PRELIMINARY SITE INVESTIGATION

For the Proposed

EDUCATIONAL ESTABLISHMENT – INTERNATIONAL AVIATION COLLEGE

Glen Innes Airport
Emmaville Road, Glen Innes

Prepared for: Australia Asia Flight Training
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1.0 Introduction

Mitchel Hanlon Consulting has been engaged by Australia Asia Flight Training Pty Ltd to carry out a Preliminary Site Investigation on the proposed '*Education Establishment – International Aviation College*' located at the Glen Innes Airport, Emmaville Road, Glen Innes, NSW. Figure 1 (p9) illustrates the proposed site regional locality within a general context.

The subject site is owned by Glen Innes Severn Council.

The focus area of this assessment is currently utilised generally as a caretakers residence and storage shed, however it is proposed the current use be changed to an *'Educational Establishment – International Aviation College'.* As it is proposed to change the site's designated land use, State Environmental Planning Policy (SEPP) No. 55 – *Remediation of Land* is deemed to apply to the development.

As such, a Preliminary Site Investigation is required to accompany the Development Application (DA) to be lodged with Glen Innes Severn Council. The purpose of the Investigation is to determine if the site has potential to have been contaminated due to current or historical land use activities.

It is noted that this report only relates to the parcel of land identified for the proposed '*Educational Establishment"* (Lot 3 DP 1102229) and not the entire Glen Innes Airport.

The assessment is required to conform to the requirements of the appropriate NSW EPA and ANZECC guidelines.

Specifically this report follows the EPA guideline *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (2000)* and Section 3.5.1 Stage 1 – Preliminary Investigation of *the* Department of Urban Affairs and Planning & NSW EPA (1998) *Managing Land Contamination – Planning guidelines SEPP55 – Remediation of Land* .

For Preliminary Site Investigation Reports, the guidelines state the following matters are to be investigated and reported upon:-

- Identify all past and present potentially contaminating activities;
- Determine the potential for and, if any, the possible nature and extent of contamination;
- Site condition;
- Preliminary assessment of site contamination; and
- The need for further investigation.

The scope of work undertaken comprises:-

- Compilation of a site history;

- Detailed inspection of the site;
- Preliminary targeted site sampling; and
- Preparation of this report.

A plan depicting the proposal site is presented in Appendix A.

1.1 The Proponent

The proponent for the development is Australia Asia Flight Training Pty Ltd (AAFT).

AAFT associates currently operate an aviation training academy at Coolangatta Airport on the Gold Coast, Queensland, trading as Australian Wings Academy Pty Ltd. The Coolangatta academy opened to commercial pilot trainees in 2006-2007 and has a capacity to train 80 residential students per year.

Mitchel Hanlon Consulting Pty Ltd

Australia Asia Flight Training

Glen Innes NSW

FIGURE 1

Regional Locality

Plot Date: 16 November 2012

J:\2012\12120 AAFT Proposed Aviation Training College Glen Innes Airport\Preliminary Contamination\ACAD\12120 Australia Asia Flight Training Phase 1 Contamination Sampling Plan ver3 16-11-12.dwg

1.2 Development

Australia Asia Flight Training Pty Ltd is seeking consent to construct and operate an Educational Establishment – International Aviation College at Glen Innes Airport, Emmaville Road, Glen Innes, NSW.

The proposal largely involves the following facilities and infrastructure:

- Accommodation for up to 600 full time students (to be constructed over 4 stages);
- Dining facilities for up to 650 people;
- Operations area and teaching facilities;
- Administration facilities;
- 13 flight briefing rooms;
- Six (6) classrooms;
- Student computer laboratory;
- Student recreational facilities including a gymnasium;
- Car parking;
- Above ground fuel storage facilities; and
- Hangers and hardstand aircraft parking area.

The development of the Aviation College will be undertaken in four stages from an initial capacity of 200 students through to 400 flying and 200 associated aviation tertiary students. It will take up to five (5) years before the College is running at full capacity.

Subject to approval from Council, construction would commence sometime after January 2013.

The application also proposes a three (3) lot subdivision of Lot 3 DP 1102229, Emmaville Road, Glen Innes.

The proposed site and development is illustrated in Appendix A.

2.0 Site Characteristics

2.1 Site Location

The Glen Innes airport is located on the Emmaville Road approximately 7km from Glen Innes. Table 1 (p11) outlines the site details and existing leasehold tenancies with uses. Appendix B includes a copy of the Title Search for the subject site and zoning information.

Table 1: Site Identification

DESCRIPTION	AREA	LESSEE	USE
Pt Lot 3 DP 1102229	135.04ha	Department Investment & Trade	Grazing
Lot 2 DP 1166576	453m^2	Superair Lonoaks P/L	Hanger Lease
Pt Lot 3 DP 1102229	220m^2	Superair Lonoaks P/L	Fuel Facility
Lot 3 DP 1166576	447m^2	D Clements	Hanger Lease
Pt Lot 3 DP 1102229	Pt 3000m^2	Greg Cox	Aircraft Hanger Space – Council Hanger
Pt Lot 3 DP 1102229	Pt 3000m^2	John Rogers	W Aircraft Hanger Space – Council Hanger
Pt Lot 3 DP 1102229	Pt 3000m^2	Michael Pettit	Aircraft Hanger Space – Council Hanger
Pt Lot 3 DP 1102229	Pt 3000m^2	Chris Sexton	Aircraft Hanger Space – Council Hanger
Pt Lot 3 DP 1102229	Pt 3000m^2	Allied Rural P/L	Aircraft Hanger Space – Council Hanger
Lot 2 DP 826155	8350m^2	Air Services Australia	Navigational Facility
Pt Lot 3 DP 1102229	1700m^2	Rural Fire Services	Reddestone Brigade Shed
Pt Lot 3 DP 1102229	440m^2	Bureau of Meteorology	Automatic weather station

Lot 3 DP 1102229 has a total area of 226.5Ha and is owned by Glen Innes Severn Council. In addition to the above, the site contains the Glen Inness Airport Terminal Building, public toilets, a caretaker residence, work shed and fuel site. The residence, workshop and fuel site are located within the proposed development area.

Title search information and current land uses was sourced from the NSW Department of Lands [Refer to Appendix B] and Glen Innes Severn Council.

2.2 Site Description

The subject site is located at Glen Innes Airport, Emmaville Road, Glen Innes, NSW, 2370 and is identified as Lot 3 in DP 1102229. The site has street frontage and is accessed from Emmaville Road. The property is surrounded by private agricultural land.

The proposed Educational Establishment is located adjacent to the general aviation area of the airport. The surrounding airport land is used primarily for agriculture and is leased to the NSW Department of Trade and Investment. The land is used for grazing purposes in association with the Glen Innes Agricultural Research Station.

The subject site also houses the Reddestone Rural Fire Services Brigade building, Glen Innes Aero Club and a number of leased private hangers.

2.3 Zoning

The subject site is currently zoned *RU 1 Primary Production* under the Glen Innes Severn Local Environmental Plan 2012.

At the time of lodging the DA for the proposed Education Establishment, the zoning was *1(a) General Rural* under the Severn Local Environmental Plan 2002.

3.0 Site Conditions

3.1 Topography

The majority of the subject site has been developed or disturbed. The operational land incorporating the airport has been developed with roads, runways and taxi-ways and aviation associated buildings. Most of the remaining land has been cleared, grassed and has some drainage improvements in the form of open drains.

The subject site is generally sparsely vegetated with grasslands, typified with improved pastures. A small amount of remnant native vegetation exists on the north eastern boundary.

The subject site falls within the Tenterfield Plateau that has the features of undulating granitic plateau with higher residuals including basalt cappings. The Tenterfield Plateau are composed of highly weathered bedrock (>50%) and soil on bedrock (<20%) (CSIRO 2006).

3.2 Geology and Soil

3.2.1 Geology

The site exists in the geological region of New England, with a geological age of Silurian to Triassic. In terms of the stratigraphy of the general area, the area is identified as being of late Silurian to middle Triassic shelf, with trough sediments, felsic to mafic volcanics, and continental sediments (CSIRO 2006).

The geology within the local area is generally described as Central Province Undifferentiated basalt flows, minor basaltic volcaniclastic units; basaltic vent and breccias. Includes alkali; dolerite, basaltic diatreme breccia (Department of Minerals, Metallogenic Series 2001).

3.2.2 Soil

The soil within the local area is generally described as being Haplic Eutrophic Brown Chromosol (ASC), Brown Podzolic Soil (GSG) (NSW Natural Resource Atlas 2011). The topsoil is moderately high in clay (62%) with moderate amounts of sand (22%) and low silt content (16%). The subsoil is of similar clay content (62%) and contains relatively low sand content (22%) silt content (16%). The topsoil and subsoil are both slightly acidic. The topsoil is expected to have a depth of approximately 0.1m, atop subsoil approximately 1.5m deep (CSIRO 2006).

3.3 Hydrogeology & Hydrology

A search of the NSW Natural Resource Atlas for registered Groundwater wells in the local area revealed the presence of 4 wells in the nearby area (approximately 5 km radius). Table 2 (p114) provides an overview of the four (4) identified groundwater bores. Groundwater works summaries are included in Appendix C.

Table 2: Standing Water Level of Local Groundwater

GROUNDWATER NUMBER	LOCATION – LOT / DP	LICENSED / AUTHORISED USE	WATER BEARING ZONES	
			FROM (M)	TO (M)
GW023235	116#	Domestic Stock	*	*
GW017947	108#	Domestic	*	*
GW967515	1/176519	Domestic Stock	*	*
GW901579	519/73282	Domestic Stock	*	*

# Indicates Groundwater bore is located within subject site
* Information not provided

Information provided by Glen Innes Severn Council identifies a bore located at the airport with a standing water table averaging 6 metres. The standing groundwater table level fluctuated with rainfall. The bore is approximately 20 metres deep, with the foot-valve at a depth between 11 to 13m. Council advise the water level has been as high as approximately 5 metres in wet years and 12 metres in drought years. E coli was detected in the groundwater taken from this well a number of years ago (the exact date unknown). As a result of this, a water tank was purchased to provide potable water to the onsite residential dwelling. Onsite absorption of household effluent was relocated to ensure that it was no longer travelling in the direction of the groundwater bore. The source and nature of the E coli presence will need to be further investigated and managed.

With the exception of the potential presence of E coli, it is considered that the groundwater within the area is unlikely to be impacted by any previous activities carried out on the site. Furthermore, the residential college proposed will rely on town water supply and sewerage will be managed by the town waste water treatment facility. Subsequently, the development will reduce the risk of E coli exposure, through eliminating the use of onsite groundwater and effluent application.

3.3.1 Hydrology

The subject site is located within the Reddestone Creek catchment. From the site, water flows predominantly eastward prior to reaching Donnelly's Creek. Donnelly's Creek joins the Reddestone Creek which flows into the Severn River, forming part of the Murray Darling Basin. The subject site is not flood prone.

Donnelly's Creek flows through the south-east corner of the property and is approximately 1km from the proposed development site.

Land slope is negligible, with moderate fall from the north-west towards Donnelly's Creek in the south-east corner of the property. The site elevation is approximately 1040 metres AHD.

4.0 Site History

4.1 Introduction

The information contained within this section was provided by the following sources:

- A review of historical plans, Deposited Plans and topographic maps;
- A review of the NSW Office of Environmental & Heritage [formerly Department of Environment, Climate Change and Water's (DECCW)] Contaminated Site Register;
- Discussions with and information from the current landholder – Glen Innes Severn Council:
- Title search information sourced from the NSW Department of Lands [Refer to Appendix B]; and
- Observations made during the Site Inspection undertaken by Mitchel Hanlon Consulting Pty Ltd.

4.2 Property Ownership

The site is currently held by the Glen Innes Severn Council. The Glen Innes airport was established in or around 1941 when land was purchased from the Lane family for its establishment. The aerodrome infrastructure was established during World War II by the Federal Government. It appears the airport was not actively used in World War II, and was established as a fall-back position in the event the Japanese invaded Australia.

In 1938 the Glen Innes Aero Club was formed with East West Airlines applying for a daily service to Sydney in 1947. Regular passenger transport ceased in the late 1980's. Since this period the use of the airport has primarily been for agricultural uses, local aviation enthusiasts, emergency services including Rural Fire Services and Toll for a daily banking/mail run.

4.3 Land Use – Subject Site

4.3.1 Historical

4.3.1.1 NSW OEH Contaminated Site Register

As part of the required site history assessment, a review of the relevant documentation available from the NSW Office of Environment & Heritage (Department of Environment, Climate Change and Water), in particular the List of Contaminated Sites was undertaken. The review indicated the site is not listed as a notified contaminated site nor is the site listed as having previously operated as a gasworks site.

4.3.1.2 Discussion with Current Land Owners/Occupants

The site is currently held by Glen Innes Severn Council who has held possession of the land since 1941. Discussions with personnel from Glen Innes Severn Council have verified that, the site has a history consistent with that of an operational airport. Following the land purchase and subsequent aiport development commencing in 1941, the aiport was used for passenger's services by East West Airlines between 1947 and the late 1980's.

Since this period, the use of the airport has primarily been for agricultural uses, local aviation enthusiasts, and emergency services including Rural Fire Services and Toll for a daily banking/mail run.

4.3.1.3 Discussions with Previous Land Owners

The extensive duration in which the proposed site has been held and operated by Glen Innes Severn Council as an airport is deemed to void the need to discuss prior land uses with any other with previous land holders. The duration, in excess of 70 years, indicates that any contamination present onsite is likely to be a result of solely operating the airport.

4.3.2 Current

The subject site is currently used primarily for agricultural uses, local aviation enthusiasts, emergency services including Rural Fire Services and Toll for a daily banking/mail run. The subject site has one caretaker residential dwelling located towards the eastern side of the lot, as shown in Appendix A.

The property has an area of approximately 226.5ha, and the current infrastructure incorporates sheds and hangers used for aircraft maintenance and fuel storage, an existing above ground fuel storage tank, on-site effluent treatment systems associated with the existing dwelling, a terminal building and public toilets.

4.3.2.1 Proposed Development Site

The proposed development site lies within the eastern portion of the lot, on the southern side of and adjacent to the internal airport road. The proposed aviation college site is illustrated Appendix A. The proposed site will be approximately 4.1 ha. The development site has been positioned to optimise the use of existing infrastructure whilst maximising the separation distance between residential dwellings.

4.4 Potentially Contaminating Activities

4.4.1 Chemical Usage / Storage

Potentially contaminating activities associated with general chemical usage and storage include:

- The use and storage of herbicides.
- The use and storage of fuel, coolants and lubricants.

It has been confirmed by the landowner and caretaker that these chemicals have been used only as directed and in small amounts. The existing groundskeeper has advised us that at any one time, no more than 20L of Round-Up has been stored onsite.

4.4.2 Fuel Storage / Use

A 1,200L diesel storage tank is located adjacent to an existing storage shed. It has been advised that this tank is presently refilled approximately once every three months and is owned by Superair.

4.4.3 Storage of Oil & Coolants

It has been reported that small amounts of oil and coolants are stored and utilised onsite. Both the current landowners and caretaker state the amount of motor oil stored onsite has never exceeded 20 litres at any one time. Furthermore, the landowners do not recall any major spillages of this oil.

4.4.4 Infrastructure Potentially Containing Hazardous Materials

It is noted the site contains a single fluorescent light, located within the corrugated iron shed, which could potentially contain PCBs. Previous studies undertaken indicate there is potential for asbestos building products and lead based paints associated with the existing caretakers dwelling, existing buildings and structures onsite. These structures have the potential for future contamination if construction or maintenance were to be undertaken.

Furthermore, it is noted that there is an on-site effluent treatment and disposal system operating as part of the caretaker's residence. Given the previous E coli pollution of the groundwater found to be present on the

onsite bore, this effluent system is suspected to be a potential source of contamination.

4.4.5 Cattle / Sheep Dip

It has been determined that the site does not contain nor has it contained a cattle / sheep dip or associated infrastructure.

4.4.6 Intensive Agriculture

Discussions with the relevant persons, in conjunction with the current land use history as an airport for over 70 years, have determined that the site has not been utilised for intensive agriculture (feed-lotting, poultry farming, orchids, turf farming or market gardens).

4.5 Land Use History – Adjoining Land

The surrounding properties are generally used for agricultural purposes, predominantly grazing and dryland cropping. Emmaville Road borders the eastern boundary of the property. The Glen Innes Agriculture Research science Reserve borders the south of the property. It is anticipated the proposed development will have negligible impact on the operations at the research site.

5.0 Site Investigation

The site was visited on 19th October 2012 by Catherine Lockyer (Environmental Scientist) of Mitchel Hanlon Consulting for the purposes of a site investigation.

The site assessment consisted of a visual inspection of the existing dwelling (external only) and associated out buildings, site soils, vegetation and any bare earth throughout the site. A random walk throughout the remainder of the site was also carried out with attention given to boundary areas close to fence lines and roadside areas.

During the site assessment, it was noted that:

- There were three (3) main buildings within the proposal area, including a residential dwelling, an old weather-board shed and a small chemical storage shed (located to the east of the homestead and large shed). A 1,200L upright diesel storage tank was located on the western side of the chemical store shed. The majority of search effort was expended within the area surrounding the chemical storage shed.
- Groundcover surrounding all on-site buildings was extensively diminished as a result of herbicide application (glyphosate). The groundskeeper detailed that he uses the herbicide only as directed, and does not store more than 20 litres of any one product on-site at any time.
- The large shed contained only herbicides, all of which were stored on concrete surface sealing. There did not appear to b any spillages or staining inside or around the large shed.
- No visible signs of spills, leaks or contamination were observed in the vicinity of the homestead or the large shed.
- A 44 gallon drum containing old diesel was located immediately south of the chemical storage shed. The soil beneath this was severely stained and odourous.
- Significant odour and staining was observed in the soil beneath the upright diesel storage tank.
- The concrete slab forming the floor of the chemical storage shed was significantly deteriorated with deterioration so severe in some areas that the concrete had crumbled onto the surrounding soils. The surrounding soils had a slight odour and some staining. It is suspected that the deterioration has occurred as a result of chemical spills inside the storage shed over the past 70 years.
- A track had been formed in the grass to the south of the chemical storage shed where vehicles travel when utilising the diesel stored

on-site. No staining or odour was observed in the soils at the fill-up location.

- Products stored within the chemical store shed were limited to:
  - approximately 200 litres of unleaded petroleum;
  - approximately 10 litres kerosene (for emergency landing signal lamps);and
  - 6 X 20 litre drums of lubricants.

  The floor of the chemical storage shed was significantly stained and appeared to have been subject to many chemical spills.
- The interior of the homestead was not able to be inspected due to access limitations. All information regarding this area has been supplied by past and present land owners and previous studies commissioned by the proponent.

6.0 Potential for Contamination

6.1 Introduction

Following the preliminary site assessment it has been concluded that the site has high potential for contamination. The potential contamination can be attributed to the historical land use and activities that have occurred on the site as a result of its aviation, residential and agricultural landuse. It is expected the contamination is localised to the area immediately surrounding the Chemical Store and upright diesel storage tank.

6.2 Chemical Usage / Storage

Based upon the extensive review of the site's land use history and discussions with the resident caretaker, it has been determined the site is unlikely to have been extensively exposed to chemicals which have the potential to detrimentally affect the surrounding environment. It has been detailed that minimal amounts of chemical have been stored onsite and that all chemicals have been used only as directed. Therefore, it has been deemed there is a low probability of the historical land use and associated chemical practices having caused soil contamination or a health risk within the study area.

6.3 Fuel Storage / Use

The visual inspection of fuel storage facilities onsite resulted in significant odour and staining being observed in the soils associated with the chemical storage shed, upright diesel storage tank and diesel storage drum.

Therefore, it has been deemed there is a moderate to high probability of the historical land use and associated petroleum practices having caused soil contamination or a health risk within the study area. It has been determined that these areas require chemical analysis (refer to section 8.0 (p31)).

6.4 Storage of Oil & Coolants

As these products are known to be toxic, coolants are considered to pose a moderate health risk if ingested. However, if proper handling and usage procedures are maintained, this risk is deemed to be significantly reduced to safe levels.

Based upon the extensive review of the site's land use history and

discussions with the current and past landowners, it has been determined that the site is unlikely to have been extensively exposed to oil and coolants to a degree which has the potential to detrimentally affect the surrounding environment. The relevant persons have detailed that minimal amounts of oil and coolants have been stored onsite and do not recall any major product spills.

Therefore, it has been deemed there is a low probability of the historical land use and associated oil and coolant practices having caused soil contamination or a health risk within the study area.

Plate 1: View North Towards the Chemical Storage Shed and Associated External Diesel Storage Infrastructure

Plate 2: Location of Sample TP2

Plate 3: Location of Sample TP3

Plate 4: Location of Sample TP4 and TP5

Plate 5: Deterioration of the Chemical Storage Shed Concrete Slab

Plate 6: Location of sample TP6

Plate 7: View West of the Large Storage Shed Onsite

Plate 8: View Inside the Onsite Chemical Storage Shed

7.0 Potential Areas of Concern

7.1 Areas of Potential Contamination

Based upon this investigation, the area immediately surrounding the existing onsite diesel storage tank and drum, as well as the chemical store shed, is identified as potentially containing soil-based contamination which may pose a health risk as a result of the identified historical practices. While the storage and use of chemicals, oils and coolants have occurred onsite, it has been determined that through appropriate storage and handling (as detailed by the present landowner) no other events which are likely to pose a health risk are believed to have occurred.

As a result of the health concerns associated with the soils surrounding the chemical store and associated external fuel storage facilities, soil sampling has been undertaken to determine the extent of the contamination. The sampling process and subsequent laboratory results are detailed in section 8.0 (p31) of this report.

8.0 Contamination Sampling

Areas of the proposal site which were identified as areas of concern during the site visual assessment were subject to contamination sampling.

8.1 Guidelines for Soil

The investigation objective is to ensure that any contamination present at the site will not pose an unacceptable risk to human health or the environment.

The subject site is planned to be utilised for residential use, and as such the *'Standard' Residential* guidelines are thought to be the most appropriate. These guideline levels are sourced from Table 5A in *Schedule B (1)* of the NEPM (NEPC, 1999) and these investigation levels are derived from toxicity of substances and estimated exposure of humans to the soil.

It is noted that the following thresholds [Refer to Table 3 (p31)] as stated by the relevant assessment criteria will apply to the soil testing carried out.

Table 3: Threshold Concentrations (*Soil)*

ANALYTE	THRESHOLD
Hydrocarbon Fractions (TPH)	
$C_6 - C_9$	65 mg/kg
$C_{10} - C_{36}$	1,000 mg/kg
BTEX Fractions	
Benzene	1 mg/kg
Toluene	130 mg/kg
Ethylbenzene	50 mg/kg
Total Xylene (combined meta, para and ortho)	25 mg/kg
PAHs	
Benzo(a)pyrene	1 mg/kg
Total PAHs	20 mg/kg
Heavy Metals / Metalloids	
Lead	300 mg/kg

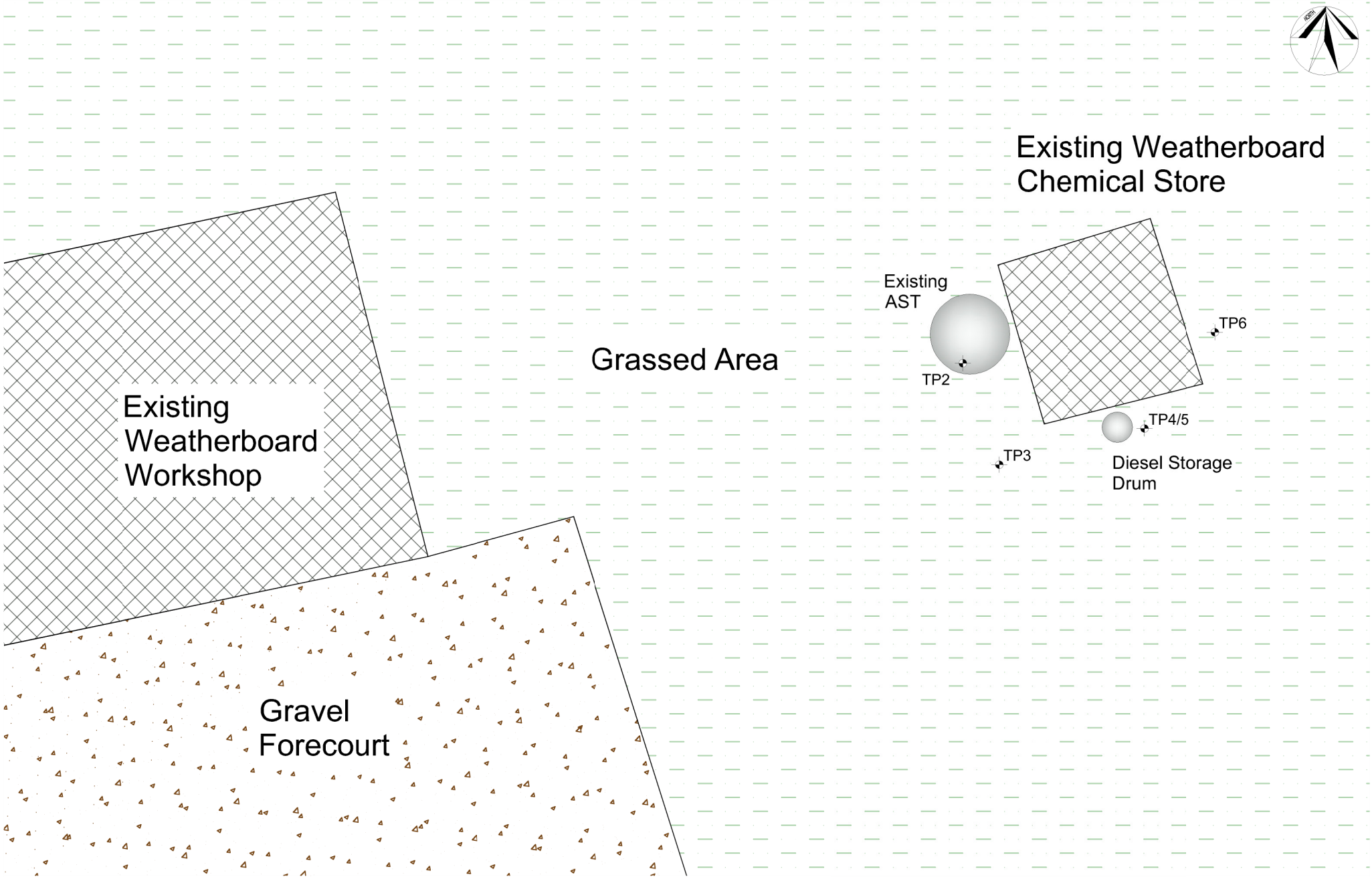
8.2 Sample Collection

In total, six (6) samples were collected from the proposal site. All of these samples were collected from the soil immediately surrounding the onsite chemical store, and the onsite petroleum storage tank. Details of specific sampling locations are detailed in the table below:

Table 4: Standing Water Level of Local Groundwater

SAMPLE ID	LOCATION
TP1	Trip Blank – Consolidated sand collected prior to travelling to Glen Innes – this sample was obtained for the purpose of quality control and assurance.
TP2	Collected from beneath the upright above ground diesel tank.
TP3	Collected for the soil beneath the vehicle fill point – approximately 1.5m south of the upright diesel tank.
TP4	Collected from the soil surrounding the 44 gallon drum of diesel south of the chemical store shed.
TP5	Collected from the soil surrounding the 44 gallon drum of diesel south of the chemical store shed. This sample was collected to act as a quality control/assurance duplicate of TP4.
TP6	Collected from the soil on the eastern side of the chemical store.

A sampling plan depicting sampling locations is presented in Figure 2 (p33).



Plot Date: 16 November 2012

Mitchel Hanlon Consulting Pty Ltd

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Australia Asia Flight Training

Glen Innes NSW

FIGURE 2
Sampling Locations

8.3 Laboratory Analysis

The six (6) soil samples collected were sent to East West EnviroAg for analysis, the analysis was conducted under subcontract by NATA accredited Australian Laboratory Services. The following analysis was performed:

- Benzene, Toluene, Ethyl benzene, Total Xylene's (BTEX);
- Total Petroleum Hydrocarbon (TPH);
- Heavy Metals (Lead); and
- Polycyclic/nuclear Aromatic Hydrocarbons (PAHs)

8.4 Quality Assurance & Quality Control

Quality control is achieved by using NATA registered laboratories using ASTM standard methods supported by internal duplicates, the checking of high, abnormal or otherwise anomalous results against background and other chemical results for the sample concerned.

Quality assurance is achieved by confirming that field results, or anticipated results based upon comparison with field observations, are consistent with laboratory results. Also that sampling methods are uniform and decontamination is thorough. In addition, the laboratory undertakes additional duplicate analysis as part of their internal quality assurance program on the basis of one duplicate analysis for every 20 samples analysed. Given that, 6 samples were obtained from the site, one (1) duplicate set was obtained.

Field observations are compared with laboratory results when they are not as expected. Confirmation, re-sampling and re-analysis of a sample are undertaken if the results are not consistent with field observations and/or measurements. In addition, field duplicate sample results have to be within the acceptable range of reproducibility. A discussion of the quality of internal laboratory results and field duplicate relative percentage difference (RPD) calculations are presented in Section 8.4.4 (p38).

Soil samples for analysis were placed into glass jars, which were labelled with the borehole number, depth of discrete sample collection, site reference and date before being placed in a chilled, darkened cooler.

8.4.1 Data Quality Objectives

Data quality objectives (DQO) are qualitative and quantitative criteria that:

- Clarify study objectives,
- Define appropriate types of data to collect, and
- Specify the tolerable levels of potential decision making errors.

The purpose of the DQO process is to ensure the data collection activities are focused on collecting the information needed to make decisions and to aid the decision-making process. The Data Quality Objectives for the site assessment are included in Table 5 (p35)

Table 5 (p35) outlines the acceptance criteria for quality control samples as per the AS 4482.1 and AS4482.2.

Table 5: Data Quality Objectives

DESCRIPTION	COMMENT
State the Problem	The problem will be directly assessed by experienced Mitchel Hanlon Consulting staff. The site has been used for petroleum product storage and the potential exists for hydrocarbon, BTEX, lead, and PAH's contamination. These analytes are typically found surrounding USTs and ASTs and are common contaminants where leaking and petrochemical exposure has occurred. A statement as to the suitability of the site for continuing commercial use is required from Mitchel Hanlon Consulting. Recommendations for further investigation or environmental management may be provided.
Identify the Decision	A detailed site inspection, UST validation and site contamination assessment sampling have been commissioned to determine if the past and present site activities have adversely affected the site or environment. A systematic sampling plan and the soil sampling regime were undertaken as outlined in section 8.2 (p32). The samples will be compared to the relevant trigger value as identified in section 8.1 (p31) of this report.
Identify the Inputs for the Decision	The study inputs include a historical investigation of the site and a soil investigation including sampling and analysis. The relevant guidelines will be referenced to assist the decision-making process.

DESCRIPTION	COMMENT
Define the Boundaries for the Study	The site location is identified as being the area immediately surrounding the chemical store shed and the proposed flight school facility site in Glen Innes, NSW. This area is identified as the boundary of the 'Contamination Sampling'
Develop a Decision Rule	All analytical data will be compared and evaluated against the relevant guidelines. In the event the threshold levels in the relevant guidelines are exceeded, management recommendations will be required. Site validation will not be confirmed where sampling indicates levels above the recommended thresholds.
Specify Tolerable Limits on Decision Error	Acceptable limits for field data analysis (relative percent differences for primary and duplicate results) are between 50 and 150 percent (depending on the origin of the sample and volatility of the chemicals present). Acceptable limits for quality control sample analysis may be affected by the heterogeneity of soil and will be set based on site specific information such as background concentrations. Most of the procedures in the NSW EPA (1995) Sampling design guidelines, Standards Australia AS 4482.1 (2005) and NEPM (1999) have risk probabilities associated with allowable error margins incorporated into them. It is therefore proposed that no further "tolerable limits" be investigated at this stage of the project.
Optimise the Design for Obtaining Data	The sample design will be undertaken with reference to the NSW EPA (1995) Sampling design guidelines, and Standards Australia AS 4482.1 (2005). A systematic sampling pattern has been adopted to capture the extent of the potential contamination and minimise bias. The sampling design is considered adequate considering the temporal and site access limitations. The density of the sampling pattern has been taken from the NSW EPA (1995) Sampling design guidelines and is suitable for this site validation assessment.

8.4.2 Field QA/QC

Fieldwork was conducted on 19th October 2012 by Catherine Lockyer (Environmental Scientist) of Mitchel Hanlon Consulting Pty Ltd. Catherine has training and experience in the collection of environmental soil and groundwater samples. Catherine is also experienced in the collection and analysis of field QA/QC data.

Duplicate samples were collected at a rate of one duplicate per twenty samples collected (5%). For this project one (1) duplicate sets (TP3 / 4). A Sample Black (TP1) was also obtained from the site. All QA/QC samples were sent to ALS for analysis. Duplicate and blanks samples were analysed for pH, BTEX, TPH, PAHs and Heavy Metals (Lead) in soil.

Field blank samples are samples obtained to check that cross contamination from equipment or containers is minimal. The field blank samples are also a check for inconsistencies in sampling and the analytical techniques used. The samples are submitted to the laboratory without notification. AS 4482.1-2005 recommends a minimum of one (1) sample is obtained per day or sampling event undertaken.

Blind replicate/Duplicate samples are two individual samples (sample pair) collected from the same sampling point and submitted to the same laboratory without notification that they have been replicated to provide information on the variation in analyte concentration between samples. At least one sample per twenty samples was analysed.

8.4.3 Laboratory QA/QC

Analysis for this project was completed by Australian Laboratory Services (ALS). ALS is accredited by NATA for the methods used (details of this accreditation can be viewed at http://www.nata.asn.au/). Details of the samples sent to each laboratory and the analysis requested are contained in the chain of custody documentation are held in Appendix A. The analytical methods are noted on the laboratory transcripts.

ALS complete laboratory control samples, laboratory blanks, sample duplicates, surrogate spikes and matrix spikes. These results are presented in the ALS reports ES1225075 (Appendix E).

These reports include details of surrogates and spikes used, percent recoveries of surrogates and spikes used, the instrument detection limits, the method detection limits, the practical quantification limits and the reference samples results.

8.4.4 QA/QC Data Evaluation

The Relative Percentage Difference (RPD) is a key indicator for comparing quality control samples. The method for calculating RPD for quality control samples is outlined below.

$$\%RPD = \left[\frac{x_1 - x_2}{\left(\frac{x_1 + x_2}{2} \right)} \right] x100$$

Where: x_1 is the first duplicate value

x_2 is the second duplicate value

The AS 4482.1 – 2005 [Refer to Table 5 (p35)] outlines the recommended acceptance criteria for quality control samples. These acceptance criteria have been adopted for this assessment as our data quality indicator for the blind replicate samples. A threshold value of <50% of the mean concentration of analyte will be used as the acceptance criteria for the blind replicate samples.

Our adopted data quality indicators (DQI's) for precision acknowledge the intrinsic heterogeneity of organic chemical concentrations and low concentration of analytes in disturbed soil. This natural heterogeneity may potentially cause large variations in results between laboratory sub-samples (although all efforts are made to homogenise non-volatile duplicate samples).

Similarly, large variations in volatile chemical concentrations between duplicates may be unavoidable even when using best practice sampling methodology. This can occur especially as we seek to minimise the disturbance to the sample while splitting it which means a high degree of inherent heterogeneity is expected.

As such, the RPD criteria are considered to be a suitable measure for the reproducibility of results within a naturally heterogeneous media such as soil. A ≤50% RPD trigger value is used, with any exceedences being discussed and assessed for acceptability.

The duplicate results and calculated RPDs are presented in Table 6 (p39).

Table 6: Calculated % RPD

ANALYTE	LOR	BLANK (TP31	REPLICATE SET 3		
			REP 1 (TP4)	REP 2 (TP5)	CALC. %RPD
$C_6 – C_9$	10	<10	<10	<10	*
$C_{10} – C_{36}$	100	<100	25,300	15,700	11.7
Benzene	0.2	<0.2	<0.2	<0.2	*
Toluene	0.5	<0.5	<0.5	<0.5	*
Ethyl-benzene	0.5	<0.5	<0.5	<0.5	*
Meta – & Para – Xylene	0.5	<0.5	<0.5	<0.5	*
Ortho – Xylene	0.5	<0.5	<0.5	<0.5	*
Xylene (Total)	0.5	<0.5	<0.5	<0.5	*
Benzo(a)pyrene	0.5	<0.5	<0.5	<0.5	*
Total PAHs	0.5	<0.5	7.2	5.3	7.6
Lead	5	<5	53	69	6.5

8.4.5 Data Usability

It should be noted that Standards Australia (AS4482.1) specify that typical Data Quality Indicators (DQIs) for precision should be ≤50% RPD, however also acknowledge that low concentrations and organic compounds in particular can be acceptably outside this range. The standard suggests that ≤50% RPD be used as a 'trigger' and values above this level of repeatability need to be noted and explained.

For split samples, because of error associated with field splitting, an RPD of between 80 and 150% (depending on the substance) will be allowed as the MDQI. Soil heterogeneity due to the "nugget effect" could result in significantly greater difference, particularly for metals.

Our adopted DQI's for precision acknowledge the intrinsic heterogeneity of metal and semi-volatile chemical concentrations in disturbed soil that may potentially cause large variations in results between laboratory sub-samples (although all efforts are made to homogenise non volatile duplicate samples). Similarly, large variations in volatile chemical concentrations between duplicates may be unavoidable even when using best practice sampling methodology, especially as we seek to minimise the disturbance to the sample while splitting it which means a high degree of inherent heterogeneity is expected.

As such, our adopted RPD criteria are considered to be a suitable measure for the reproducibility of results within a naturally heterogeneous media such as soil.

As such, the calculated RPD values are not considered grounds for rejecting the data i.e. the data is deemed to be accurate and precise. It should be noted that the calculated RPD results are for concentrations significantly below adopted guidelines.

All results adhered to chemical laws or were not outside logical explanation.

Extraction and analysis of samples were all within the relevant prescribed holding times. The internal laboratory control results (blanks, duplicates and spikes) are considered to be acceptable.

Based on information presented in the sections above it can be confidently stated that the Data Quality Objectives for this project have been met and the data set is considered to be reliable

8.4.6 Assessment Criteria

The following assessment criteria were adopted by Mitchel Hanlon Consulting:

- National Environment Protection (*Assessment of Site Contamination*) Measure 1999 – *B(1) Guideline on Investigation Levels for Soil and Groundwater* – A 'Standard' Residential; and
- NSW EPA (1994*) Guidelines for Assessing Service Station Sites.*

8.5 Results

NATA Accredited laboratory results received from Australian Laboratory Services (ALS) under sub contract from East West EnviroAg Pty Ltd are attached in Appendix D.

Table 7 (p40), details the contaminant levels for each sample (TP1, the blank sample has not been included – these results have been included in section 8.4 (p34) of this report. Also detailed are the published thresholds as stated in NEPM *Schedule B (1) Investigation Levels for Soil and Groundwater 1999* and NSW EPA Contaminated Sites: *Guidelines for Assessing Service Station Sites*.

Table 7: Site Assessment Soil Sampling Results (*mg/kg*)

ANALYTE	THRESHOLD (A)(B)	TP2	TP3	TP4	TP5	TP6
Moisture	-	24.2	7.5	20.5	22.3	26.2
TPH						
$C_6 – C_9$	65 [(a)]	<10	<10	<10	<10	<10
$C_{10} – C_{36}$	1,000 [(a)]	**2,690**	230	**25,300**	**15,700**	670
BTEX						
Benzene	1[(a)]	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	130[(a)]	<0.5	<0.5	<0.5	<0.5	<0.5
Ethyl-benzene	50[(a)]	<0.5	<0.5	<0.5	<0.5	<0.5
Meta - & Para - Xylene	-	<0.5	<0.5	<0.5	<0.5	<0.5
Ortho-Xylene	-	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (Total)	Cumulative – 25[(a)]	<0.5	<0.5	<0.5	<0.5	<0.5

ANALYTE	THRESHOLD (A)(B)	TP2	TP3	TP4	TP5	TP6
PAHs						
Benzo(a)pyrene	1 [(a)]	<0.5	<0.5	<0.5	<0.5	<0.5
Total PAHs	20 [(a)]	<0.5	<0.5	7.2	5.3	<0.5
Metals						
Lead	300[(b)]	33	29	53	69	24

(a) – NSW EPA Contaminated Sites: Guidelines for Assessing Service Station Sites.
(b) – NEPM *Schedule B (1) Investigation Levels for Soil and Groundwater 1999* ('Standard' Residential)
* No Values were able to be calculated as results were below reporting limits

The soil laboratory results revealed that the area beneath the upright diesel AST and the 44 gallon diesel drum are burdened with C_{10} – C_{36} hydrocarbon fractions at levels in excess of the guideline threshold levels as identified in NEPM *Schedule B (1) Investigation Levels for Soil and Groundwater 1999* and NSW EPA Contaminated Sites: *Guidelines for Assessing Service Station Sites.*

9.0 Conclusions

Based upon the investigation carried out, the subject site has been determined to be contaminated as a result of historical activities related to its use as an airport. The contamination is expected to be localised to the area immediately surrounding the chemical storage shed and associated external diesel storage infrastructure.

It is therefore recommended based on the previous land use history, the observations made during the site inspection and the laboratory results, that remediation is required. The site is not deemed suitable for stage 2 of the proposed development; however stage 1 (which does not involve the immediate area identified) is permitted under this assessment to progress. Prior to any development works progressing in the immediate chemical storage shed/ diesel storage infrastructure area, remediation works must be carried out.

10.0 Recommendations

The contamination appears to be localised to the area immediately surrounding the chemical storage shed and associated external diesel storage infrastructure. As result of this, it is deemed that a Phase 2 Site Assessment is not required prior to the commencement of the proposed development; however remediation works will be required prior to Stage 2 of the development commencing.

It is recommended that a remediation action plan (RAP) be prepared by a suitably qualified environmental consultant. The RAP should include plans for monitoring well installation, remediation works, subsequent validation sampling. Pending the results of the validation sampling, a Validation Report should be prepared. This report should detail the outcomes on the onsite remediation works.

As a result of fuel based contaminant levels exceeding the threshold concentrations identified by NSW EPA Contaminated Sites: *Guidelines for Assessing Service Station Sites* by over two-and-a-half times, it is a requirement that the NSW Office of Environment & Heritage (OEH) be notified. Under Section 60 of the Contaminated Lands Management Act 1997 it is a legal requirement that the OEH be notified. It should be noted that failing to notify the NSW OEH may result in prosecution.

11.0 Report Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only and the specific instructions received from Australia Asia Flight Training Pty Ltd.

This report has been prepared in accordance with the requirements of appropriate NSW EPA and ANZECC guidelines and in particular section 3.5.2 Stage 1 – Preliminary Investigation of the NSW EPA 'Planning Guidelines SEPP 55 – Remediation of Land'. Specifically this report follows the EPA Guideline Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (2000).

The findings and recommendations made in this report are based upon a site inspection and a review of relevant surveys, aerial photos, and historical information obtained from verbal discussions with current and past tenants.

This report may not be relied upon by any third party not named in this report for any purpose except with the prior written consent of Mitchel Hanlon Consulting Pty Ltd or Australia Asia Flight Training Pty Ltd (which consent may or may not be given at the discretion of Mitchel Hanlon Consulting Pty Ltd or Australia Asia Flight Training Pty Ltd).

This report comprises the formal report, documentation sections, tables, figures and appendices as referred to in the index to this report and must not be released to any third party or copied in part without all the material included in this report for any reason.

The report only relates to the site referred to in the scope of works being located within the proposal site, located at the proposed flight training college at Glen Innes ("the site").

The report relates to the site as at the date of the report as conditions may change thereafter due to natural processes and/or site activities.

No warranty or guarantee is made in regard to any other use than as specified in the scope of works and only applies to the depth tested and reported in this report.

12.0 References

Department of Urban Affairs and Planning & NSW EPA (1998) Managing Land Contamination – Planning guidelines SEPP55 – Remediation of Land

NSW DEC (2006) Contaminated sites: guidelines for the NSW site auditor scheme;

NSW EPA (1997) Guidelines for consultants reporting on contaminated sites;

Hibbs & Associates Pty Ltd (2010), Hazardous Materials Survey, Radar Building, Round Mountain, Round Mountain Road, Cathedral Rock National Park NSW 2350

CSIRO (2006) Australian Soil Resource Information System, http://www.asris.csiro.au/index_ie.html. Accessed 14th November 2012

NSW Natural Resource Atlas (2011) http://nratlas.nsw.gov.au. Accessed 14th November 2012

Appendix A Site Plans

1 Existing Site Plan
1 : 500

Revision Schedule		
issue#	date	description

PROJECT TITLE:
Australia-Asia Flight Training Academy - Glen Innes, NSW

CLIENT:
AUSTRALIA ASIA FLIGHT TRAINING PTY LTD

ADDRESS:
Glen Innes Airport, NSW.

DRAWING TITLE:
Existing Site Plan

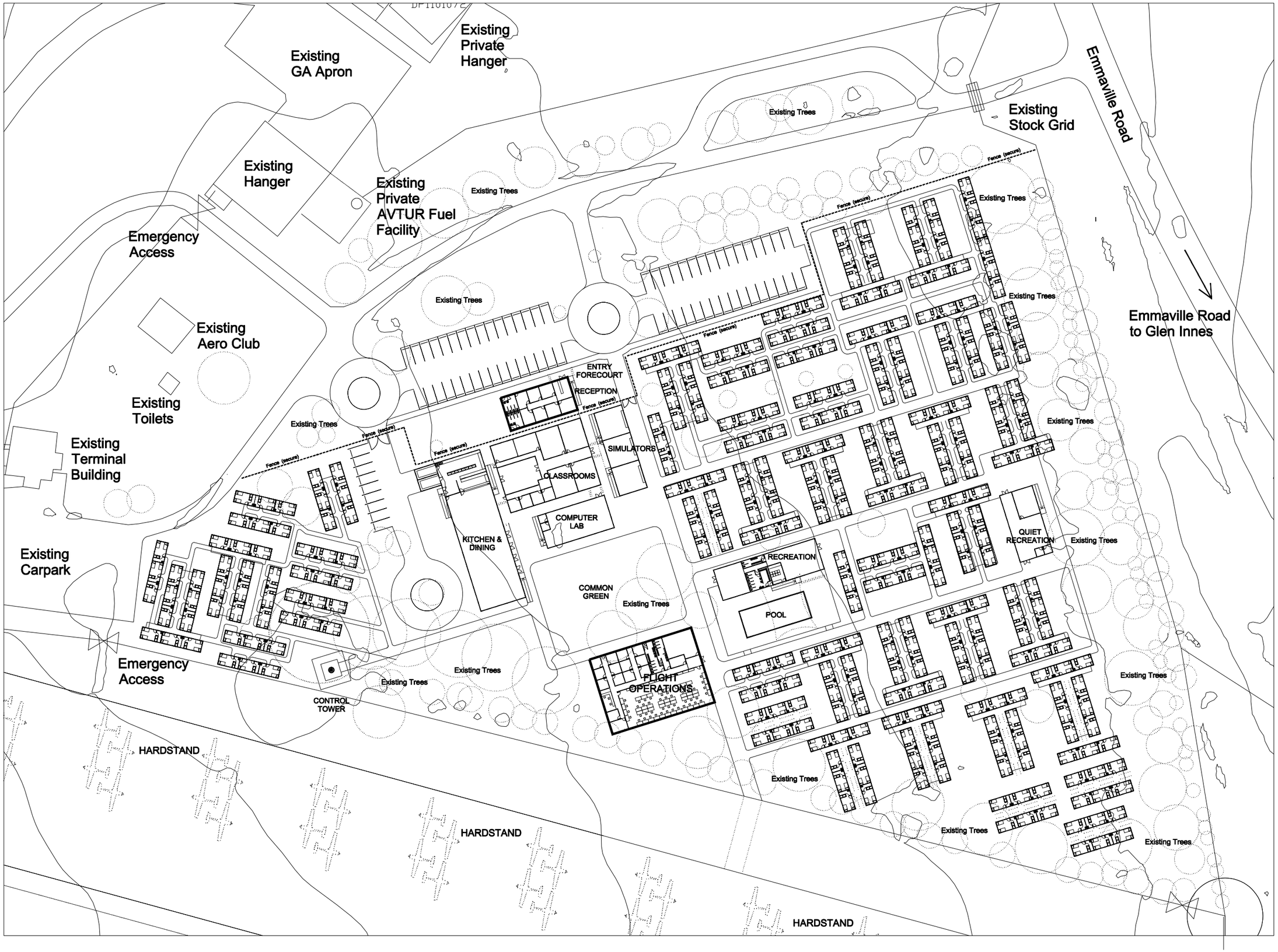
DRAWN:	CHECKED:
gfs	

SCALE:
1 : 500

DRAWING NO:
1211- DA01

ISSUE:	DATE:
A	

Development Application



1 Proposed Ground Floor Plan
1 : 500

Revision Schedule		
issue#	date	description
A	10 Feb 2009	Development Application

ddc architects

Suite 5, Level 2,
118 Devonshire Street,
Surry Hills NSW 2010
p: 02 8306 9600

PROJECT TITLE:
Australia-Asia Flight Training Academy - Glen Innes, NSW

CLIENT:
AUSTRALIA ASIA FLIGHT TRAINING PTY LTD

ADDRESS:
Glen Innes Airport, NSW.

DRAWING TITLE:
Proposed Ground Floor Plan

DRAWN:	CHECKED:
gfs	

SCALE:
1 : 500

DRAWING NO:
1211_DA03

ISSUE:	DATE:
A	

Development Application

Appendix B Title Search Information

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 3/1102229

SEARCH DATE	TIME	EDITION NO	DATE
16/11/2012	12:11 PM	3	27/7/2011

LAND

LOT 3 IN DEPOSITED PLAN 1102229
AT GLEN INNES
LOCAL GOVERNMENT AREA GLEN INNES SEVERN
PARISH OF YARROWFORD COUNTY OF GOUGH
TITLE DIAGRAM DP1102229

FIRST SCHEDULE

GLEN INNES SEVERN COUNCIL (CN AG88290)

SECOND SCHEDULE (4 NOTIFICATIONS)

1 D608508 EASEMENT FOR DRAINAGE APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE PARTS SHOWN IN PLAN WITH D608508
2 I593810 LEASE TO AVIATION AUTHORITY OF PART BEING LOT 2 IN DP826155. EXPIRES: 30/6/2008. OPTION OF RENEWAL: 10 YEARS.
O949128 CHANGE OF NAME AFFECTING LEASE I593810 LESSEE NOW AIRSERVICES AUSTRALIA
AE141545 VARIATION OF LEASE I593810 EXPIRY DATE NOW 30/6/2018.
3 AC261216 LEASE TO LONOAKS PTY LIMITED OF LOT 1 IN DP1101072. EXPIRES: 31/10/2009.
4 AG336958 LEASE TO DANNY CLEMENT OF LOT 3 IN DP1166576. EXPIRES: 9/5/2015.

NOTATIONS

UNREGISTERED DEALINGS: L AH358233.

*** END OF SEARCH ***

Mitchel Hanlon Consulting PRINTED ON 16/11/2012

Appendix C Groundwater Works Summaries

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Friday, November 16, 2012

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW967515

Works Details (top)

GROUNDWATER NUMBER	GW967515
LIC-NUM	90WA825944
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	Rotary - Percussion (Down Hole Hammer)
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	2001-12-17
FINAL-DEPTH (metres)	60.00
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GLENORIE
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	90 - BARWON
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6718142.00
EASTING	373298.00
LATITUDE	29 39' 37"
LONGITUDE	151 41' 27"
GS-MAP	
AMG-ZONE	56
COORD-SOURCE	Map Interpretation
REMARK	

Form-A (top)

COUNTY	GOUGH
PARISH	YARROWFORD
PORTION-LOT-DP	1 176519

Licensed (top)

COUNTY	GOUGH
PARISH	YARROWFORD
PORTION-LOT-DP	1 176519

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	60.00	150			Rotary - Percussion (Down Hole Hammer)
1	1	Casing	P.V.C.	0.00	60.00	150			

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Friday, November 16, 2012

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW023235

Works Details (top)

GROUNDWATER NUMBER	GW023235
LIC-NUM	90BL017243
AUTHORISED-PURPOSES	NOT KNOWN
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore open thru rock
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1965-11-01
FINAL-DEPTH (metres)	12.20
DRILLED-DEPTH (metres)	12.20
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	90 - BARWON
RIVER-BASIN	416 - BORDER RIVERS
AREA-DISTRICT	
CMA-MAP	9238-4S
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6716751.00
EASTING	373691.00
LATITUDE	29 40' 22"
LONGITUDE	151 41' 41"
GS-MAP	0008C3
AMG-ZONE	56
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	GOUGH
PARISH	YARROWFORD
PORTION-LOT-DP	116

Licensed (top)

COUNTY	GOUGH
PARISH	YARROWFORD
PORTION-LOT-DP	116

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	(Unknown)	0.00	9.10	152			Suspended in Clamps
1	1	Opening	Slots - Vertical		5.20	152		1	SL: 0mm; A: 12.7mm

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	12.19	12.19	Clay Red Ironstone Interlayere		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Friday, November 16, 2012

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW017947

Works Details (top)

GROUNDWATER NUMBER	GW017947
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	DOMESTIC
WORK-TYPE	Well
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	Federal Govt
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	13.70
DRILLED-DEPTH (metres)	0.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	90 - BARWON
RIVER-BASIN	416 - BORDER RIVERS
AREA-DISTRICT	
CMA-MAP	9238-4S
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6715886.00
EASTING	373432.00
LATITUDE	29 40' 50"
LONGITUDE	151 41' 31"

GS-MAP	0008C3
AMG-ZONE	56
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	GOUGH
PARISH	YARROWFORD
PORTION-LOT-DP	108

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Friday, November 16, 2012

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW901579

Works Details (top)

GROUNDWATER NUMBER	GW901579
LIC-NUM	90WA825859
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	1920-01-01
FINAL-DEPTH (metres)	7.00
DRILLED-DEPTH (metres)	7.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	WELLINGROVE ROAD
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	1.80
SALINITY	
YIELD	

Site Details (top)

REGION	90 - BARWON
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6715037.00
EASTING	373080.00
LATITUDE	29 41' 18"
LONGITUDE	151 41' 17"
GS-MAP	
AMG-ZONE	56
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	GOUGH
PARISH	GLEN INNES
PORTION-LOT-DP	519 DP753282

Licensed (top)

COUNTY	GOUGH
PARISH	GLEN INNES
PORTION-LOT-DP	519 DP753282

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	7.00	1500			Hand Dug
1		Hole	Hole	0.00	7.00	150			Hand Drilled
1	1	Casing	Brick	0.00	7.00	150			(Unknown); (Unknown); (Unknown)
1	1	Casing	Lining	0.00	7.00				

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	7.00	7.00	(		

Appendix D Laboratory Results

Appendix D Laboratory Results

EAST WEST enviroag
ABN 82 125 442 382

82 Plain Street
Tamworth NSW 2340
Ph 02 6762 1733
Fx 02 6765 9109
admin@ewenviroag.com.au
www.ewenviroag.com.au

ANALYSIS REPORT

Project No:	**EW120691**	**Date of Issue:**	**9/11/2012**
Client:	Mitchel Hanlon Consulting	Report No:	1
Address:	PO Box 1568 Tamworth NSW 2340	Date Received:	22/10/2012
		Matrix:	SOIL
Phone:	02 6762 4411	Location:	MHC-12120
Fax:	02 6762 4412	Sampler ID:	Client Supplied
email:	clockyer@mitchelhanlon.com.au	Date Sampled:	19/10/2012

Comments: *All analysis performed under sub-contract by ALS (Ref ES1225075) - NATA 825.

Signed: Stephanie Cameron
Operations Manager

This analysis relates to the sample submitted and it is the client's responsibility to make certain the sample is representative of the matrix to be tested.
Samples will be discarded one month after the date of this report. Please advise if you wish to have your sample/s returned.

ANALYSIS REPORT

Project No: EW120691 Location: MHC-12120 Soil

			Sample ID	TP1	TP2	TP3	TP4
			Depth (m)	-	-	-	-
Analyte	**Method**	**Units**		**120691-1**	**120691-2**	**120691-3**	**120691-4**
Moisture	EA055	%		2.4	24.2	7.5	20.5
Total Metals							
Lead	EG005T	mg/kg		<5	33	29	53
Total Petroleum Hydrocarbon Bands							
C6-C9 Fraction	EPO80/071	mg/kg		<10	<10	<10	<10
C10-C14 Fraction	EPO80/071	mg/kg		<50	<50	<50	2020
C15-C28 Fraction	EPO80/071	mg/kg		<100	2500	230	22900
C29-C36 Fraction	EPO80/071	mg/kg		<100	190	<100	380
C10-C36 Fraction (sum)	EPO80/071	mg/kg		<50	2690	230	25300
Total Recoverable Petroleum Hydrocarbon Bands (NEPM 2010 Draft)							
C6-C10 Fraction	EPO80/071	mg/kg		<10	<10	<10	<10
C6-C10 Frac. - BTEX	EPO80/071	mg/kg		<10	<10	<10	<10
>C10-C16 Fraction	EPO80/071	mg/kg		<50	100	<50	6280
>C16-C34 Fraction	EPO80/071	mg/kg		<100	2490	230	18700
>C34-C40 Fraction	EPO80/071	mg/kg		<100	150	<100	360
>C10-C40 Fraction (sum)	EPO80/071	mg/kg		<50	2740	230	25300
BTEX							
Benzene	EP080	mg/kg		<0.2	<0.2	<0.2	<0.2
Toluene	EP080	mg/kg		<0.5	<0.5	<0.5	<0.5
Ethylbenzene	EP080	mg/kg		<0.5	<0.5	<0.5	<0.5
meta- & para- Xylene	EP080	mg/kg		<0.5	<0.5	<0.5	<0.5
ortho-Xylene	EP080	mg/kg		<0.5	<0.5	<0.5	<0.5
BTEX Sum	EP080	mg/kg		<0.2	<0.2	<0.2	<0.2
Total Xylenes	EP080	mg/kg		<0.5	<0.5	<0.5	<0.5
Naphthalene	EP080	mg/kg		<1	<1	<1	<1
Polynuclear Aromatic Hydrocarbons							
Naphthalene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	<0.5
Acenaphthylene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	<0.5
Acenaphthene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	<0.5
Fluorene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	<0.5
Phenanthrene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	2.4
Anthracene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	<0.5
Fluoranthene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	0.7
Pyrene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	3.6
Benz(a)anthracene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	<0.5
Chrysene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	0.5
Benzo(b)fluoranthene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	EP075(SIM)B	mg/kg		<0.5	<0.5	<0.5	<0.5
Sum of polycyclic aromatic hydrocarbons				<0.5	<0.5	<0.5	7.2
Benzo(a)pyrene TEQ (WHO)		mg/kg		<0.5	<0.5	<0.5	<0.5

EAST WEST enviroag

Date Issued: 9/11/2012

ANALYSIS REPORT

Project No: EW120691 Location: MHC-12120 Soil

Analyte	Method	Units	Sample ID: TP5, Depth (m): - 120691-5	Sample ID: TP6, Depth (m): - 120691-6
Moisture	EA055	%	22.3	26.2
Total Metals				
Lead	EG005T	mg/kg	69	24
Total Petroleum Hydrocarbon Bands				
C6-C9 Fraction	EPO80/071	mg/kg	<10	<10
C10-C14 Fraction	EPO80/071	mg/kg	1500	<50
C15-C28 Fraction	EPO80/071	mg/kg	14000	310
C29-C36 Fraction	EPO80/071	mg/kg	230	360
C10-C36 Fraction (sum)	EPO80/071	mg/kg	15700	670
Total Recoverable Petroleum Hydrocarbon Bands (NEPM 2010 Draft)				
C6-C10 Fraction	EPO80/071	mg/kg	<10	<10
C6-C10 Frac. - BTEX	EPO80/071	mg/kg	<10	<10
>C10-C16 Fraction	EPO80/071	mg/kg	4240	<50
>C16-C34 Fraction	EPO80/071	mg/kg	11600	540
>C34-C40 Fraction	EPO80/071	mg/kg	210	310
>C10-C40 Fraction (sum)	EPO80/071	mg/kg	16000	850
BTEX				
Benzene	EP080	mg/kg	<0.2	<0.2
Toluene	EP080	mg/kg	<0.5	<0.5
Ethylbenzene	EP080	mg/kg	<0.5	<0.5
meta- & para- Xylene	EP080	mg/kg	<0.5	<0.5
ortho-Xylene	EP080	mg/kg	<0.5	<0.5
BTEX Sum	EP080	mg/kg	<0.2	<0.2
Total Xylenes	EP080	mg/kg	<0.5	<0.5
Naphthalene	EP080	mg/kg	<1	<1
Polynuclear Aromatic Hydrocarbons				
Naphthalene	EP075(SIM)B	mg/kg	<0.5	<0.5
Acenaphthylene	EP075(SIM)B	mg/kg	<0.5	<0.5
Acenaphthene	EP075(SIM)B	mg/kg	<0.5	<0.5
Fluorene	EP075(SIM)B	mg/kg	<0.5	<0.5
Phenanthrene	EP075(SIM)B	mg/kg	2.8	<0.5
Anthracene	EP075(SIM)B	mg/kg	<0.5	<0.5
Fluoranthene	EP075(SIM)B	mg/kg	0.6	<0.5
Pyrene	EP075(SIM)B	mg/kg	1.9	<0.5
Benz(a)anthracene	EP075(SIM)B	mg/kg	<0.5	<0.5
Chrysene	EP075(SIM)B	mg/kg	<0.5	<0.5
Benzo(b)fluoranthene	EP075(SIM)B	mg/kg	<0.5	<0.5
Benzo(k)fluoranthene	EP075(SIM)B	mg/kg	<0.5	<0.5
Benzo(a)pyrene	EP075(SIM)B	mg/kg	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	EP075(SIM)B	mg/kg	<0.5	<0.5
Dibenz(a.h)anthracene	EP075(SIM)B	mg/kg	<0.5	<0.5
Benzo(g.h.i)perylene	EP075(SIM)B	mg/kg	<0.5	<0.5
Sum of polycyclic aromatic hydrocarbons			5.3	<0.5
Benzo(a)pyrene TEQ (WHO)		mg/kg	<0.5	<0.5

DOCUMENT END

Date Issued: 9/11/2012

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1225075**	Page	: 1 of 7
Client	: **EAST WEST ENVIROAG P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS STEPHANIE CAMERON	Contact	: Client Services
Address	: 82 PLAIN STREET TAMWORTH NSW, AUSTRALIA 2340	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: stephanie.c@ewenviroag.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 6762 1733	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 6765 9109	Facsimile	: +61-2-8784 8500
Project	: EW120691	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: EW120691		
C-O-C number	: ----	Date Samples Received	: 23-OCT-2012
Sampler	: ----	Issue Date	: 26-OCT-2012
Site	: ----		
		No. of samples received	: 6
Quote number	: SY/395/11	No. of samples analysed	: 6

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*
Evie.Sidarta	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Raymond Commodor	Instrument Chemist	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.

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

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: 120691-1	120691-2	120691-3	120691-4	120691-5
				Client sampling date / time: 22-OCT-2012 15:00	22-OCT-2012 15:00	22-OCT-2012 15:00	22-OCT-2012 15:00	22-OCT-2012 15:00
				ES1225075-001	ES1225075-002	ES1225075-003	ES1225075-004	ES1225075-005
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	2.4	24.2	7.5	20.5	22.3
EG005T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	<5	33	29	53	69
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	2.4	2.8
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	0.7	0.6
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	3.6	1.9
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	0.5	<0.5
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	7.2	5.3
Benzo(a)pyrene TEQ (WHO)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	2020	1500
C15 - C28 Fraction	----	100	mg/kg	<100	2500	230	22900	14000
C29 - C36 Fraction	----	100	mg/kg	<100	190	<100	380	230
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	2690	230	25300	15700
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	----	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	100	<50	6280	4240
>C16 - C34 Fraction	----	100	mg/kg	<100	2490	230	18700	11600
>C34 - C40 Fraction	----	100	mg/kg	<100	150	<100	360	210
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	2740	230	25300	16000
EP080: BTEX								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: 120691-1	120691-2	120691-3	120691-4	120691-5
				Client sampling date / time: 22-OCT-2012 15:00	22-OCT-2012 15:00	22-OCT-2012 15:00	22-OCT-2012 15:00	22-OCT-2012 15:00
				ES1225075-001	ES1225075-002	ES1225075-003	ES1225075-004	ES1225075-005
EP080: BTEX - Continued								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP080: BTEXN								
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<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	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	**74.5**	**79.9**	**75.4**	**69.7**	**71.3**
2-Chlorophenol-D4	93951-73-6	0.1	%	**82.5**	**83.9**	**84.0**	**76.4**	**78.6**
2.4.6-Tribromophenol	118-79-6	0.1	%	**79.5**	**86.0**	**88.4**	**82.2**	**79.9**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	**89.9**	**95.7**	**92.4**	**87.9**	**92.2**
Anthracene-d10	1719-06-8	0.1	%	**94.7**	**96.7**	**94.7**	**93.1**	**93.8**
4-Terphenyl-d14	1718-51-0	0.1	%	**93.6**	**94.0**	**91.2**	**92.0**	**90.8**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**121**	**106**	**102**	**104**	**97.2**
Toluene-D8	2037-26-5	0.1	%	**112**	**104**	**101**	**95.0**	**102**
4-Bromofluorobenzene	460-00-4	0.1	%	**106**	**101**	**106**	**98.6**	**103**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: 120691-6	----	----	----	----
				Client sampling date / time: 22-OCT-2012 15:00	----	----	----	----
				ES1225075-006	----	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**26.2**	----	----	----	----
EG005T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	**24**	----	----	----	----
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	----	----	----	----
Benzo(b)fluoranthene	205-99-2	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 (WHO)	----	0.5	mg/kg	<0.5	----	----	----	----
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	**310**	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	**360**	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	**670**	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	10	mg/kg	<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	----	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	**540**	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	**310**	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	**850**	----	----	----	----
EP080: BTEX								

Analytical Results

Sub-Matrix: SOIL			Client sample ID	120691-6	----	----	----	----
			Client sampling date / time	22-OCT-2012 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1225075-006	----	----	----	----
EP080: BTEX - Continued								
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	----	----	----	----
EP080: BTEXN								
^ **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	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	**70.3**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	**77.6**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.1	%	**82.7**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	**87.6**	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%	**89.5**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	**88.9**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**85.4**	----	----	----	----
Toluene-D8	2037-26-5	0.1	%	**100**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	**98.5**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	56.3	133.3
2-Chlorophenol-D4	93951-73-6	53.8	133.8
2.4.6-Tribromophenol	118-79-6	23.1	134.9
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	58.9	132.7
Anthracene-d10	1719-06-8	55.0	137.6
4-Terphenyl-d14	1718-51-0	54.0	147.8
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

Appendix E Quality Control/Assurance Documentation

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **ES1225075**	Page	: 1 of 7
Client	: **EAST WEST ENVIROAG P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS STEPHANIE CAMERON	Contact	: Client Services
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Project	: EW120691	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 23-OCT-2012
Sampler	: ----	Issue Date	: 26-OCT-2012
Order number	: EW120691		
		No. of samples received	: 6
Quote number	: SY/395/11	No. of samples analysed	: 6

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*
Evie.Sidarta	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Raymond Commodor	Instrument Chemist	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**

				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: 2562294)									
ES1224899-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	14.4	13.2	8.3	0% - 50%
ES1225075-002	120691-2	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	24.2	26.3	8.4	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 2562237)									
ES1225019-006	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	46	46	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2561235)									
ES1225075-001	120691-1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		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 (WHO)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2561234)									
ES1225075-001	120691-1	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: 2561310)									
ES1225013-002	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES1225013-011	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2561234)									
ES1225075-001	120691-1	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit

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 Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2561310)									
ES1225013-002	Anonymous	EP080: C6 - C10 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES1225013-011	Anonymous	EP080: C6 - C10 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 2561310)									
ES1225013-002	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
ES1225013-011	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit

Method Blank (MB) and Laboratory Control 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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2562237)								
EG005T: Lead	7439-92-1	5	mg/kg	<5	40.0 mg/kg	95.6	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2561235)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	4 mg/kg	96.3	81.9	113
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	4 mg/kg	94.8	79.6	113
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	4 mg/kg	96.3	81.5	112
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	4 mg/kg	97.7	79.9	112
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	4 mg/kg	98.8	79.4	114
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	4 mg/kg	96.8	81.1	112
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	4 mg/kg	99.5	78.8	113
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	4 mg/kg	101	78.9	113
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	4 mg/kg	91.8	77.2	112
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	4 mg/kg	94.8	79.8	114
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	4 mg/kg	86.0	71.8	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	4 mg/kg	93.2	74.2	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	4 mg/kg	89.9	76.4	113
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	4 mg/kg	79.8	71	113
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	4 mg/kg	78.8	71.7	113
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	4 mg/kg	80.4	72.4	114
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2561234)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	100	59	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	96.0	74	138
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	96.0	63	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2561310)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	77.4	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2561234)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	96.0	59	131
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	93.7	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
		50	mg/kg	----	150 mg/kg	119	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2561310)								
EP080: C6 - C10 Fraction	----	10	mg/kg	<10	31 mg/kg	71.2	68.4	128
EP080: BTEXN (QCLot: 2561310)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	70.7	62	120
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	70.9	62	128

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080: BTEXN (QCLot: 2561310) - continued								
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	66.3	58	118
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	67.8	60	120
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	71.4	60	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	83.1	62	138

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Spike Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 2562237)							
ES1225019-006	Anonymous	EG005T: Lead	7439-92-1	250 mg/kg	92.5	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2561235)							
ES1225075-001	120691-1	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	88.8	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	94.1	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2561234)							
ES1225075-001	120691-1	EP071: C10 - C14 Fraction	----	640 mg/kg	82.8	73	137
		EP071: C15 - C28 Fraction	----	3140 mg/kg	96.6	53	131
		EP071: C29 - C36 Fraction	----	2860 mg/kg	84.2	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2561310)							
ES1225013-002	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	75.8	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2561234)							
ES1225075-001	120691-1	EP071: >C10 - C16 Fraction	----	850 mg/kg	103	73	137
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	88.7	53	131
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	71.3	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2561310)							
ES1225013-002	Anonymous	EP080: C6 - C10 Fraction	----	37.5 mg/kg	72.8	70	130
EP080: BTEXN (QCLot: 2561310)							
ES1225013-002	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	73.6	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	75.2	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	76.5	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	73.2	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	75.6	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 2561310) - continued							
ES1225013-002	Anonymous	EP080: Naphthalene	91-20-3	2.5 mg/kg	71.4	70	130

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	MSD	Low	High	Value	Control Limit
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2561234)										
ES1225075-001	120691-1	EP071: C10 - C14 Fraction	----	640 mg/kg	82.8	----	73	137	----	----
		EP071: C15 - C28 Fraction	----	3140 mg/kg	96.6	----	53	131	----	----
		EP071: C29 - C36 Fraction	----	2860 mg/kg	84.2	----	52	132	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2561234)										
ES1225075-001	120691-1	EP071: >C10 - C16 Fraction	----	850 mg/kg	103	----	73	137	----	----
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	88.7	----	53	131	----	----
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	71.3	----	52	132	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2561235)										
ES1225075-001	120691-1	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	88.8	----	70	130	----	----
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	94.1	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2561310)										
ES1225013-002	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	75.8	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2561310)										
ES1225013-002	Anonymous	EP080: C6 - C10 Fraction	----	37.5 mg/kg	72.8	----	70	130	----	----
EP080: BTEXN (QCLot: 2561310)										
ES1225013-002	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	73.6	----	70	130	----	----
		EP080: Toluene	108-88-3	2.5 mg/kg	75.2	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	76.5	----	70	130	----	----
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	73.2	----	70	130	----	----
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	75.6	----	70	130	----	----
		EP080: Naphthalene	91-20-3	2.5 mg/kg	71.4	----	70	130	----	----
EG005T: Total Metals by ICP-AES (QCLot: 2562237)										
ES1225019-006	Anonymous	EG005T: Lead	7439-92-1	250 mg/kg	92.5	----	70	130	----	----

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES1225075**	Page	: 1 of 5
Client	: EAST WEST ENVIROAG P/L	Laboratory	: Environmental Division Sydney
Contact	: MS STEPHANIE CAMERON	Contact	: Client Services
Address	: 82 PLAIN STREET TAMWORTH NSW, AUSTRALIA 2340	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: stephanie.c@ewenviroag.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 6762 1733	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 6765 9109	Facsimile	: +61-2-8784 8500
Project	: EW120691	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 23-OCT-2012
Sampler	: ----	Issue Date	: 26-OCT-2012
Order number	: EW120691		
		No. of samples received	: 6
Quote number	: SY/395/11	No. of samples analysed	: 6

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

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103)							
120691-1, 120691-2, 120691-3, 120691-4, 120691-5, 120691-6	**22-OCT-2012**	**----**	----	----	**24-OCT-2012**	05-NOV-2012	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
120691-1, 120691-2, 120691-3, 120691-4, 120691-5, 120691-6	**22-OCT-2012**	**24-OCT-2012**	20-APR-2013	✓	**24-OCT-2012**	20-APR-2013	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft							
Soil Glass Jar - Unpreserved (EP071)							
120691-1, 120691-2, 120691-3, 120691-4, 120691-5, 120691-6	**22-OCT-2012**	**23-OCT-2012**	05-NOV-2012	✓	**24-OCT-2012**	02-DEC-2012	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
120691-1, 120691-2, 120691-3, 120691-4, 120691-5, 120691-6	**22-OCT-2012**	**23-OCT-2012**	05-NOV-2012	✓	**23-OCT-2012**	02-DEC-2012	✓
EP080: BTEX							
Soil Glass Jar - Unpreserved (EP080)							
120691-1, 120691-2, 120691-3, 120691-4, 120691-5, 120691-6	**22-OCT-2012**	**23-OCT-2012**	05-NOV-2012	✓	**24-OCT-2012**	05-NOV-2012	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
120691-1, 120691-2, 120691-3, 120691-4, 120691-5, 120691-6	**22-OCT-2012**	**23-OCT-2012**	05-NOV-2012	✓	**24-OCT-2012**	05-NOV-2012	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
120691-1, 120691-2, 120691-3, 120691-4, 120691-5, 120691-6	**22-OCT-2012**	**23-OCT-2012**	05-NOV-2012	✓	**24-OCT-2012**	05-NOV-2012	✓

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(where) 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	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	8	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	10	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	8	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	**12.5**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	10	**10.0**	**5.0**	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	8	**12.5**	**5.0**	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	**5.0**	**5.0**	✓	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	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2010 Draft) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) 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 (1999) Schedule B(3)
TPH - 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 - C36. This method is compliant with NEPM (1999) Schedule B(3) (Method 506.1)
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 (1999) Schedule B(3) (Method 502 and 507)
TPH 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. This method is compliant with NEPM (1999) Schedule B(3) (Method 501)

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 (Option B - Non-concentrating)	ORG17B	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 20mL 1:1 DCM/Acetone by end over end tumble. The solvent is transferred directly to a GC vial 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

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

Environmental Division

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **ES1225075**		
Client	: **EAST WEST ENVIROAG P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS STEPHANIE CAMERON	Contact	: Client Services
Address	: 82 PLAIN STREET TAMWORTH NSW, AUSTRALIA 2340	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: stephanie.c@ewenviroag.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 6762 1733	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 6765 9109	Facsimile	: +61-2-8784 8500
Project	: EW120691	Page	: 1 of 2
Order number	: EW120691		
C-O-C number	: ----	Quote number	: ES2012EASWES0282 (SY/395/11)
Site	: ----		
Sampler	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 23-OCT-2012	Issue Date	: 23-OCT-2012 14:37
Client Requested Due Date	: 26-OCT-2012	Scheduled Reporting Date	: **26-OCT-2012**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 21' C
No. of coolers/boxes	: 1 HARD	No. of samples received	: 6
Security Seal	: Intact.	No. of samples analysed	: 6

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
- **Samples received in appropriately pretreated and preserved containers.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.

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 neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - S-21 TPH/BTEX/PAH + Pb
ES1225075-001	22-OCT-2012 15:00	120691-1	✓
ES1225075-002	22-OCT-2012 15:00	120691-2	✓
ES1225075-003	22-OCT-2012 15:00	120691-3	✓
ES1225075-004	22-OCT-2012 15:00	120691-4	✓
ES1225075-005	22-OCT-2012 15:00	120691-5	✓
ES1225075-006	22-OCT-2012 15:00	120691-6	✓

Proactive Holding Time Report

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

Requested Deliverables

MS ANNE MICHIE

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

THE ADMIN OFFICE

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

Friday 26.10.12 Pabi + Nanthini

CHAIN OF CUSTODY DOCUMENTATION

Australian Laboratory Services Pty Ltd

CLIENT: East West Enviroag

ADDRESS / OFFICE: 82 Plain St Tamworth NSW 2340

PROJECT MANAGER (PM):Stephanie Cameron

PROJECT ID: EW120691

SITE:

P.O. NO.:EW120691

RESULTS REQUIRED (Date):ASAP

QUOTE NO.: SY/395/11

SAMPLER:

MOBILE:

PHONE

EMAIL REPORT TO: admin@ewenviroag.com.au & anne.m@ewenviroag.com.au

EMAIL INVOICE TO: (if different to report)

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY

COOLER SEAL (circle appropriate)

Intact: Yes No N/A

SAMPLE TEMPERATURE

CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

1xjar for each sample

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

Environmental Division Sydney

Work Order

ES1225075

Telephone : +61-2-8784 8555

SAMPLE INFORMATION (note: S = Soil, W=Water) | CONTAINER INFORMATION

ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles	
1	120691-1	soil	22/10/2012			jar,1x plastic b	S-21
2	120691-2	soil	22/10/2012				S-21
3	120691-3	soil	22/10/2012				S-21
4	120691-4	soil	22/10/2012				S-21
5	120691-5	soil	22/10/2012				S-21
6	120691-6	soil	22/10/2012				S-21

RELINQUISHED BY:

Name: Stephanie Cameron	Date:22/10/2012
Of:East West Enviroag	Time:1700
Name:	Date:
Of:	Time:

RECEIVED BY

Name: David	Date:	23/10	
Of: ALS	Time:	0900	
Name:	Date:		
Of:	Time:		

METHOD OF SHIPMENT

Con' Note No:

Transport Co: TNT

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; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

Mitchel Hanlon Consulting Pty Ltd

Job No: 12120 **Date:** 22/10/12	**Mitchel Hanlon Consulting** Analysis Request & Chain of Custody This form is to be completed and submitted with all samples
Contact:	**Project Name:** Australia Asia Flight Training **Order Number:**
Address: PO Box 1568 121 Bridge Street Tamworth NSW 2340	**Quote Ref:** **Final Report:**
Telephone: 02 6762 4411	**Email** clockyer@mitchelhanlon.com.au **Post** PO Box 1568 Tamworth NSW 2340
Fax: 02 6762 4412	**Turn-around Time Requirements:** ASAP
Date of Submission: 22/10/12	

Sample Description

Sample ID	Sample Matrix	Sample Description	Analysis Required	Sampling Date	Container Type
TP1 – TP6	Soil	Test pits	TPH, BTEX, PAH's, lead.	19/10/12	glass jar.

Obtained by: C. Lockyer

Comments:

Chain of Custody

From: Mitchel Hanlon Consulting P/L	To (Laboratory Name): EW Enviro Ag
Date: 22/10/12	
Cold Stored: ☐ No ☐ Yes	Containers Intact: ☑ Yes ☐ No
Relinquished By:	Received By:

22 OCT 2012

120691