70	130
		EG005T: Lead	7439-92-1	50 mg/kg	84.4	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	103	70	130
		EG005T: Zinc	7440-66-6	50 mg/kg	72.8	70	130
EG005T: Total Metals by ICP-AES (QCLot: 61268)							
EB1512062-019	SG-BH4-0.5	EG005T: Arsenic	7440-38-2	50 mg/kg	111	70	130
		EG005T: Cadmium	7440-43-9	25 mg/kg	112	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	112	70	130
		EG005T: Copper	7440-50-8	50 mg/kg	113	70	130
		EG005T: Lead	7439-92-1	50 mg/kg	113	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	111	70	130
		EG005T: Zinc	7440-66-6	50 mg/kg	119	70	130
EG005T: Total Metals by ICP-AES (QCLot: 61896)							
EB1512062-011	SG-BH2-2.0	EG005T: Arsenic	7440-38-2	50 mg/kg	85.7	70	130
		EG005T: Cadmium	7440-43-9	25 mg/kg	106	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	103	70	130
		EG005T: Copper	7440-50-8	50 mg/kg	106	70	130
		EG005T: Lead	7439-92-1	50 mg/kg	103	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	103	70	130
		EG005T: Zinc	7440-66-6	50 mg/kg	96.5	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 61266)							
EB1511981-002	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	103	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 61267)							
EB1512062-019	SG-BH4-0.5	EG035T: Mercury	7439-97-6	5 mg/kg	106	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 61897)							
EB1512173-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	97.4	70	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 61272)							
EB1512062-018	SG-BH4-0.1	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	76.2	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 61269)							
EB1512062-018	SG-BH4-0.1	EP068: 4,4`-DDT	50-29-3	0.5 mg/kg	85.4	70	130



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 61269) - continued							
EB1512062-018	SG-BH4-0.1	EP068: Aldrin	309-00-2	0.5 mg/kg	89.3	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	77.1	70	130
		EP068: Endrin	72-20-8	0.5 mg/kg	81.0	70	130
		EP068: gamma-BHC	58-89-9	0.5 mg/kg	81.9	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	122	70	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 61269)							
EB1512062-018	SG-BH4-0.1	EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	83.6	70	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	88.0	70	130
		EP068: Diazinon	333-41-5	0.5 mg/kg	71.2	70	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	86.7	70	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	87.8	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 61271)							
EB1512062-006	SG-BH2-0.1	EP075(SIM): Acenaphthene	83-32-9	1.5 mg/kg	87.6	70	130
		EP075(SIM): Pyrene	129-00-0	1.5 mg/kg	86.3	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 61249)							
EB1512062-002	SG-BH1-0.5	EP080: C6 - C9 Fraction	----	8 mg/kg	93.0	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 61270)							
EB1512062-002	SG-BH1-0.5	EP071: C10 - C14 Fraction	----	318 mg/kg	99.7	70	130
		EP071: C15 - C28 Fraction	----	531 mg/kg	98.6	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 61249)							
EB1512062-002	SG-BH1-0.5	EP080: C6 - C10 Fraction	C6_C10	8 mg/kg	94.7	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 61270)							
EB1512062-002	SG-BH1-0.5	EP071: >C10 - C16 Fraction	>C10_C16	428 mg/kg	104	70	130
		EP071: >C16 - C34 Fraction	----	395 mg/kg	92.7	70	130
EP080: BTEXN (QCLot: 61249)							
EB1512062-002	SG-BH1-0.5	EP080: Benzene	71-43-2	2 mg/kg	77.0	70	130
		EP080: Toluene	108-88-3	2 mg/kg	75.4	70	130

QA/QC Compliance Assessment for DQO Reporting

Work Order : **EB1512062**

Page : 1 of 6

Client : **LLOYD CONSULTING**
Contact : **MS LEONA KOPITTKE**
Project : **1415-019**
Site : **----**
Sampler : **LEONA KOPITTKE**
Order number : **----**

Laboratory : **Environmental Division Brisbane**
Telephone : **+61-7-3243 7222**
Date Samples Received : **04-Feb-2015**
Issue Date : **11-Feb-2015**
No. of samples received : **28**
No. of samples analysed : **20**

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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



Analysis Holding Time Compliance

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

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

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

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content								
Soil Glass Jar - Unpreserved (EA055-103) SG-BH1-01, SG-BH1-2.0, SG-BH2-0.5, SG-BH3-0.1, SG-BH3-1.0, SG-BH4-0.1, SG-BH4-1.0, SG-BH5-0.1, SG-BH5-0.5, SG-BH5-2.0 SG-BH1-0.5, SG-BH2-0.1, SG-BH2-0.1A, SG-BH3-0.5, SG-BH4-2.0, SG-BH4-0.5, SG-BH4-2.0, SG-BH5-0.1A, SG-BH5-1.0,	02-Feb-2015	----	----	----	05-Feb-2015	16-Feb-2015	✓	
Soil Glass Jar - Unpreserved (EA055-103) SG-BH2-2.0	02-Feb-2015	----	----	----	06-Feb-2015	16-Feb-2015	✓	
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T) SG-BH1-01, SG-BH1-2.0, SG-BH2-0.5, SG-BH3-0.1, SG-BH3-1.0, SG-BH4-0.1, SG-BH4-1.0, SG-BH5-0.1, SG-BH5-0.5, SG-BH5-2.0 SG-BH1-0.5, SG-BH2-0.1, SG-BH2-0.1A, SG-BH3-0.5, SG-BH4-2.0, SG-BH4-0.5, SG-BH4-2.0, SG-BH5-0.1A, SG-BH5-1.0,	02-Feb-2015	05-Feb-2015	01-Aug-2015	✓	09-Feb-2015	01-Aug-2015	✓	
Soil Glass Jar - Unpreserved (EG005T) SG-BH2-2.0	02-Feb-2015	06-Feb-2015	01-Aug-2015	✓	06-Feb-2015	01-Aug-2015	✓	



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
SG-BH1-01, SG-BH1-2.0, SG-BH2-0.5, SG-BH3-0.1, SG-BH3-1.0, SG-BH4-0.1, SG-BH4-1.0, SG-BH5-0.1, SG-BH5-0.5, SG-BH5-2.0	SG-BH1-0.5, SG-BH2-0.1, SG-BH2-0.1A, SG-BH3-0.5, SG-BH4-2.0, SG-BH4-0.5, SG-BH4-2.0, SG-BH5-0.1A, SG-BH5-1.0,	02-Feb-2015	05-Feb-2015	02-Mar-2015	✔	10-Feb-2015	02-Mar-2015	✔
Soil Glass Jar - Unpreserved (EG035T)								
SG-BH2-2.0		02-Feb-2015	06-Feb-2015	02-Mar-2015	✔	09-Feb-2015	02-Mar-2015	✔
EP066S: PCB Surrogate								
Soil Glass Jar - Unpreserved (EP066)								
SG-BH1-01,	SG-BH4-0.1	02-Feb-2015	05-Feb-2015	16-Feb-2015	✔	10-Feb-2015	17-Mar-2015	✔
EP068C: Triazines								
Soil Glass Jar - Unpreserved (EP068)								
SG-BH1-01,	SG-BH4-0.1	02-Feb-2015	05-Feb-2015	16-Feb-2015	✔	10-Feb-2015	17-Mar-2015	✔
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071)								
SG-BH1-01, SG-BH1-2.0, SG-BH2-0.1A, SG-BH4-0.1, SG-BH5-0.1A,	SG-BH1-0.5, SG-BH2-0.1, SG-BH3-0.1, SG-BH5-0.1, SG-BH5-0.5	02-Feb-2015	05-Feb-2015	16-Feb-2015	✔	10-Feb-2015	17-Mar-2015	✔
EP075(SIM)S: Phenolic Compound Surrogates								
Soil Glass Jar - Unpreserved (EP075(SIM))								
SG-BH2-0.1, SG-BH3-0.1, SG-BH5-0.1, SG-BH5-0.5	SG-BH2-0.1A, SG-BH4-0.1, SG-BH5-0.1A,	02-Feb-2015	05-Feb-2015	16-Feb-2015	✔	10-Feb-2015	17-Mar-2015	✔
EP075(SIM)A: Phenolic Compounds								
Soil Glass Jar - Unpreserved (EP075(SIM))								
SG-BH1-01		02-Feb-2015	05-Feb-2015	16-Feb-2015	✔	10-Feb-2015	17-Mar-2015	✔

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
SG-BH1-01,	SG-BH1-0.5,	02-Feb-2015	05-Feb-2015	16-Feb-2015	✓	10-Feb-2015	16-Feb-2015	✓
SG-BH1-2.0,	SG-BH2-0.1,							
SG-BH2-0.1A,	SG-BH3-0.1,							
SG-BH4-0.1,	SG-BH5-0.1,							
SG-BH5-0.1A,	SG-BH5-0.5							



Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	2	20	10.00	10.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	10.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	2	50.00	10.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	2	50.00	10.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	10	10.00	10.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	2	16	12.50	10.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	2	50.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	2	50.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	16	6.25	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	2	50.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	2	50.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	16	6.25	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	2	50.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	2	50.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	16	6.25	5.00	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement



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	EA055-103	SOIL	In-house. A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 21st ed., 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 21st ed., 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	(USEPA SW 846 - 8270B) 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	(USEPA SW 846 - 8270B) 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	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) 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	(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.
Preparation Methods	Method	Matrix	Method Descriptions
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	(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, Na ₂ SO ₄ and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EB1512062

Client : **LLOYD CONSULTING**
 Contact : MS LEONA KOPITKE
 Address : PO BOX 320
 WILSTON QLD, AUSTRALIA 4057

E-mail : leona@lloydconsulting.com.au
 Telephone : +61 07 33527300
 Facsimile : ----

Project : 1415-019
 Order number : ----
 C-O-C number : ----

Site : ----
 Sampler : LEONA KOPITKE

Laboratory : Environmental Division Brisbane
 Contact : Customer Services EB
 Address : 2 Byth Street Stafford QLD Australia
 4053

E-mail : ALSEnviro.Brisbane@alsglobal.com
 Telephone : +61-7-3243 7222
 Facsimile : +61-7-3243 7218

Page : 1 of 3
 Quote number : EB2014LLOCON0014 (BNBQ/157/14)
 QC Level : NEPM 2013 Schedule B(3) and ALS
 QCS3 requirement

Dates

Date Samples Received : 04-Feb-2015
 Client Requested Due : 11-Feb-2015
 Date

Issue Date : 04-Feb-2015
 Scheduled Reporting Date : **11-Feb-2015**

Delivery Details

Mode of Delivery : Carrier
 No. of coolers/boxes : 1
 Receipt Detail : MEDIUM

Security Seal : Intact.
 Temperature : 13.1°C - Ice Bricks present
 No. of samples received / analysed : 28 / 19

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.
- Please direct any queries related to sample condition / numbering / breakages to John Pickering (John.Pickering@alsglobal.com).
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Please be advised that ALS sample 1 is labelled as 'SG-BH1-0.2' instead of 'SG-BH1-0.01'.**
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exist.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-02 8 Metals (incl. Digestion)	SOIL - S-05 TRH/BTEXN/8 Metals	SOIL - S-13 OC/OP/PCB	SOIL - S-26 8 metals/TRH/BTEXN/PAH
EB1512062-001	[02-Feb-2015]	SG-BH1-01		✓			✓	✓
EB1512062-002	[02-Feb-2015]	SG-BH1-0.5		✓		✓		
EB1512062-003	[02-Feb-2015]	SG-BH1-1.0	✓					
EB1512062-004	[02-Feb-2015]	SG-BH1-2.0		✓		✓		
EB1512062-005	[02-Feb-2015]	SG-BH1-3.0	✓					
EB1512062-006	[02-Feb-2015]	SG-BH2-0.1		✓				✓
EB1512062-007	[02-Feb-2015]	SG-BH2-0.5		✓	✓			
EB1512062-008	[02-Feb-2015]	SG-BH2-1.0	✓					
EB1512062-009	[02-Feb-2015]	SG-BH1-4.0	✓					
EB1512062-010	[02-Feb-2015]	SG-BH2-0.1A		✓				✓
EB1512062-011	[02-Feb-2015]	SG-BH2-2.0	✓					
EB1512062-012	[02-Feb-2015]	SG-BH2-3.0	✓					
EB1512062-013	[02-Feb-2015]	SG-BH3-0.1		✓				✓
EB1512062-014	[02-Feb-2015]	SG-BH3-0.5		✓	✓			
EB1512062-015	[02-Feb-2015]	SG-BH3-1.0		✓	✓			
EB1512062-016	[02-Feb-2015]	SG-BH4-2.0		✓	✓			
EB1512062-017	[02-Feb-2015]	SG-BH3-3.0	✓					
EB1512062-018	[02-Feb-2015]	SG-BH4-0.1		✓			✓	✓
EB1512062-019	[02-Feb-2015]	SG-BH4-0.5		✓	✓			
EB1512062-020	[02-Feb-2015]	SG-BH4-1.0		✓	✓			
EB1512062-021	[02-Feb-2015]	SG-BH4-2.0		✓	✓			
EB1512062-022	[02-Feb-2015]	SG-BH4-3.0	✓					
EB1512062-023	[02-Feb-2015]	SG-BH5-0.1		✓				✓
EB1512062-024	[02-Feb-2015]	SG-BH5-0.1A		✓				✓
EB1512062-025	[02-Feb-2015]	SG-BH5-0.5		✓				✓
EB1512062-026	[02-Feb-2015]	SG-BH5-1.0		✓	✓			
EB1512062-027	[02-Feb-2015]	SG-BH5-2.0		✓	✓			
EB1512062-028	[02-Feb-2015]	SG-BH5-3.0	✓					

Proactive Holding Time Report

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

ACCOUNTS PAYABLE

Email catherine@lloydconsulting.com.au

Email leona@lloydconsulting.com.au

- [illegible]

Email trevor@lloydconsulting.com.au

- [illegible]

CERTIFICATE OF ANALYSIS

Work Order	: ES1502483	Page	: 1 of 6
Client	: LLOYD CONSULTING	Laboratory	: Environmental Division Sydney
Contact	: MS LEONA KOPITKE	Contact	: Client Services
Address	: PO BOX 320 WILSTON QLD, AUSTRALIA 4057	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: leona@lloydconsulting.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 07 33527300	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 1415-019	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 04-FEB-2015
Sampler	: LK	Issue Date	: 11-FEB-2015
Site	: ----		
Quote number	: BNBQ/157/14	No. of samples received	: 2
		No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Pabi Subba	Senior Organic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics



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

- **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.**

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID		SG-BH2-0.1B		SG-BH5-0.1B		----		----		----	
				Client sampling date / time		02-FEB-2015 15:00		02-FEB-2015 15:00		----		----		----	
Compound		CAS Number	LOR	Unit	ES1502483-001		ES1502483-002		----		----		----		
EA055: Moisture Content															
Moisture Content (dried @ 103°C)		----	1.0	%	9.2		9.6		----		----		----		
EG005T: Total Metals by ICP-AES															
Arsenic		7440-38-2	5	mg/kg	9		9		----		----		----		
Cadmium		7440-43-9	1	mg/kg	<1		<1		----		----		----		
Chromium		7440-47-3	2	mg/kg	7		9		----		----		----		
Copper		7440-50-8	5	mg/kg	9		6		----		----		----		
Lead		7439-92-1	5	mg/kg	20		24		----		----		----		
Nickel		7440-02-0	2	mg/kg	10		10		----		----		----		
Zinc		7440-66-6	5	mg/kg	33		22		----		----		----		
EG035T: Total Recoverable Mercury by FIMS															
Mercury		7439-97-6	0.1	mg/kg	<0.1		<0.1		----		----		----		
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons															
Naphthalene		91-20-3	0.5	mg/kg	<0.5		<0.5		----		----		----		
Acenaphthylene		208-96-8	0.5	mg/kg	<0.5		<0.5		----		----		----		
Acenaphthene		83-32-9	0.5	mg/kg	<0.5		<0.5		----		----		----		
Fluorene		86-73-7	0.5	mg/kg	<0.5		<0.5		----		----		----		
Phenanthrene		85-01-8	0.5	mg/kg	<0.5		<0.5		----		----		----		
Anthracene		120-12-7	0.5	mg/kg	<0.5		<0.5		----		----		----		
Fluoranthene		206-44-0	0.5	mg/kg	<0.5		<0.5		----		----		----		
Pyrene		129-00-0	0.5	mg/kg	<0.5		<0.5		----		----		----		
Benz(a)anthracene		56-55-3	0.5	mg/kg	<0.5		<0.5		----		----		----		
Chrysene		218-01-9	0.5	mg/kg	<0.5		<0.5		----		----		----		
Benzo(b+j)fluoranthene		205-99-2 205-82-3	0.5	mg/kg	<0.5		<0.5		----		----		----		
Benzo(k)fluoranthene		207-08-9	0.5	mg/kg	<0.5		<0.5		----		----		----		
Benzo(a)pyrene		50-32-8	0.5	mg/kg	<0.5		<0.5		----		----		----		
Indeno(1.2.3.cd)pyrene		193-39-5	0.5	mg/kg	<0.5		<0.5		----		----		----		
Dibenz(a.h)anthracene		53-70-3	0.5	mg/kg	<0.5		<0.5		----		----		----		
Benzo(g.h.i)perylene		191-24-2	0.5	mg/kg	<0.5		<0.5		----		----		----		
^ Sum of polycyclic aromatic hydrocarbons		----	0.5	mg/kg	<0.5		<0.5		----		----		----		
^ Benzo(a)pyrene TEQ (zero)		----	0.5	mg/kg	<0.5		<0.5		----		----		----		
^ Benzo(a)pyrene TEQ (half LOR)		----	0.5	mg/kg	0.6		0.6		----		----		----		
^ Benzo(a)pyrene TEQ (LOR)		----	0.5	mg/kg	1.2		1.2		----		----		----		
EP080/071: Total Petroleum Hydrocarbons															



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

				SG-BH2-0.1B	SG-BH5-0.1B	----	----	----
Client sampling date / time				02-FEB-2015 15:00	02-FEB-2015 15:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1502483-001	ES1502483-002	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	----	----	----
>C10 - C16 Fraction	>C10_C16	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	1330-20-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	94.0	87.6	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	100	93.6	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	91.3	85.3	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	103	97.2	----	----	----
Anthracene-d10	1719-06-8	0.1	%	91.0	86.2	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	111	104	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	84.1	84.7	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Client sample ID

Client sampling date / time

				SG-BH2-0.1B	SG-BH5-0.1B	----	----	----
				02-FEB-2015 15:00	02-FEB-2015 15:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1502483-001	ES1502483-002	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
Toluene-D8	2037-26-5	0.1	%	93.8	98.8	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	93.4	96.9	----	----	----



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	72.8	133.2
Toluene-D8	2037-26-5	73.9	132.1
4-Bromofluorobenzene	460-00-4	71.6	130.0

**Environmental**

A trading name of Australian Laboratory Services Pty ABN 84 009 936 029. An ALS Limited Company

TAX INVOICEInvoice No. : **E1062322**

Page : 1 of 1

LLOYD CONSULTING
MS LEONA KOPITKE
PO BOX 320
WILSTON QLD, AUSTRALIA 4057

Work Order	Project	Site	Order number	C-O-C number	Contact
ES1502483	1415-019	----	----	----	MS LEONA KOPITKE

Issue Date	: 11-FEB-2015	Taxable value	: AUD\$ 224.00
		GST	: AUD\$ 22.40
Due Date	: 13-MAR-2015	Amount Payable	: AUD\$ 246.40

Work Order Breakdown

Method	Method Descriptions	Quantity	Unit Value (AUD\$)	Value (AUD\$)	GST (AUD\$)	Line Total (AUD\$)
Work Order: ES1502483		Quote number: BNBQ/157/14		Submatrix summary: 2 SOILS		
Misc	Workorder Admin Fee	1	40.00	40.00	4.00	44.00
S-26	8 metals/TRH/BTEXN/PAH	2	92.00	184.00	18.40	202.40

• Please direct all enquiries to Environmental Division Sydney on +61 2 8784 8555.

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REMITTANCE ADVICE

POST TO: Australian Laboratory Services Pty Ltd
P.O. Box 66 Everton Park
QLD 4053 Australia

EMAIL TO: remittances@alsglobal.com

Vendor bank details

Bank: **Commonwealth Bank** or **Credit Card**
BSB: **064 000** **Visa**
Account: **12672843** **Mastercard**
Swift Code: **CTBAAU2S**
or **Cheque**
Payable to Australian Laboratory Services Pty Ltd

Amount Payable**AUD\$ 246.40****ALS Client Reference****LLOCON****TAX INVOICE****E1062322**

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RIGHT SOLUTIONS RIGHT PARTNER

QUALITY CONTROL REPORT

Work Order	: ES1502483	Page	: 1 of 8
Client	: LLOYD CONSULTING	Laboratory	: Environmental Division Sydney
Contact	: MS LEONA KOPITTKE	Contact	: Client Services
Address	: PO BOX 320 WILSTON QLD, AUSTRALIA 4057	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: leona@lloydconsulting.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 07 33527300	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 1415-019	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 04-FEB-2015
Sampler	: LK	Issue Date	: 11-FEB-2015
Order number	: ----		
Quote number	: BNBQ/157/14	No. of samples received	: 2
		No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

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



NATA Accredited
Laboratory 825

Accredited for
compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Pabi Subba	Senior Organic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics



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.

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**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (QC Lot: 3811408)									
ES1502483-002	SG-BH5-0.1B	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	9.6	10.3	6.9	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 3817043)									
ES1502238-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	40	45	10.1	0% - 20%
		EG005T: Chromium	7440-47-3	2	mg/kg	1280	1340	4.2	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	354	386	8.6	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	30	30	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	1140	1180	2.9	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	520	568	8.9	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	26000	28700	10.1	0% - 20%
ES1502434-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	9	9	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	8	13	51.4	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	9	18.8	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	132	138	4.2	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	102	124	19.8	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	224	215	4.0	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3817044)									
ES1502238-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.1	0.1	0.0	No Limit
ES1502434-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.1	0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3811336)									
ES1502595-003	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.8	<0.8	0.0	No Limit

Page : 4 of 8
 Work Order : ES1502483
 Client : LLOYD CONSULTING
 Project : 1415-019



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: Polynuclear Aromatic Hydrocarbons (QC Lot: 3811336) - continued									
ES1502595-003	Anonymous	EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.8	<0.8	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3811335)									
ES1502595-003	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3812032)									
ES1502408-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	30	24	20.6	No Limit
ES1502480-002	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3811335)									
ES1502595-003	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3812032)									
ES1502408-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	82	69	17.5	No Limit
ES1502480-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 3812032)									
ES1502408-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	0.7	0.6	15.6	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	0.8	0.7	15.1	No Limit
ES1502480-002	Anonymous	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
		EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit		

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.

Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
		LCS	Low	High	
<5	21.7 mg/kg	104	92	130	
<1	4.64 mg/kg	96.7	87	121	
<2	43.9 mg/kg	98.5	80	136	
<5	32.0 mg/kg	103	93	127	
<5	40.0 mg/kg	94.1	86	124	
<2	55.0 mg/kg	107	93	131	
<5	60.8 mg/kg	99.6	81	133	
<0.1	2.57 mg/kg	80.4	70	105	
<0.5	4 mg/kg	99.5	80	124	
<0.5	4 mg/kg	98.4	77	123	
<0.5	4 mg/kg	92.8	79	123	
<0.5	4 mg/kg	97.1	77	123	
<0.5	4 mg/kg	97.4	79	123	
<0.5	4 mg/kg	97.7	79	123	
<0.5	4 mg/kg	96.3	79	123	
<0.5	4 mg/kg	95.8	79	125	
<0.5	4 mg/kg	98.1	73	121	
<0.5	4 mg/kg	96.2	81	123	
<0.5	4 mg/kg	79.8	70	118	
<0.5	4 mg/kg	80.6	77	123	
<0.5	4 mg/kg	101	76	122	
<0.5	4 mg/kg	74.0	71	113	
<0.5	4 mg/kg	74.5	71.7	113	
<0.5	4 mg/kg	75.3	72.4	114	
<50	200 mg/kg	104	71	131	
<100	300 mg/kg	111	74	138	
<100	200 mg/kg	103	64	128	



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
					MS	MSD	Low	High	Value	Control Limit
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3811335) - continued										
ES1502595-003	Anonymous	EP071: >C10 - C16 Fraction	>C10_C16	902 mg/kg	92.7	----	73	137	----	----
		EP071: >C16 - C34 Fraction	----	3190 mg/kg	100	----	53	131	----	----
		EP071: >C34 - C40 Fraction	----	1087 mg/kg	88.7	----	52	132	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3811336)										
ES1502595-003	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	94.0	----	70	130	----	----
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	112	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3812032)										
ES1502408-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	93.9	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3812032)										
ES1502408-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	99.1	----	70	130	----	----
EP080: BTEXN (QCLot: 3812032)										
ES1502408-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	73.5	----	70	130	----	----
		EP080: Toluene	108-88-3	2.5 mg/kg	80.9	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	84.9	----	70	130	----	----
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	94.9	----	70	130	----	----
			106-42-3							
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	80.8	----	70	130	----	----
	EP080: Naphthalene	91-20-3	2.5 mg/kg	74.5	----	70	130	----	----	
EG005T: Total Metals by ICP-AES (QCLot: 3817043)										
ES1502238-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	110	----	70	130	----	----
		EG005T: Cadmium	7440-43-9	50 mg/kg	85.3	----	70	130	----	----
		EG005T: Chromium	7440-47-3	50 mg/kg	# Not Determined	----	70	130	----	----
		EG005T: Copper	7440-50-8	500 mg/kg	80.3	----	70	130	----	----
		EG005T: Lead	7439-92-1	250 mg/kg	76.2	----	70	130	----	----
		EG005T: Nickel	7440-02-0	50 mg/kg	# Not Determined	----	70	130	----	----
		EG005T: Zinc	7440-66-6	250 mg/kg	# Not Determined	----	70	130	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3817044)										
ES1502238-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	89.6	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1502483	Page	: 1 of 5
Client	: LLOYD CONSULTING	Laboratory	: Environmental Division Sydney
Contact	: MS LEONA KOPITTKE	Contact	: Client Services
Address	: PO BOX 320 WILSTON QLD, AUSTRALIA 4057	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: leona@lloydconsulting.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 07 33527300	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 1415-019	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 04-FEB-2015
Sampler	: LK	Issue Date	: 11-FEB-2015
Order number	: ----		
Quote number	: BNBQ/157/14	No. of samples received	: 2
		No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



Analysis Holding Time Compliance

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

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

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

Matrix: **SOIL**

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

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content								
Soil Glass Jar - Unpreserved (EA055-103) SG-BH2-0.1B, SG-BH5-0.1B	02-FEB-2015	----	----	----	05-FEB-2015	16-FEB-2015	✓	
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T) SG-BH2-0.1B, SG-BH5-0.1B	02-FEB-2015	10-FEB-2015	01-AUG-2015	✓	10-FEB-2015	01-AUG-2015	✓	
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T) SG-BH2-0.1B, SG-BH5-0.1B	02-FEB-2015	10-FEB-2015	02-MAR-2015	✓	11-FEB-2015	02-MAR-2015	✓	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP071) SG-BH2-0.1B, SG-BH5-0.1B	02-FEB-2015	05-FEB-2015	16-FEB-2015	✓	05-FEB-2015	17-MAR-2015	✓	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM)) SG-BH2-0.1B, SG-BH5-0.1B	02-FEB-2015	05-FEB-2015	16-FEB-2015	✓	05-FEB-2015	17-MAR-2015	✓	
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) SG-BH2-0.1B, SG-BH5-0.1B	02-FEB-2015	06-FEB-2015	16-FEB-2015	✓	09-FEB-2015	16-FEB-2015	✓	
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080) SG-BH2-0.1B, SG-BH5-0.1B	02-FEB-2015	06-FEB-2015	16-FEB-2015	✓	09-FEB-2015	16-FEB-2015	✓	



Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	1	3	33.3	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	20	10.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	19	10.5	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	10	10.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	2	19	10.5	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	19	5.3	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	10	10.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	19	5.3	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	19	5.3	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	10	10.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	19	5.3	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	5.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	19	5.3	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	10	10.0	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	19	5.3	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement



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	EA055-103	SOIL	In-house. A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 21st ed., 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 21st ed., 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) 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	(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.
Preparation Methods	Method	Matrix	Method Descriptions
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(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, Na ₂ SO ₄ 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.



Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

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	ES1502238-001	Anonymous	Chromium	7440-47-3	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG005T: Total Metals by ICP-AES	ES1502238-001	Anonymous	Nickel	7440-02-0	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG005T: Total Metals by ICP-AES	ES1502238-001	Anonymous	Zinc	7440-66-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.

Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.



CLIENT: Lloyd Consulting		TURNAROUND REQUIRE Standard TAT (List due date): _____ Non Standard or urgent TAT (List due date): _____		FOR LABORATORY USE ONLY (Circle)				
OFFICE: 30 Heather Street, Wilston, Q, 4051.				Custody Seal Intact? Yes No N/A				
PROJECT: 1415-019		QUOTE NO: BNBQ-157-54	COC SEQUENCE NUMBER (Circle)		Free ice / frozen ice bricks present upon receipt? Yes No N/A			
ORDER NUMBER:			COC: ① 2 3 4 5 6 7 OF: ① 2 3 4 5 6 7		Random Sample Temperature on Receipt: 'C			
PROJECT MANAGER: Leona Kopittke		CONTACT PH: 07 3352 7300		Other comment:				
SAMPLER: LK		SAMPLER MOBILE:		RELINQUISHED BY:		RECEIVED BY:		
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):		DATE/TIME:		DATE/TIME:		
Email Reports to leona@lloydconsulting.com.au; trevor@lloydconsulting.com.au		DATE/TIME:		DATE/TIME:		DATE/TIME:		
Email Invoice to catherine@lloydconsulting.com.au		DATE/TIME:		DATE/TIME:		DATE/TIME:		

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS				MATRIX: Solid (S)	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price)										Additional Information
		Water(W)				Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	Total Bottles												
					5-26											
1	SG-BH2-01B	2-2-15	S	1	X											
2	SG-BH5-01B	"	S	1	X											

ES1502483



Telephone : + 61-2-8784 8555

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