

BUSHFIRE ASSESSMENT

IN SUPPORT OF A DEVELOPMENT APPLICATION

PROPOSED EXPANSION OF APPROVED
MINE WORKERS VILLAGE



Premise

PREPARED FOR:

ROVEST HOLDINGS PTY LTD

NOVEMBER 2019



 ENGINEERING  ENVIRONMENT  AGRICULTURE  WATER

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The preparation of this report has been in accordance with the project brief provided by the client and has relied upon the information, data and results provided or collected from the sources and under the conditions outlined in the report.

All information contained within this report is prepared for the exclusive use of Rovest Holdings Pty Ltd to accompany this report for the land described herein and are not to be used for any other purpose or by any other person or entity. No reliance should be placed on the information contained in this report for any purposes apart from those stated therein.

Premise accepts no responsibility for any loss, damage suffered or inconveniences arising from, any person or entity using the plans or information in this study for purposes other than those stated above.

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1. INTRODUCTION

1.1 BACKGROUND

Premise has been commissioned by Rovest Holdings Pty Ltd to prepare a Bush Fire Assessment Report to accompany a Development Application (DA) for the proposed expansion of an existing approved mine workers accommodation village located on land at Barrier Highway, Cobar.

Cobar Shire Council have advised that the site features a bush fire threat, although we note that the land is not mapped as bushfire prone via NSW Department Planning, Industry and Environment Planning Portal mapping or Rural Fire Service bushfire prone land mapping.

1.2 SCOPE OF THIS REPORT

A bushfire assessment is to be prepared to address the requirements of Section 4.14 of the *Environmental Planning and Assessment Act 1979*.

A Bush Fire Safety Authority is not required for the development on the basis that the land is not mapped as bushfire prone land.

If the development were mapped as bushfire prone, a bushfire safety authority would not be expected to be required on the basis that the development is not for a special fire protection purpose pursuant to Section 100B of the *Rural Fires Act 1997* (RF Act). That is, it is not one of the following:

- (a) a school,
- (b) a child care centre,
- (c) a hospital (including a hospital for the mentally ill or mentally disordered),
- (d) a hotel, motel or other tourist accommodation,
- (e) a building wholly or principally used as a home or other establishment for mentally incapacitated persons,
- (f) seniors housing within the meaning of *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004*,
- (g) a group home within the meaning of *State Environmental Planning Policy No 9—Group Homes*,
- (h) a retirement village,
- (i) any other purpose prescribed by the regulations.

By reference to clause 46 of the *Rural Fires Regulation 2013*, and in respect of point (i) above, the development is not:

- (a) a manufactured home estate (within the meaning of *State Environmental Planning Policy No 36—Manufactured Home Estates*), comprising two or more caravans or manufactured homes, used for the purpose of casual or permanent accommodation (but not tourist accommodation),
- (b) a sheltered workshop, or other workplace, established solely for the purpose of employing persons with disabilities,
- (c) a respite care centre, or similar centre, that accommodates persons with a physical or mental disability or provides respite for carers of such persons,
- (d) student or staff accommodation associated with a school, university or other educational establishment,
- (e) a community bush fire refuge approved by the Commissioner.

This report has been prepared pursuant to Appendix 4 of the NSW Rural Fire Service document *Planning for BushFire Protection 2006* and the NSW Rural Fire Services' "Submission Requirements", and is set out in the following format:

- **Section 2** provides a description of the site subject to the DA.
- **Section 3** provides a description of significant environmental features at the site.
- **Section 4** provides a Bush Fire Assessment for the proposed development.
- **Section 5** concludes the report.

2. DEVELOPMENT SITE

2.1 BACKGROUND

2.1.1 SUBJECT SITE

The site the subject of this development application is the existing Cobar Mine Workers Village, located on the eastern outskirts of Cobar NSW at 12769 Barrier Highway, Cobar and identified as Lot 991 DP1029946. The subject site is approximately 28 hectares in size.

The subject site boundary is setback approximately 40 metres from the constructed pavement of the Barrier Highway, which runs adjacent to the northern boundary of the site. The mining village is located in the eastern section of the subject site, approximately 130 metres from the northern and eastern site boundaries.

The site is predominantly cleared with some scattered non-significant vegetation. Vegetation across the site is characterised as native woodland as a result of the AREA Biodiversity Assessment Report (November, 2019).

The mining village currently operates under Cobar Shire Council development consent 2012-LD-0029, dated 13 July 2012, and accommodates a maximum of 119 occupants in 30 accommodation units. Each accommodation unit is self-contained, containing up to four bedrooms, each with en-suite bathrooms. The units measure 14.4 metres in length, 3.3 metres in width and 2.9 metres in height and are sited in four rows south of the approved communal amenities building. One of the units is configured as a three-room unit, with one room being disabled accessible.

In addition to the accommodation units, a communal amenities building comprising kitchen, cool room, freezer and storage, laundry, toilets, first aid station and recreation room is located on the subject site – refer **Drawing A02**.

Three separate on-site wastewater management systems currently treat wastewater produced at the site. One system comprising a 4,500 litre balance tank and eight (8) SK-10 secondary wastewater treatment systems is located to the east of the accommodation units to service the existing accommodation units. Wastewater from the communal amenities building is serviced by two management systems, located adjacent the building to the north and west.

Figure 1 depicts the mining village within the context of the subject site.



Figure 1: Subject Site (Source: Google Maps)

2.2 THE LOCALITY

The site locality is considered typical of the outskirts of a rural township. The local context is characterised by broad acre farming to the east, north-east and south, and industrial developments to the north-west. Further to the west is the urban areas of the town of Cobar.

The closest residential dwelling is approximately 200 metres north of the site boundary and is separated by the Barrier Highway (Nyngan Road).

Figure 2 depicts the subject site in the context of the surrounding locality.

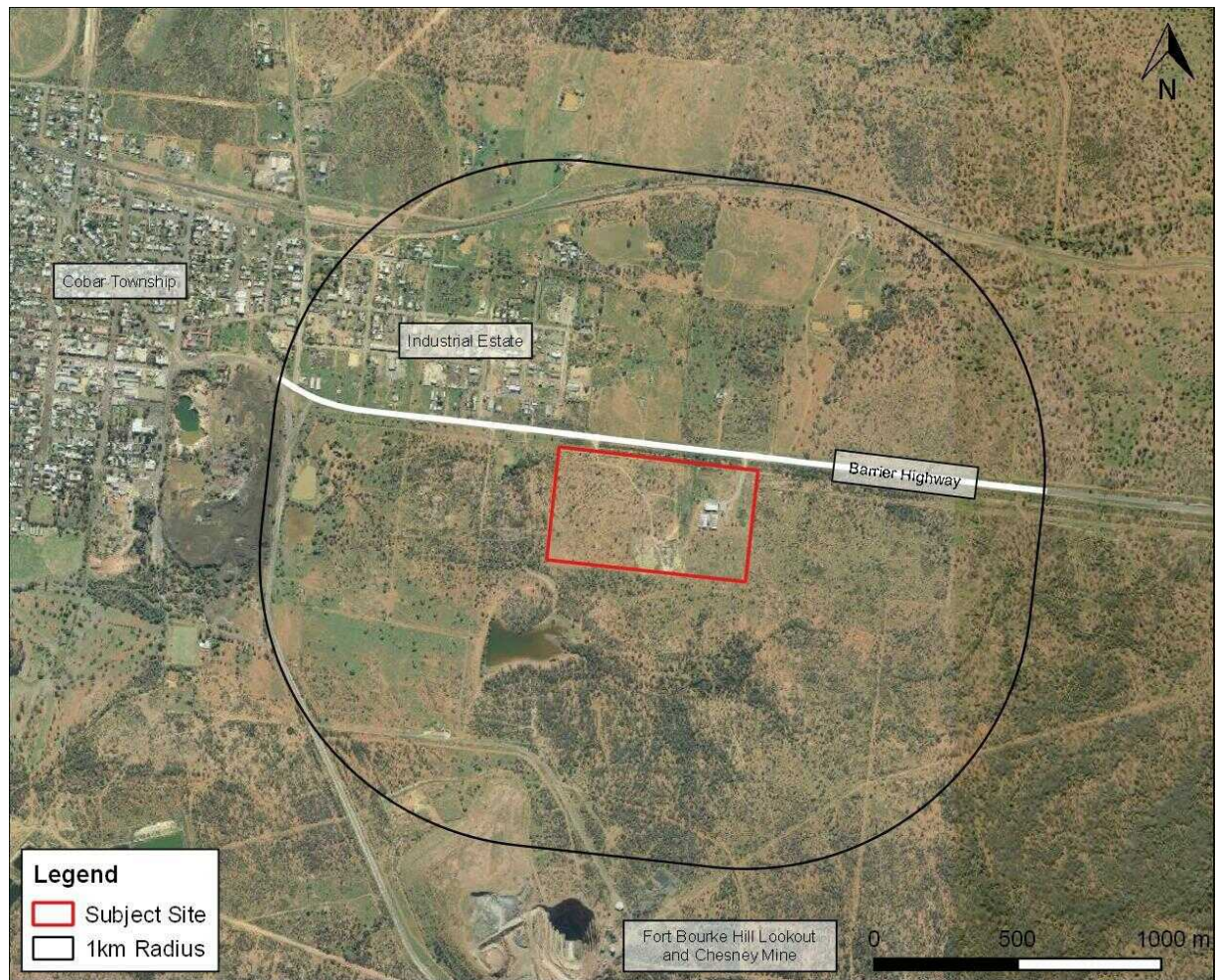


Figure 2: Site Locality (Source: LPI Data)

2.2.1 ZONING

The property is zoned RU1 – Primary Production pursuant to the *Cobar Local Environmental Plan 2012* (LEP). The current zoning is depicted in **Figure 2**.



Figure 3: Land zoning at subject site and adjoining lands

2.3 VEGETATION

By reference to the Biodiversity Assessment Report (BDAR) prepared by AREA in relation to the proposed development, the site is characterised, via state vegetation mapping, as wholly containing vegetation from the *PCT 103 - Poplar Box – Coolabah - White Cypress Pine shrubby woodland mainly in the Cobar Penepplain Bioregion*. A site inspection by AREA confirmed the vegetation on the land is consistent with the mapped PCT 103 community.

AREA's on site observation of condition identified the following:

Flora has low species richness and fauna habitat features including hollows and fallen logs were not recorded in the development site or in the vegetation plots.

The Vegetation Integrity Score is 16.5.

Utilising the technique identified in Appendix 3 to PBFP (2011), vegetation within 140 metres of the proposed accommodation buildings is characterised as follows:

- North – Woodland;
- East – Woodland;
- South – Woodland; and
- West – Woodland

Vegetation formations are mapped as per **Figure 4**.

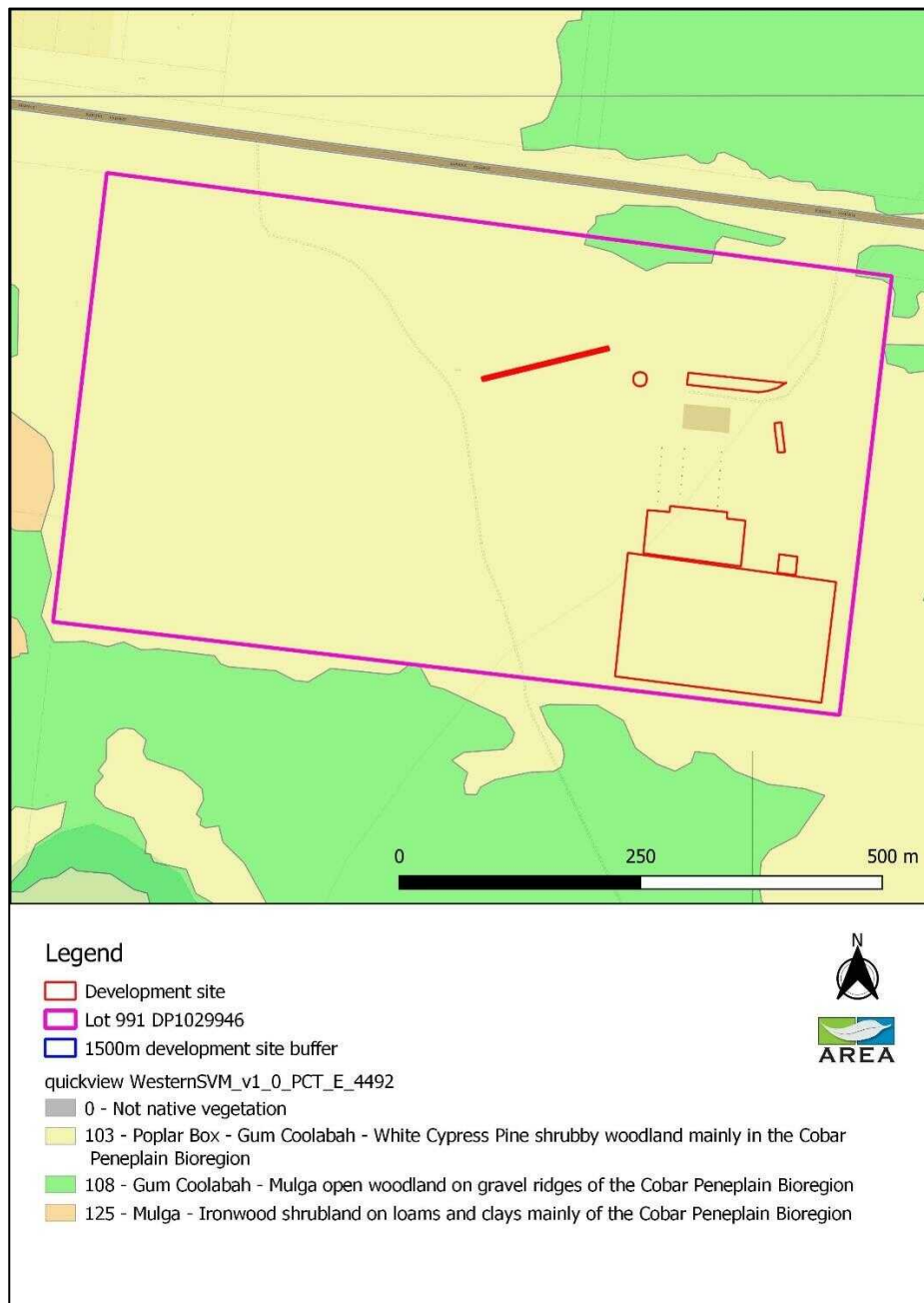


Figure 4: Vegetation at the subject site

2.4 SLOPE

Slopes within 140 metres of the development site are generally flat (ie, less than 5 degrees), with a general rise to the south-west and north. **Figure 4** depicts contours at the site.

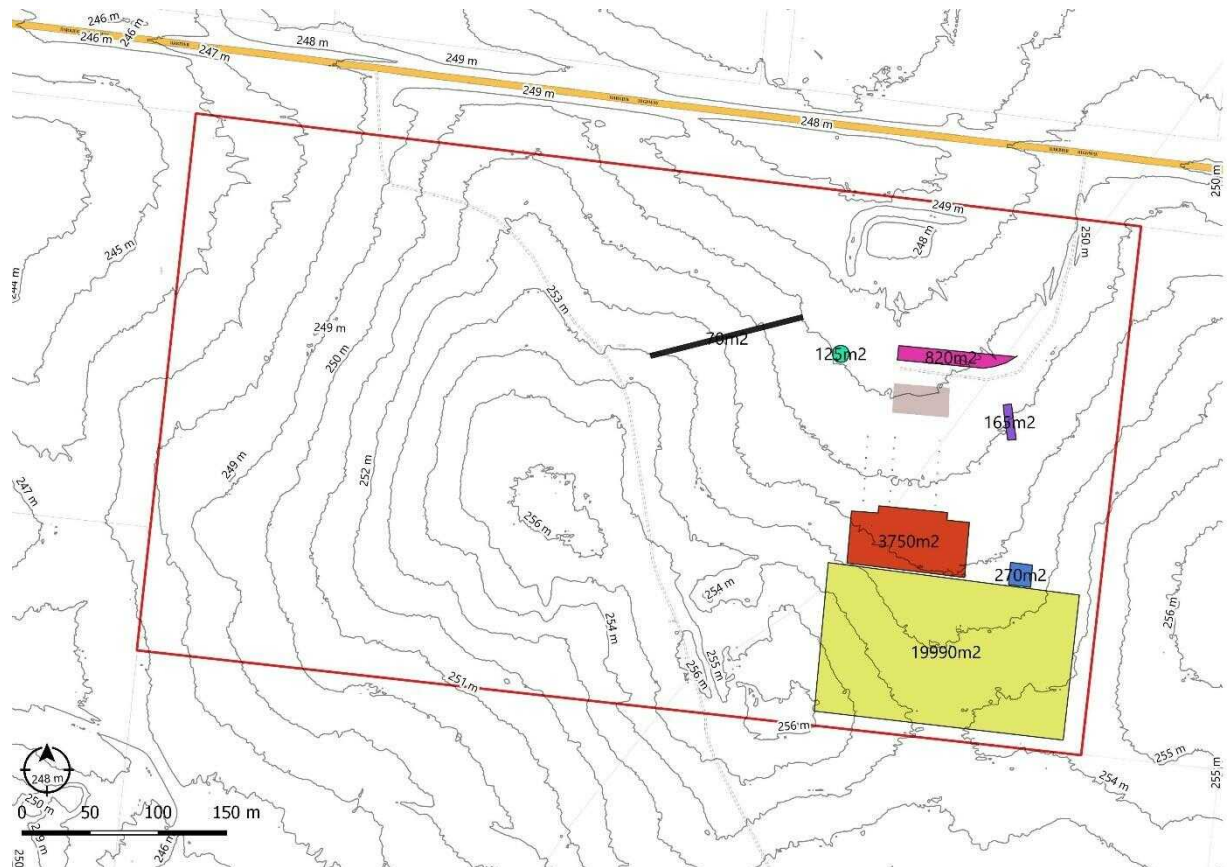


Figure 5: Contours at the subject site

In relation to the contours, the following prevailing slope is identified in relation to the site:

- North – $<5^{\circ}$ downslope;
- East – Upslope;
- South – Upslope; and
- West – Upslope.

2.5 BUSH FIRE PRONE LAND

Review of the RFS Bushfire prone land map and planning portal does not identify any mapped bushfire prone land. Nonetheless, Council have indicated an identified bushfire threat requiring assessment.

3. SIGNIFICANT ENVIRONMENTAL FEATURES

3.1 ECOLOGY

A Biodiversity Assessment Report (BDAR) has been prepared by AREA (refer **Appendix A**) which confirms that the site contains native vegetation (PCT 103) but that the vegetation is in poor condition (VIS of 16.5). PCT 103 is not associated with a threatened ecological community. Offsetting to account for clearing of native vegetation is not required.

No significant impact to endangered or vulnerable species or communities is predicted as a result of the proposal.

AREA consider the site to be degraded in terms of fauna habitat features (AREA, 2019, p. 46).

3.2 INDIGENOUS HERITAGE

A search of the of the Aboriginal Heritage Information Management System (AHIMS) in relation to the subject site, including a 200 m buffer, did not identify any recorded Aboriginal sites or places.

No Aboriginal places were identified on or near the site in the Office of Environment and Heritage's NSW Atlas of Aboriginal Places. No Aboriginal places or objects were identified on or near the site in the State Heritage Register (SHR).

A search of the National Native Title database, Native Title Vision, was undertaken for native title land applications, determinations or Indigenous Land Use Agreements (ILUAs) relevant to the property. The database and mapping showed no registered National Native Title claim within or near the site.

A copy of the AHIMS search result is provided in **Appendix B**.

Physical changes relate to the proposed development site include the installation of the additional accommodation buildings, the expansion of the bus parking area and the use of land for irrigation of waste water.

3.3 VULNERABLE LANDS

3.3.1 STEEP OR HIGHLY ERODIBLE

Review of the Office of Environment and Heritage (OEH) GIS dataset for Vulnerable Land – Steep or Highly Erodible confirms the subject site is not classed as steep or highly erodible.

By reference to the slope analysis, slope across the site, in the context of the proposed footprint, is predominantly 10 degrees or less.

3.4 EXTRACTIVE RESOURCES

A review of the MinView DIGS database confirms the site is affected by Consolidated Mining Lease 6 (TAS ID 18481), held by Peak Gold Mines. The grant date of the licence was 29/4/1996 and expiry is 27/02/2034. It was last renewed on 15/6/2015.

The primary activity of the Peak Gold Mine operation is well separated from the subject site. The site is currently developed and any future exploration near to the site would be subject to the agreement of the landowners and operators. The portable nature of the accommodation units means that they do not pose any significant barrier to the future development of the land for mining purposes.

3.5 CONTAMINATION

Searches of the NSW EPA *List of NSW contaminated sites notified to the EPA* and *Contaminated Land Record* did not identify any contaminated sites at or near the subject site.

In relation to the original DA relating to the land, Envirowest carried out a contamination assessment which confirmed no known instances of contamination at the site – refer **Appendix B**. There has been no other use of the land than the approved use since the contamination assessment was completed, and therefore the findings remain valid.

The obligations of SEPP55 are therefore satisfied.

4. BUSHFIRE ASSESSMENT

4.1 INTRODUCTION

The site is currently in use as a mine workers camp. The land impacted by the development is not currently actively used for any purpose.

4.2 ASSET PROTECTION ZONES

4.2.1 DEFINITIONS

An Asset Protection Zone (APZ) is:

An APZ is a buffer zone between a bush fire hazard and buildings, which is managed progressively to minimise fuel loads and reduce potential radiant heat levels, flame, ember and smoke attack. The appropriate APZ is based on vegetation type, slope and levels of construction (NSW RFS 2006:10).

APZs consist of:

- Inner Protection Area (IPA): extends from the edge of the OPA to the development, incorporating the defendable space and for managing heat intensities at the building surface.
- Outer Protection Area (OPA): located between the hazard and the IPA, for reducing the potential length of flames by slowing the rate of spread, filtering embers and suppressing the crown fire.
- A defendable space, a subset of the APZ, is required as a workable area in which fire fighters, emergency services personnel, residents and others can undertake property protection after the passage of a bush fire (NSW RFS 2006:10).

4.2.2 OBJECTIVES

Chapter 4 of PBFP provides performance based controls for a range of development types including residential and rural residential subdivision, development for special fire protection purposes and infill and other development. On the basis that the proposal does not entail development for residential and rural residential subdivision or special fire protection purposes, the infill and other development objectives have been considered in relation to this DA.

The objectives for infill development are discussed in **Table 4.1**.

Table 4.1 -Infill and other development objectives

Objective	Relevance to application
• <i>ensure that the bush fire risk to adjoining lands is not increased;</i>	Through the adoption of recommended controls provided by this report, risk to adjoining land is not increased
• <i>provide a minimum defendable space;</i>	The area around the primary amenities building would act as a defendable space.
• <i>provide better bush fire protection, on a re-development site, than the existing situation. This should not result in new works being exposed to greater risk than an existing building;</i>	Through the addition of specific bushfire protection measures, the situation is improved by reference to the existing
• <i>ensure that the footprint of the proposed building does not extend towards the hazard beyond existing building lines on neighbouring land;</i>	As there is no mapped hazard, and the areas within 140 metres of the site all feature a consistent low threat level, this objective is achieved.

Table 4.1 -Infill and other development objectives

Objective	Relevance to application
• <i>not result in an increased bush fire management and maintenance responsibility on adjoining land owners unless they have agreed to the development;</i>	No impact to adjoining land owners. All development and protection measures maintained within the curtilage of the site.
• <i>ensure building design and construction enhance the chances of occupant and building survival.</i>	Not applicable. As the site is not mapped as bushfire prone, AS3959-2009 does not apply.

Source: Planning for Bushfire Protection 2006

The performance solutions of Section 4.3.5 of PBFP with respect to infill and other development are discussed in **Table 4.2**.

Table 4.2 -Infill and other development performance criteria

Performance Criteria	Acceptable Solutions	Assessment
In relation to Asset Protection Zones: <ul style="list-style-type: none"> • a defendable space is provided onsite. • an asset protection zone is provided and maintained for the life of the development. 	<ul style="list-style-type: none"> • APZ determined in accordance with Appendix 2. 	Fuel loads on the site are very low as a result of historic site clearing and due to the sparse nature of the vegetation. A 50 metre APZ would be supplied around the accommodation buildings in all directions; thereby exceeding the requirements of Appendix 2.
in relation to siting and design: <ul style="list-style-type: none"> • buildings are sited and designed to minimise the risk of bush fire attack. 	<ul style="list-style-type: none"> • buildings are designed and sited in accordance with the siting and design principles in this section (see also figure 4.7). 	Building are located close to other buildings, but with suitable separation to ensure BCA compliance. Suitable fire measures are provided to ensure protection for site users.
in relation to construction standards: <ul style="list-style-type: none"> • it is demonstrated that the proposed building can withstand bush fire attack in the form of wind, smoke, embers, radiant heat and flame contact . 	<ul style="list-style-type: none"> • construction determined in accordance with Appendix 3 and the Requirements for attached garages and other structures in this section. <p>Note: provisions in relation to Class 10a buildings may also apply.</p>	Construction standards as per AS3959-2009 does not apply on the basis that the site is not mapped as bushfire prone.
in relation to access requirements: <ul style="list-style-type: none"> • safe, operational access is provided (and maintained) for emergency services personnel in suppressing a bush fire while residents are seeking to relocate, in advance of a bush fire, (satisfying the intent and performance criteria for access roads in sections 4.1.3 and 4.2.7). 	<ul style="list-style-type: none"> • compliance with section 4.1.3 for property access roads. • compliance with section 4.2.7 for access standards for internal roads. 	Refer Section 4.4
in relation to water and utility services: <ul style="list-style-type: none"> • adequate water and electricity services are provided for firefighting operations 	<ul style="list-style-type: none"> • compliance with section 4.1.3 for services - water, electricity and gas. 	Refer Section 4.5

Table 4.2 -Infill and other development performance criteria

Performance Criteria	Acceptable Solutions	Assessment
<ul style="list-style-type: none"> gas and electricity services are located so as not to contribute to the risk of fire to a building. 		
in relation to landscaping: <ul style="list-style-type: none"> it is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind driven embers to cause ignitions. 	<ul style="list-style-type: none"> compliance with Appendix 5. 	No landscaping proposed, given the isolated nature of the location and distance from the public domain

4.2.3 REQUIRED APZ

By reference to the prevailing slope and vegetation type, and the methodology outlined Appendix 2 of PBFP, the required APZ has been determined. Table 2.6 from Appendix 2 of PBFP has used on the basis that the buildings proposed are considered by Council to represent class 3 buildings. By reference to the designation of the vegetation type as a semi-arid woodland, the required APZ's are:

- North – 35 metres
- East – 30 metres;
- South – 30 metres; and
- West – 30 metres.

The land to the north of the proposed accommodation buildings currently accommodates managed land and existing accommodation buildings. As this land is managed land the APZ in this direction is achieved.

The land to the east and south is to be managed to provide irrigation areas for effluent management. As the land in these directions is managed land, the APZ in these directions is achieved.

The land to the west and east would be managed as an APZ to a distance of 50 metres. This exceeds the requirements of Appendix 2.

4.3 CONSTRUCTION STANDARDS

As the land is not mapped as bushfire prone, AS3959-2009 *Construction of buildings in bushfire prone areas* does not apply to the proposed development (Section 1.7 (p,13), AS3959-2009).

4.4 ACCESS

PBFP provides control in relation to site access in relation to new roads, property access and fire trails. As no new roads or fire trails are required or proposed, the focus of this element of the assessment is property access.

Table 4.3 outlines the performance criteria and acceptable solutions for property access. The table also outlines how the proposed development achieves the requirements.

Table 4.3 - Property Access

Performance Criteria	Acceptable Solutions	Comments	Compliance
Access to properties is provided in recognition of the risk to fire fighters and/ or evacuating occupants.	At least one alternative property access road is provided for individual dwellings (or groups of dwellings) that are located more than 200 metres from a public through road	The accommodation units are within 200 metres of the main road.	✓
The capacity of road surfaces and bridges is sufficient to carry fully loaded fire fighting vehicles.	Bridges clearly indicate load rating and pavements and bridges are capable of carrying a load of 15 tonnes	The site accommodates heavy delivery vehicles and buses, and has historically accommodated heavy vehicles associated with the former abattoir. This requirement is achieved.	✓
All weather access is provided.	Roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge).	The access driveway is designed to an all-weather standard.	✓
Road widths and design enable safe access for vehicles	A minimum carriageway width of four metres for rural residential areas, rural landholdings or urban areas with a distance of greater than 70 metres from the nearest hydrant point to the most external part of a proposed building (or footprint). Note: No specific access requirements apply in a urban area where a 70 metres unobstructed path can be demonstrated between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency fire fighting vehicles (i.e. a hydrant or water supply).	As above	✓
	In forest, woodland and heath situations, rural property access roads have passing bays every 200 metres that are 20 metres long by two metres wide, making a minimum trafficable width of six metres at the passing bay.	Roads are two way internally to all the passing of vehicles.	✓

Table 4.3 - Property Access

Performance Criteria	Acceptable Solutions	Comments	Compliance
	A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches.	Trees are largely avoided, and therefore this is achievable.	✓
	Internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle with a minimum 12 metre outer radius.	This is achieved by reference to the current arrangement.	✓
	Curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress.	This is achieved by reference to the current arrangement.	✓
	The minimum distance between inner and outer curves is six metres	This is achieved by reference to the current arrangement.	✓
	The cross fall is not more than 10 degrees.	This is achieved by reference to the current arrangement.	✓
	Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads. Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m), extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.	This is achieved by reference to the current arrangement.	✓
	Access to a development comprising more than three dwellings have formalised access by dedication of a road and not by right of way	No dwellings involved.	N/A

4.5 SERVICES

The intent of the measures for services, including water, electricity and gas is:

to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building (NSW RFS 2006:26).

Table 4.4 outlines the performance criteria and acceptable solutions for services. The table also outlines how the proposed development achieves the requirements.

Table 4.4 - Services

Performance Criteria	Acceptable Solutions	Comments	Compliance
Non-reticulated water supply area			
For rural-residential and rural developments (or settlements) in bush fire prone areas, a water supply reserve dedicated to fire fighting purposes is installed and maintained. The supply of water can be an amalgam of minimum quantities for each lot in the subdivision (community titled subdivisions), or held individually on each lot	The minimum dedicated water supply required for fire fighting purposes for each occupied building excluding drenching systems, is provided in accordance with Table 4.2. For lots >10,000m ² Table 4.2 requires the dedicated water supply of 20,000L/lot.	A 250,000 litre fire-fighting tank would be supplied.	✓
	A suitable connection for fire fighting purposes is made available and located within the IPA and away from the structure. A 65mm Storz outlet with a Gate or Ball valve is provided.	An appropriate valve would be provided on the above tank.	✓
	Gate or Ball valve and pipes are adequate for water flow and are metal rather than plastic.	This would be achieved.	✓
	Underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank. A hardened ground surface for truck access is supplied within 4 metres of the access hole.	No underground tanks proposed	N/A
	Above ground tanks are manufactured of concrete or metal and raised tanks have their stands protected. Plastic tanks are not used. Tanks on the hazard side of a building are provided with adequate shielding for the protection of fire fighters.	This would be achieved.	✓
	All above ground water pipes external to the building are metal including and up to any taps. Pumps are shielded.	This would be achieved.	✓
Electricity Services			
Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings	Where practicable, electrical transmission lines are underground.	All electrical services to the site are existing.	✓

Table 4.4 - Services

Performance Criteria	Acceptable Solutions	Comments	Compliance
Regular inspection of lines is undertaken to ensure they are not fouled by branches	Where overhead electrical transmission lines are proposed: <ul style="list-style-type: none"> lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and no part of a tree is closer to a power line than the distance set out in accordance with the specifications in 'Vegetation Safety Clearances' issued by Energy Australia (NS179, April 2002). 	This would be achieved	✓
Gas services			
Location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings	Reticulated or bottled gas is installed and maintained in accordance with AS1596 and the requirements of relevant authorities. Metal piping is to be used.	Achievable.	✓
	All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation.	Achievable.	✓
	If gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal.	Achievable.	✓
	Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not used.	Achievable.	✓

4.6 ON-GOING MANAGEMENT

Areas identified as APZs would be subject to ongoing management.

The following general measures would also be applied:

- Management of fuel loads within APZ areas through slashing or grazing by stock;

- Storage and maintenance of fire-fighting equipment, including siting and provision of adequate water supplies for bush fire suppression;
- Operational procedures relating to mitigation and suppression of bush fire relevant to the quarry site;
- Identifying, implementing and maintaining appropriate asset protection zones where required in relation to any future buildings;
- Providing adequate egress/access to the site for use by fire-fighting vehicles; and
- Preparing an Emergency Response Plan outlining:
 - Roles and Responsibilities
 - Emergency response measures
 - Evacuation procedures

On the basis of the above, Council can be satisfied that the development would be operated in full awareness of the limited bushfire risk.

5. CONCLUSION

The site is not mapped as bushfire prone, however Council has requested consideration of bushfire risk.

An assessment of the site has been undertaken in accordance with PBFP (NSW RFS 2006). The results of this assessment are outlined in this report along with recommendations to minimise any bushfire risk.

In summary these recommendations include:

- Management of fuel loads within 50 metres of the accommodation units in the vicinity of the proposal through slashing or grazing of stock;
- Property access driveways to be constructed to PBFP standards as applicable.
- A 250,000 litre dedicated fire-fighting tank to be supplied fitted with 65mm Storz outlet with a Gate or Ball valve.

References

NSW Department of Planning and Environment (DoPE), n.d. *NSW Planning Portal*. [ONLINE] Available at: <https://www.planningportal.nsw.gov.au/> [Accessed 20 July 2016]

NSW Office of Environment and Heritage (OEH), n.d. *Aboriginal Heritage Information Management System (AHIMS)*. [ONLINE] Available at: <http://www.environment.nsw.gov.au/licences/AboriginalHeritageInformationManagementSystem.htm> [Accessed 20 July 2016]

NSW Office of Environment and Heritage (OEH), 2010. *Vulnerable Land – Steep or Highly Erodible GIS Dataset*.

Rural Fire Service, 2006. *Planning for Bush Fire Protection*, RFS, Sydney.

Standards Australia, 2009. *Australian Standard: Construction of buildings in bushfire-prone areas (AS 3959-2009)*.

Appendix A

AHIMS SEARCH RESULT

Geolyse Pty Ltd
PO Box 1842 62 Wingewarra Street
Dubbo New South Wales 2830
Attention: David Walker
Email: dwalker@geolyse.com

Date: 05 November 2019

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 991, DP:DP1029946 with a Buffer of 200 meters, conducted by David Walker on 05 November 2019.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(http://www.nsw.gov.au/gazette\)](http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Appendix B

CONTAMINATION ASSESSMENT

Preliminary contamination investigation

Former Western Plains Meats abattoir
Lot 991 Barrier Highway, Cobar NSW



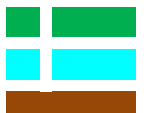
Ref: R12139c

Date: 14 May 2012

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Report Number: R12139c

Date: 14 May 2012

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Executive summary

Background

A new mining accommodation village is proposed for Lot 991 Barrier Highway, Cobar NSW. The village will consist of up to 30 new accommodation modules each with 4 single bedrooms units.

The site was formerly Western Plains Meats abattoir which comprised a processing factory building, holding yards and associated infrastructure. Western Plains Meats abattoir ceased operation in late 2011.

Previous land-use may have resulted in contamination of the site. An investigation of the site is required to determine the soil contamination status, suitability for residential land-use.

Objectives of the investigation

A preliminary site investigation was conducted in accordance with the contaminated land management planning guidelines State Environmental Planning Policy No. 55 (SEPP 55) to determine the soil contamination status.

Investigation

Site inspections were undertaken on 2 and 3 May 2012. Lot 991 has a total area of 28.5 hectares. The investigation area was separated into two main areas. The primary investigation area was the 5 hectare area surrounding the existing building, including a dam located 100m north of the building and the potential locations of the accommodation units. The primary investigation area has an area of approximately 5 hectares. The secondary investigation area was the remainder of the site (23.5 hectares)

The site is the Former Western Plains Meats abattoir which contains a disused abattoir and meat processing building with amenities including toilets, showers, kitchen and washing areas. The site operated as a pet meat abattoir from 2001 to 2011. Prior land-use is unknown but expected to be agricultural.

The redevelopment will be undertaken of the existing building into a kitchen and recreation area for occupants of the accommodation units at the mining village.

A desktop study was undertaken to obtain information of historical land uses. A visual inspection, soil sampling and laboratory analysis program was undertaken for the preliminary investigation.

Boreholes were constructed up to a depth of 4m over the primary investigation area and the profile described. Soil samples were collected from the 0-100mm depth for analysis of BTEXN (benzene, toluene, ethyl benzene, xylene, naphthalene, TPH (C6-C36), arsenic, cadmium, chromium, copper, lead, nickel and zinc.

Four areas of potential contamination were detected in the primary investigation area:

- The area surrounding the existing building
- The possible locations of the accommodation units
- The dam located 100m of the existing building
- A small fill stockpile located 200m south of the building

The remainder of the site (secondary investigation area) was assessed by a walkover and visual inspection. No soil samples were collected for analysis from the secondary investigation area.

Conclusions

No evidence of contamination was identified in the soil from the boreholes. The soil sampling program did not detect elevated levels of the analysed contaminants. The levels of all analytes evaluated were either not detected or below the residential and sensitive land-use thresholds. In conclusion, no contamination was identified in the primary investigation area.

Several waste stockpiles were located in the secondary investigation area. The stockpiles included car bodies, metal scrap, residual building waste, bitumen and wire which is general solid waste. A former quarry was also identified in the area which also contained small fill stockpiles.

Recommendations

No further investigation is necessary and the investigation area is suitable for residential activities.

The waste stockpiles on the site require disposal to a landfill licenced to accept general solid waste.

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1. Introduction

A redevelopment of the former Western Plains Meats abattoir at Lot 991 Barrier Highway, Cobar NSW is proposed. The proposed land-use is a mining accommodation village. Previous land-use may have resulted in contamination of the site. An investigation of the site is required to determine the soil contamination status and suitability for residential land-use.

2. Scope of work

Envirowest Consulting Pty Ltd was commissioned by Geolyse Pty Ltd on behalf of Pybar Mining & Civil Contractors to undertake a preliminary contamination investigation, in accordance with the contaminated land management planning guidelines, from the *Contaminated Land Management Act 1997* and the *State Environmental Policy No. 55 (SEPP 55)*, of the former abattoir, Lot 991 Barrier Highway, Cobar NSW. The objective was to identify past potentially contaminating activities, identify potential contamination types, discuss the site condition, provide a detailed assessment of site contamination and assess the need for further investigation.

3. Site identification

Address	Lot 991 Barrier Highway Cobar NSW
Client	Pybar Mining Contractors and Geolyse Pty Ltd
Deposited plans	Lot 991 DP1029946
Australian Map Grid	Zone 55J, E391797m, N6514112m
Locality map	Figure 1
Aerial photograph	Figure 2
Site plan	Figure 3
Photographs	Figure 4
Assessment area	Approximately 5 hectares. The area surrounding the existing building and the location of the proposed accommodation units.

4. Site history

4.1 Zoning

The site is zoned as 1a – General Rural under the Cobar Shire Local Environmental Plan 2001. The site zone under the Cobar Shire Draft Local Environmental Plan 2011 is RU1 – Primary Production.

4.1 Site visit and description

Site inspections and soil sampling were conducted on 2 and 3 May 2012. The site is located on Lot 991 Barrier Highway, Cobar NSW and is a former pet meat processing building, former livestock holding pens and associated infrastructure. The site is approximately 1km out of the town of Cobar in a rural area.

4.3 Land-use

The existing building on the site is currently vacant. A site caretaker accommodates at the site in temporary storage units. No livestock were located in the holding pens.

4.4 Summary of council records

None known.

4.5 Sources of information for historical review and site description

- Information from Pybar Employee, Lindsay Hawke
- Information from site caretaker
- Site inspection 2 and 3 May 2012 by Andrew Ruming of Envirowest Consulting
- Cobar 1:250,000 Geological Sheet
- Aerial photograph 2010
- NSW Office of Environment and Heritage (OEH) records of public notices under the CLM Act 1997
- Cobar Regional Council LEP 2001

4.6 Chronological list of site uses

The building on the site was constructed in 2001 and extended in 2006. The building was used as a kangaroo, goat and ostrich abattoir and meat processing plant until closure in late 2011. The processing plant traded as Western Plains Meats under proprietors FS and GC Carne Pty Ltd. Products included pet meat for domestic and export use. Livestock pens are located to the west of the building. The pens were used to contain goats prior to processing. The remainder of the site is vacant. Few small to medium stockpiles of manure and woodchip stockpiles were observed on the site.

A caretaker is resident on the site in temporary storage units.

The land-use prior to 2001 is expected to be vacant. Several old waste stockpiles were located across the site. Waste material included bitumen, old toilets, iron, metal and old car bodies. A pit expected to be a former gravel quarry is located in the southern section of the site. The pit also contains waste material.

4.7 Buildings and infrastructure

The site contains a factory building which was formerly used as a meat processing plant. The building contains amenities such as washing facilities, bathrooms and a kitchen. Two on-site wastewater management systems are located on the site to manage wastewater from the building. The location and destination of the stormwater infrastructure is not known.

The site contains derelict steel livestock yards which were used in the former land-use processes.

4.8 Potential contaminants

The possible contaminants impacting on the site are from the form abattoir activities. The potential contaminants of concern are heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury).

Petroleum hydrocarbon contamination is possible during the storage and maintenance of vehicles, fork lifts and other machinery on the site or machines traversing the site. Hydrocarbons from fuels and oils are detected by analytes of TPH (C6-C36) and BTEXN.

4.9 Relevant complaint history

None known.

4.10 Contaminated site register

The site is not listed on the NSW OEH register of contaminated sites.

4.11 Previous investigations

None known.

4.12 Historical use of adjacent land

North – Barrier Highway and rural land-use

South – Rural-residential land-use

East – Rural land-use

West – Rural land-use

No neighbouring land-uses have potential to impact on the contamination status of the site.

4.13 Integrity assessment

The information obtained is accurate as the review records have allowed. The information available is considered sufficient for the purpose of the assessment and believed to be correct by the investigator.

5. Site condition and environment

5.1 Surface cover

The site is characterised by open woodlands and woodlands of bumble box. The bumble box woodlands form communities with mulga. Patches of mulga are sparsely located on the site within bare areas of soil and gravel across gentle slopes of less than 1%. Surface water flows across the bare areas until captured by mulga patches.

5.2 Topography

The topography of the site is a lower slope with an inclination of 1% and westerly aspect.

5.3 Soils and geology

Natural soils from the boreholes constructed were yellowish red to red silty sand over brown, yellow brown and yellow clayey sand, gravelly sand and weathered rock subsoil to the drilling depth of 4 metres.

Erosion was observed due to surface flow over bare areas (sheet erosion).

The Cobar region contains a wide range of soil types. Sands, sandy earths and red earth soils are dominant in the upland areas. The footslopes and lower areas are predominantly colluvial and aeolian (wind deposited) sediments with alluvial sediments associated along streams (Brunker 1967).

The geology on the site is the Cobar Group slate, shale, sandstone and greywacke overlain by quaternary alluvium (Brunker 1967).

5.4 Hydrology

5.4.1 Surface water

Surface water flows west and north across the hard surface cover and into the dam near the existing building. The dam was dry at the time of inspection.

5.4.2 Groundwater

A search of the NSW Natural Resource Atlas located no bores within 1km of the site. Groundwater at the site is expected to be greater than 10m in depth.

5.5 Evidence of contamination checklist

Site layout showing industrial processes	Nil
Sewer and service plans	Underground services are located along the boundary and within the site. The site is not connected to municipal sewer.
Manufacturing processes	Former abattoir and pet meat processing plant located on the site
Underground tanks	None known
Product spills and loss history	None known
Discharges to land, water and air	None known
Disposal locations, presence of drums, wastes and fill materials	Several waste stockpiles are located on the site
Soil staining	Nil
Visible signs of plant stress, bare areas	No plant stress observed in vegetation. Bare areas prevalent due to surface water runoff and gravel hardpan areas inhibiting plant growth.
Odours	Nil
Ruins	Nil
Other	No evidence of mining disturbance was identified in the primary investigation area. A former gravel quarry is located in the southern section of the site.

6. Sampling analysis plan and sampling methodology

6.1. Sampling strategy

A systematic and judgemental sampling strategy was undertaken over the primary investigation area. The primary investigation area was separated into four areas based on land-use. The areas investigated were:

- The area surrounding the existing building
- The possible locations of the accommodation units
- The dam located 100m of the existing building
- A small fill stockpile located 200m south of the building

The secondary area was investigated by a site walkover and visual assessment. No soil samples were collected for analysis from the secondary investigation area.

6.1.1 Sampling design and location

6.1.1.1 Existing building

A systematic sampling strategy was undertaken over the surrounds of the existing building. Eight samples were collected on a 25m grid pattern at a depth of 0 to 100mm.

The samples were combined in groups of four and thoroughly mixed to form two composite samples (PC4 and PC5) for analysis. The samples collected are expected to be representative of the area. The samples were collected on 2 May 2012.

6.1.1.2 Accommodation unit sites

A systematic sampling strategy was undertaken over the area available for construction of the accommodation units. Boreholes were constructed to a depth of 4m in 12 locations. Twelve samples were collected from the boreholes at a depth of 0 to 100mm on a 50m grid pattern. The samples were combined in groups of four and thoroughly mixed to form three composite samples (PC1, PC2, PC3) for analysis. The subsoil (0.1m to 4m) from the boreholes was visually and olfactory assessed for evidence of contamination. The samples collected are expected to be representative of the area. The samples were collected on 2 May 2012.

6.1.1.3 Dam

A judgemental sampling strategy was undertaken at the dam site. One discrete sample (PC6) was collected from the dam base (centre of dam) a depth of 0 to 100mm. The samples were collected on 2 May 2012.

6.1.1.4 Fill stockpile

A judgemental sampling strategy was undertaken at the fill stockpile 200m south of the building. One discrete sample (PC7) was collected from centre of the fill stockpile at a depth of 0 to 100mm. The samples were collected on 2 May 2012.

6.1.2 Sampling density

The sampling density over the surrounds of the building can detect a potential hot spot with a diameter of 10.8m at a 95% level of confidence.

The sampling density over the unit sites can detect a potential hot spot with a diameter of 27m at a 95% level of confidence.

The number of sampling locations is less than the recommended density in the OEH sampling guidelines. However uniform management practices have been undertaken over the site and the soil sampling and laboratory analysis is considered indicative of the primary investigation site as a whole.

6.1.4 Sampling depths

Heavy metals are generally immobile in the soil, and unlikely to be leached from the topsoil. Any heavy metals present are expected to be contained in the 0-100mm soil layer which was the target sampling depth as soil disturbance has not occurred. Any other contaminants are expected to have been deposited to the surface of the soil which should contain the greatest level of any contaminant.

The sampling locations are described in Figure 3.

Schedule of samples collected for laboratory analysis is outlined in Table 1.

Table 1. Schedule of samples and analyses

Sample ID	Sample location (Figure 3)	Depth (mm)	Sample type	Analysis undertaken
PC1	Unit site (south of existing building)	100	Composite	As, Cd, Cr, Cu, Pb, Ni, Zn
PC2	Unit site (east of existing building)	100	Composite	As, Cd, Cr, Cu, Pb, Ni, Zn
PC3	Unit site (west of existing building)	100	Composite	As, Cd, Cr, Cu, Pb, Ni, Zn
PC4	Existing building surrounds	100	Composite	TPH, BTEXN, As, Cd, Cr, Cu, Pb, Ni, Zn
PC5	Existing building surrounds	100	Composite	TPH, BTEXN, As, Cd, Cr, Cu, Pb, Ni, Zn
PC6	Dam	100	Discrete	As, Cd, Cr, Cu, Pb, Ni, Zn
PC7	Fill stockpile	100	Discrete	As, Cd, Cr, Cu, Pb, Ni, Zn

6.2 Analytes

Samples collected from around the building were analysed for TPH (C6-C36), arsenic, cadmium, chromium, copper, lead, nickel, zinc and BTEXN. Samples collected from the unit site areas, dam and fill were analysed for metals.

6.3 Sampling methods

Soil samples were collected from the auger tip using a spade. The soil was transferred to a solvent rinsed glass jar with a teflon lid quickly to minimise volatile vapour loss.

Tools were decontaminated between sampling locations to prevent cross contamination by: brushing to remove caked or encrusted material, washing in detergent and tap water, rinsing in deionised water rinsing with clean tap water and allowing to air dry or using a clean towel.

All sample containers were placed immediately into a cooler containing ice. A chain of custody form accompanied the transport of samples.

7. Quality assurance and quality control

7.1 Sampling design

The sampling program is intended to provide data as to the presence and levels of contaminants.

A systematic and judgemental sampling strategy was undertaken over the investigation area.

A total of five composite samples and two discrete samples were analysed. This sampling density will enable the detection of an area with an elevated concentration on a radius of 10.8m to 27m with a 95% confidence level.

The number and location of samples taken is expected to provide an adequate assurance that the soil samples are representative of the site as a whole.

7.2 Field

The collection of samples was undertaken in accordance with accepted standard protocols (NEPC 1999). Samples collected were analysed for TPH (C10-C36), arsenic, cadmium, chromium, copper, lead, nickel, zinc and OCP.

Sampling equipment was decontaminated between each sampling event. The appropriate storage conditions and duration were observed between sampling and analysis. A chain of custody form accompanied the samples to the laboratory (Appendix 4).

A single sampler was used to collect the samples using standard methods. Soil collected was a fresh sample from a hand shovel. After collection the samples were immediately placed in new glass sampling jars and placed in a cooler. A field sampling log is presented in Appendix 4.

One field duplicate laboratory sample was collected. The duplicate was from the same sampling location and analysed for the same analytes. Additional details on field sampling procedures are presented in Appendix 1.

7.3 Laboratory

Chemical analysis was conducted by ALS Laboratories, Smithfield, which is NATA accredited for the tests undertaken. The laboratories have quality assurance and quality control programs in place, which include internal replication and analysis of spike samples and recoveries.

Method blanks, matrix duplicates and laboratory control samples were within acceptance criteria. The quality assurance and quality control report is presented together with the laboratory report as Appendix 4.

7.4 Data evaluation

The laboratory quality control report indicates the data variability is within acceptable industry limits. The data is considered representative and usable for the purposes of the investigation. Data quality indicators are presented in Appendix 1.

8. Assessment criteria

The proposed land-use is residential. The appropriate assessment criteria is health investigation level A (HILA - residential land-use with access to soil). The health-based investigation levels of contaminants in the soil for HILA for the substances for which criteria are available, are listed in Table 2, as recommended in the NEPC (1999) and by the DEC (2006).

The laboratory results for soil sampling were also assessed against sensitive land-use thresholds (Table 2). No residential thresholds are available for hydrocarbons. The sensitive land-use guidelines for hydrocarbons (EPA 1994) are considered appropriate for this assessment as they are recommended for residential land-use.

The residential land-use and sensitive land-use guidelines are thresholds for protection of the environment and will also provide protection for human health.

Table 2. Assessment criteria for soil samples (mg/kg)

Analyte	Sensitive land-use (EPA 1994)		HILA Residential land-use (DEC 2006)	
	Discrete	Composite	Discrete	Composite
Arsenic		-	100	25
Cadmium		-	20	5
Chromium		-	120,000	30,000
Copper		-	1,000	250
Lead		-	300	75
Nickel		-	600	150
Zinc		-	7,000	1,750
TPH (C6-C9)	65	-	-	-
TPH (C10-C36)	1,000	25	-	-
TPH (C6-C36)	-	-	-	-
Benzene	1	-	-	-
Toluene	1.4 ^a /130 ^b	-	-	-
Ethylbenzene	3.1 ^a /50 ^b	-	-	-
Xylene	14 ^a /25 ^b	-	-	-
Naphthalene	20	5	-	-

^aprotection of the environment, ^bprotection of human health

9. Results and discussion

9.1 Surface description

9.1.1 Primary investigation area

The site contains open woodlands of bumble box with. Patches of mulga are sparsely located within bare areas of soil and gravel across gentle slopes of less than 1%. Surface runoff flows across the bare areas. The vegetation was not stunted and contained no discolouration. Two small trees had died in the former goat pens due to livestock disturbance (ringbarking).

The surface area surrounding the existing building was silty sand topsoil typical of the site with areas of garden beds. No soil staining or evidence of contamination was observed around the building.

The site contained a dam 100m north of the existing building. The dam was dry on the day of assessment. No odour or staining was observed in the base of the dam. Several diversion banks were observed directing surface flow toward the dam.

A small stockpile of soil, manure and woodchip stockpiles was observed approximately 200m south of the existing building.

Disused livestock holding pens were located 60m west of the existing building. The surface of the livestock pens contained manure and woodchips to a depth of 100mm with natural silty sand topsoil below.

No evidence of mining disturbance was observed in the primary investigation area.

9.1.2 Secondary investigation area

The vegetation in the secondary investigation area was open woodland bumble box with mulga. Bare areas due to surface gravel and sheet erosion inhibiting plant growth were observed on the surface.

Several waste stockpiles were located in the secondary investigation area. The stockpiles material was typically incinerated and included car bodies, metal scrap, residual building waste, bitumen and wire. A former quarry was also identified in the area which also contained small fill stockpiles.

9.2 Soil profile

Natural soils on the site consist of yellowish red to red silty sand topsoil over yellow brown to yellow sandy gravel, clayey sand and gravelly clay subsoil to the drilling depth of 4m. The soil was moist to dry with stiff to hard consistency.

No odour, staining was identified in any borehole.

Bore logs of borehole 1 to 3 (typical profile) and soil descriptions are presented in Appendix 3.

9.3 Soil analysis

The levels of all analytes evaluated from the primary investigation area were either not detected or below the residential and sensitive land-use thresholds in all samples collected (Tables 3 and 4).

The soil from the secondary investigation area was typical of the site on a whole and is expected to be similar to the primary site analyte levels.

Table 3. Soil sampling results for hydrocarbons, (mg/kg)

Sample ID	Location	Sample type	Hydrocarbons (mg/kg)							
			TPH C6-C9	TPH C10-C36	TPH C6-C36	Benzene	Toluene	Ethyl-benzene	Xylenes	Naphthalene
PC1	Unit site (south of existing building)	Composite	ND	ND	ND	ND	ND	ND	ND	ND
PC2	Unit site (east of existing building)	Composite	-	ND	ND	-	-	-	-	-
PC3	Unit site (west of existing building)	Composite	ND	ND	ND	ND	ND	ND	ND	ND
PC4	Existing building surrounds	Composite	-	ND	ND	-	-	-	-	-
PC5	Existing building surrounds	Composite	ND	ND	ND	ND	ND	ND	ND	ND
PC6	Dam	Discrete	-	ND	ND	-	-	-	-	-
PC7	Fill stockpile	Discrete	-	ND	ND	-	-	-	-	-
Sensitive land-use threshold (EPA 1994) Discrete sample			65	1000	-	1	1.4 ^a / 130 ^b	3.1 ^a / 50 ^b	14 ^a / 25 ^b	20
Sensitive land-use threshold (EPA 1994) Composite sample			-	250	-	-	-	-	-	5

ND- not detected

Table 4. Soil sampling results for heavy metals (mg/kg)

Sample ID	Location	Sample type	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
PC1	Unit site (south of existing building)	Composite	ND	ND	24	25	12	14	32
PC2	Unit site (east of existing building)	Composite	ND	ND	25	18	10	14	29
PC3	Unit site (west of existing building)	Composite	ND	ND	25	39	24	12	33
PC4	Existing building surrounds	Composite	ND	ND	26	38	17	14	56
PC5	Existing building surrounds	Composite	ND	ND	27	27	10	13	32
PC6	Dam	Discrete	ND	ND	31	74	25	19	67
PC7	Fill stockpile	Discrete	ND	ND	18	26	10	8	64
Residential land-use threshold (DEC 2006) – Discrete samples			100	20	120,000	1,000	300	600	7,000
Residential land-use threshold (DEC 2006) – Composite samples			25	5	30,000	250	75	150	1,750

ND- not detected

10. Site characterisation

10.1 Environmental contamination

No soil contamination was identified.

10.2 Chemical degradation production

Not applicable as no contamination was identified.

10.3 Exposed population

Not applicable as no contamination was identified.

11. Conclusions and recommendations

11.1 Summary and conclusion

Site inspections were undertaken on 2 and 3 May 2012. Lot 991 has a total area of 28.5 hectares. The investigation area was separated into two main areas. The primary investigation area was the 5 hectare area surrounding the existing building, including a dam located 100m north of the building and the potential locations of the accommodation units. The primary investigation area has an area of approximately 5 hectares. The secondary investigation area was the remainder of the site (23.5 hectares)

The site is the Former Western Plains Meats abattoir which contains a disused abattoir and meat processing building with amenities including toilets, showers, kitchen and washing areas. The site operated as a pet meat abattoir from 2001 to 2011. Prior land-use is unknown but expected to be agricultural.

The redevelopment will be undertaken of the existing building into a kitchen and recreation area for occupants of the accommodation units at the mining village.

A desktop study was undertaken to obtain information of historical land uses. A visual inspection, soil sampling and laboratory analysis program was undertaken for the preliminary investigation.

Boreholes were constructed up to a depth of 4m over the primary investigation area and the profile described. Soil samples were collected from the 0-100mm depth for analysis of BTEXN (benzene, toluene, ethyl benzene, xylene, naphthalene, TPH (C6-C36), arsenic, cadmium, chromium, copper, lead, nickel and zinc.

Four areas of potential contamination were detected in the primary investigation area:

- The area surrounding the existing building
- The possible locations of the accommodation units
- The dam located 100m of the existing building
- A small fill stockpile located 200m south of the building

The remainder of the site (secondary investigation area) was assessed by a walkover and visual inspection. No soil samples were collected for analysis from the secondary investigation area.

No evidence of contamination was identified in the soil from the boreholes. The soil sampling program did not detect elevated levels of the analysed contaminants. The levels of all analytes evaluated were either not detected or below the residential and sensitive land-use thresholds. In conclusion, no contamination was identified in the primary investigation area.

Several waste stockpiles were located in the secondary investigation area. The stockpiles included car bodies, metal scrap, residual building waste, bitumen and wire which is general solid waste. A former quarry was also identified in the area which also contained small fill stockpiles.

11.2 Assumptions in reaching the conclusions

It is assumed the sampling sites are representative of the site. An accurate history has been obtained.

11.3 Extent of uncertainties

The analytical data relate only to the locations sampled. Soil conditions can vary both laterally and vertically and it cannot be excluded that unidentified contaminants may be present. The sampling density surrounding the administration building was designed to detect a 'hot spot' in the field area within a radius of approximately 10.8 to 27 metres and with a 95% level of confidence.

11.4 Suitability for proposed use of the site

The site is suitable for residential activities.

11.5 Limitations and constraints on the use of the site

No constraints are recommended.

11.6 Recommendations

No further investigation is necessary and the investigation area is suitable for residential activities.

The waste stockpiles on the site require disposal to a landfill licenced to accept general solid waste.

12. Report limitations and intellectual property

This report has been prepared for the use of the client to achieve the objectives given the clients requirements. The level of confidence of the conclusion reached is governed by the scope of the investigation and the availability and quality of existing data. Where limitations or uncertainties are known, they are identified in the report. No liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been predicted using the scope of the investigation and the information obtained.

The investigation identifies the actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing is interpreted by geologists, engineers or scientists who then render an opinion about overall subsurface conditions, the nature and extent of the contamination, it's likely impact on the proposed development and appropriate remediation measures. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock or time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. It is thus important to understand the limitations of the investigation and recognise that we are not responsible for these limitations.

This report, including data contained and its findings and conclusions, remains the intellectual property of Envirowest Consulting Pty Ltd. A licence to use the report for the specific purpose identified is granted for the persons identified in that section after full payment for the services involved in preparation of the report. This report should not be used by persons or for purposes other than those stated and should not be reproduced without the permission of Envirowest Consulting Pty Ltd.

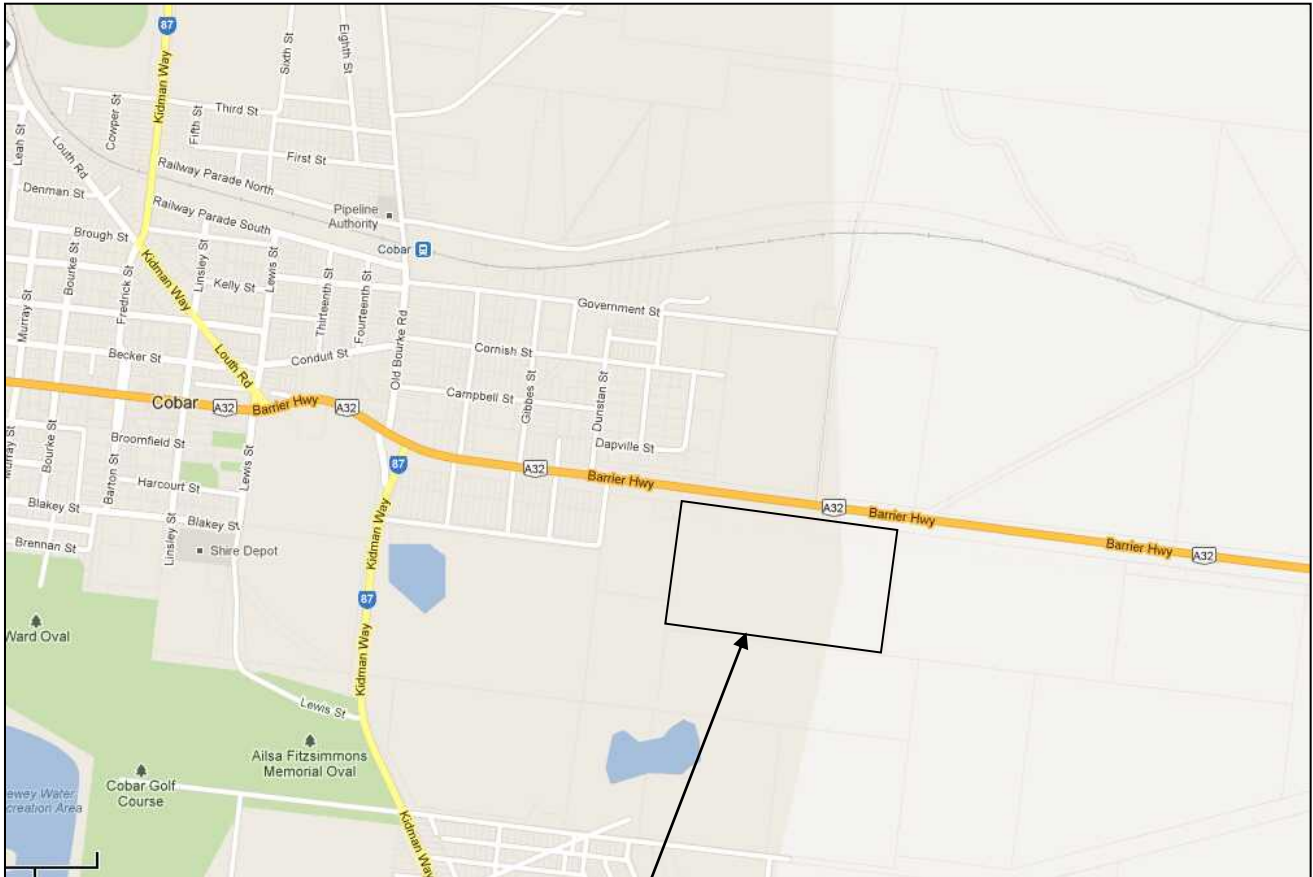
13. References

DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditors Scheme* (NSW Department of Environment and Conservation, Chatswood)


Environment Protection Authority (1995) *Contaminated sites: Sampling Design Guidelines* (NSW Environment Protection Authority, Chatswood)

National Environment Protection Council (1999) *National Environment Protection (Assessment of Site Contamination) Measure 1999* (National Environment Protection Council Service Corporation, Adelaide)

Brunker, R.J (1967) *Cobar 1:250,000 Geological Sheet SH/55-14* (Geological Survey of New South Wales, Sydney)



Site assessed

Figure 1: Locality map	
Lot 991 Barrier Highway, Cobar NSW	
	Envirowest Consulting Pty Ltd
Job: R12139c	Date: 9/05/2012

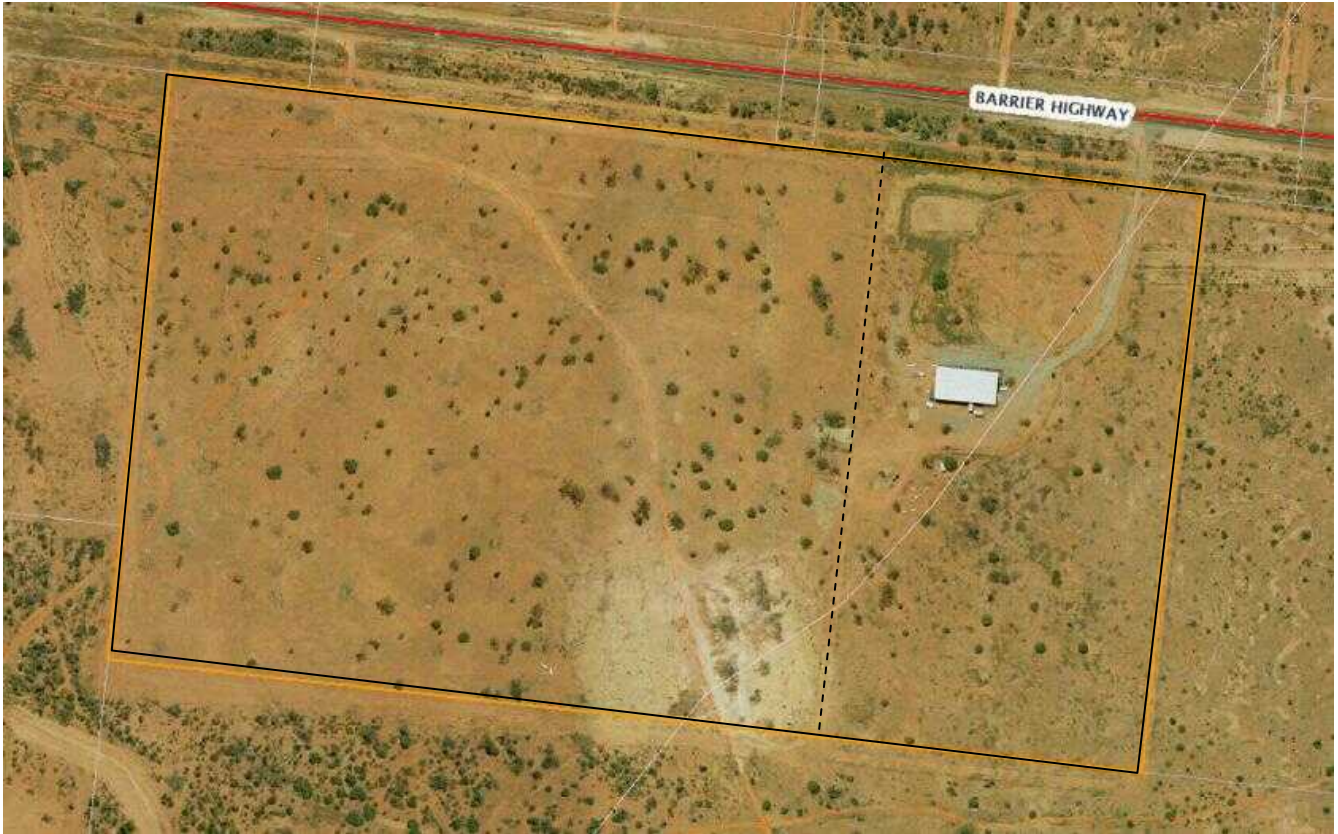


Figure 2: Aerial Photograph

Lot 991 Barrier Highway, Cobar NSW

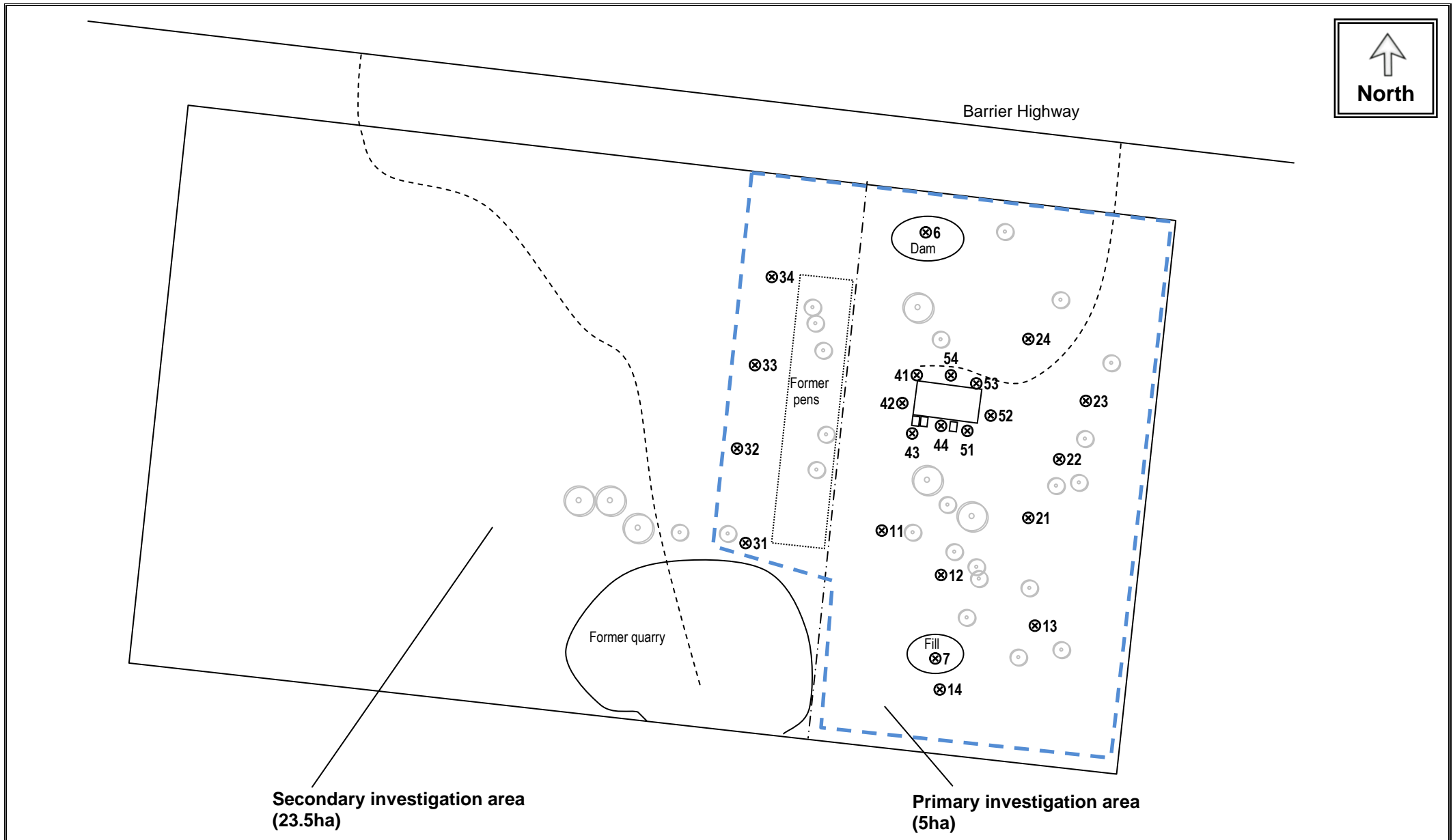


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Job: R12139c

Drawn by: AR

Date: 9/05/2012



Legend

- ⊗ Boreholes / sampling locations
- Tree
- Fence
- Existing building

Figure 3: Plan of site and soil sampling locations

Lot 991 Barrier Highway, Cobar NSW



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Drawn by: AR

Date: 9/05/2012

Figure 4. Photographs of the site



Figure 4.1. Looking south toward the existing building



Figure 4.2. Northern side of the existing building



Figure 4.3. Proposed unit site



Figure 4.4. Fill stockpile 200m south of building



Figure 4.5. Bitumen stockpile



Figure 4.6. Waste material stockpile

Appendix 1. Soil sampling protocol

1. Sampling

The samples will be collected from the auger tip, mattock, hand auger or shovel immediately on withdrawal.

The time between retrieval of the sample and sealing of the sample container was kept to a minimum.

The material was collected using single use disposal gloves or a stainless steel spade which represented material which had not been exposed to the atmosphere prior to sampling.

All sampling jars were filled as close to the top as possible to minimise the available airspace within the jar.

2. Handling, containment and transport

Daily sampling activities will be recorded including sampling locations, numbers, observations, measurements, sampler, date and time and weather condition.

The sampling jars will be new sterile glass jars fitted with plastic lid and airtight Teflon seals, supplied by the laboratories for the purpose of collecting soil samples for analysis. Sample containers will be marked indelibly with the sample ID code to waterproof labels affixed to the body of the container.

All samples will be removed from direct sunlight as soon as possible after sampling and placed in insulated containers. Samples were stored in a refrigerator at 4°C prior to transportation to the laboratory in insulated containers with ice bricks in accordance with AS4482.1.

Handling and transportation to the laboratory will be accompanied with a chain of custody form to demonstrate the specimens are properly received, documents, processed and stored.

Maximum holding time for extraction (AS4482.1) are:

Analyte	Maximum holding time
Metals	6 months
Mercury	28 days
Sulfate	7 days
Organic carbon	7 days
OCP, OPP, PCB	14 days
TPH, BTEX, PAH, phenols	14 days

3. Decontamination of sampling equipment

Sampling tools will be decontaminated between sampling locations by

- Removing soil adhering to the sampling equipment by scraping, brushing or wiping
- Washing with a phosphate-free detergent
- Rinsing thoroughly with clean water
- Repeating if necessary
- Dry equipment with disposable towels or air

Appendix 2. Sample analysis, quality assurance and quality control (QA/QC) report

1. Data quality indicators (DQI) requirements

1.1 Completeness

A measure of the amount of usable data for a data collection activity. Greater than 95% of the data must be reliable based on the quality objectives. Where greater than two quality objectives have less reliability than the acceptance criterion the data may be considered with uncertainty.

1.1.1 Field

Consideration	Requirement
Locations and depths to be sampled	Described in the sampling plan. The acceptance criterion is 95% data retrieved compared with proposed. Acceptance criterion is 100% in crucial areas.
SOP appropriate and compiled	Described in the sampling plan.
Experienced sampler	Sampler or supervisor
Documentation correct	Sampling log and chain of custody completed

1.1.2 Laboratory

Consideration	Requirement
Samples analysed	Number according to sampling and quality plan
Analytes	Number according to sampling and quality plan
Methods	EPA or other recognised methods with suitable PQL
Sample documentation	Complete including chain of custody and sample description
Sample holding times	Metals 6 months, OCP, PAH, TPH, PCB 14 days

1.2 Comparability

The confidence that data may be considered to be equivalent for each sampling and analytical event. The data must show little or no inconsistencies with results and field observations.

1.2.1 Field

Consideration	Requirement
SOP	Same sampling procedures to be used
Experienced sampler	Sampler or supervisor
Climatic conditions	Described as may influence results
Samples collected	Sample medium, size, preparation, storage, transport

1.2.2 Laboratory

Consideration	Requirement
Analytical methods	Same methods, approved methods
PQL	Same
Same laboratory	Justify if different
Same units	Justify if different

1.3 Representativeness

The confidence (expressed qualitatively) that data are representative of each media present on the site.

1.3.1 Field

Consideration	Requirement
Appropriate media sampled	Sampled according to sampling and quality plan or in accordance with the EPA (1995) sampling guidelines.
All media identified	Sampling media identified in the sampling and quality plan. Where surface water bodies on the site sampled.

1.3.2 Laboratory

Consideration	Requirement
Samples analysed	Blanks and spikes

1.4 Precision

A quantitative measure of the variability (or reproduced of the data). Is measured by standard deviation or relative percent difference (RPD). A RPD analysis is calculated and compared to the practical quantitation limit (PQL) or absolute difference AD.

- Levels greater than 10 times the PQL the RPD is 50%
- Levels between 5 and 10 times the PQL the RPD is 75%
- Levels between 2 and 5 times the PQL the RPD is 100%
- Levels less than 2 times the PQL, the AD is less than 2.5 times the PQL

Data not conforming to the acceptance criterion will be examined for determination of suitability for the purpose of site characterisation.

1.4.1 Field

Consideration	Requirement
Field duplicates	Frequency of 5%, results to be within RPD or discussion required indicate the appropriateness of SOP

1.4.2 Laboratory

Consideration	Requirement
Laboratory and inter lab duplicates	Frequency of 5%, results to be within RPD or discussion required. Inter laboratory duplicates will be one sample per batch.
Field duplicates	Frequency of 5%, results to be within RPD or discussion required
Laboratory prepared volatile trip spikes	One per sampling batch, results to be within RPD or discussion required

1.5 Accuracy

A quantitative measure of the closeness of the reported data to the true value.

1.5.1 Field

Consideration	Requirement
SOP	Complied
Inter laboratory duplicates	Frequency of 5%. Analysis criterion 60% RPD for levels greater than 10 times the PQL 85% RPD for levels between 5 to 10 times the PQL 100% RPD at levels between 2 to 5 times the PQL Absolute difference, 3.5 times the PQL where levels are, 2 times PQL

1.5.2 Laboratory

Recovery data (surrogates, laboratory control samples and matrix spikes) data subject to the following control limits:

- 60 to 140% acceptable data
- 20-60% discussion required, may be considered acceptable
- 10-20% data should be considered as estimates
- 10% data should be rejected

Consideration	Requirement
Field blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Rinsate blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Method blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Matrix spikes	Frequency of 5%, results to be within +/-40% or discussion required
Matrix duplicates	Sample injected with a known concentration of contaminants with tested. Frequency of 5%, results to be within +/-40% or discussion required
Surrogate spikes	QC monitoring spikes to be added to samples at the extraction process in the laboratory where applicable. Surrogates are closely related to the organic target analyte and not normally found in the natural environment. Frequency of 5%, results to be within +/-40% or discussion required
Laboratory control samples	Externally prepared reference material containing representative analytes under investigation. These will be undertaken at one per batch. It s to be within +/-40% or discussion required
Laboratory prepared spikes	Frequency of 5%, results to be within +/-40% or discussion required

2. Laboratory analysis summary

One analysis batch were undertaken over the investigation program. The analysis batch was sampled on 3 May 2012. A total of 8 (including 1 field duplicate) soil samples were submitted for analytical testing.

The samples were analysed at the laboratories of ALS, Smithfield, NSW which is National Association of Testing Authorities (NATA) accredited for the tests undertaken. The analyses undertaken, number of samples tested and methods are presented in the following tables:

Laboratory analysis schedule

Sample id. (sampling location)	Number of samples	Analyses	Date collected	Substrate	Lab report
PC1, PC2, PC3, PC6, PC7, PCA	6	As, Cd, Cr, Cu, Pb, Ni, Zn,	2/4/2012	Soil	ES1210772
PC4, PC5	2	TPH, BTEXN, As, Cd, Cr, Cu, Pb, Ni, Zn,	2/4/2012	Soil	ES1210772

Analytical methods

Analyte	Extraction	Laboratory methods
Metals	USEPA 200.2 Mod	APHA USEPA SW846-6010
Mercury	USEPA 200.2 Mod	APHA 3112
TPH(C6-C9)	USPEA SW846-5030A	USPEA SW 846-8260B
TPH(C10-C36)	Tumbler extraction of solids	USEPA SW 846-8270B
PCB	Tumbler extraction of solids	USEPA SW 846-8270B
OC Pesticides	Tumbler extraction of solids	USEPA SW 846-8270B
BTEX	Tumbler extraction of solids	USEPA SW 846-8260B

3. Field quality assurance and quality control

One field duplicate soil sample was collected for the analysis batch. The frequency was greater than the recommended frequency of 5%. The following table outlines the sample collected and differences in replicate analyses and acceptance limits for replicate analyses.

Field duplicate frequency

Sample id.	Number of Duplicate samples	Frequency (%)	Date collected	Substrate	Laboratory report
PC1 to PC7, PCA	8	1	12.5	2/4/2012	Soil ES1210772

Relative percent differences between field duplicates

Laboratory report	Duplicate sample comparison	Analyte	Difference in replicate analyses (%)	Acceptance limits (%)
ES1210772	PC1 and PCA	Arsenic	0	40 or <5 times the PQL
		Cadmium	0	40 or <5 times the PQL
		Chromium	6	40 or <5 times the PQL
		Copper	5	40 or <5 times the PQL
		Nickel	8	40 or <5 times the PQL
		Lead	0	40 or <5 times the PQL
		Zinc	0	40 or <5 times the PQL
		BTEXN	0	40 or <5 times the PQL
		TPH(C10-C36)	0	40 or <5 times the PQL

4. Laboratory quality assurance and quality control

Sample holding times are recommended in NEPM (1999). The time between collection and extraction for all samples was less than the criteria listed below:

Analyte	Maximum holding time
Metals, cyanide, nitrogen, phosphorus	6 months
pH, EC	7 days
OCP, OPP, TPH, PCB, BTEX, PAH	14 days

The laboratory interpretative reports are presented with individual laboratory report. Assessment is made of holding time, frequency of control samples and quality control samples. No significant outliers or non-conformities were identified. The laboratory report also contains a detailed description of preparation methods and analytical methods. Some laboratory matrix spikes recoveries were outside acceptable limits due to poor matrix effects.

The results, quality report, interpretative report and chain of custody are presented in the attached appendix. The quality report contains the laboratory duplicates, spikes, laboratory control samples, blanks and where appropriate matrix spike recovery (surrogate).

5. Data quality indicators (DQI)

5.1 Completeness

A measure of the amount of usable data for a data collection activity (total to be greater than 95%).

The data set was found to be complete based on the scope of work. No critical areas of contamination were omitted from the data set.

5.1.1 Field

Consideration	Accepted	Comment
Locations to be sampled	Yes	In accordance with sampling methodology, described in the report.
Depth to be sampled	Yes	In accordance with sampling methodology
SOP appropriate and compiled	Yes	In accordance with sampling methodology
Experienced sampler	Yes	Environmental scientist
Documentation correct	Yes	Sampling log completed Chain of custody completed

5.1.2 Laboratory

Consideration	Accepted	Comment
Samples analysed	Yes	In accordance with chain of custody and analysis plan
Analytes	Yes	In accordance with chain of custody and analysis plan
Methods	Yes	Analysed in NATA accredited laboratory with recognised methods and suitable PQL
Sample documentation	Yes	Completed including chain of custody and sample results and quality results
Sample holding times	Yes	Metals < 6 months PAH, TPH < 14 days

5.2 Comparability

The confidence that data may be considered to be equivalent for each sampling and analytical event.

The data sets were found to be acceptable.

5.2.1 Field

Consideration	Accepted	Comment
SOP	Yes	Same sampling procedures used and sampled on one date
Experienced sampler	Yes	Experienced environmental scientist
Climatic conditions	Yes	Sampling log
Samples collected	Yes	Suitable size and storage

5.2.2 Laboratory

Consideration	Accepted	Comment
Analytical methods	Yes	Same methods all samples
PQL	Yes	Suitable for analytes
Same laboratory	Yes	ALS Environmental is NATA accredited for the test
Same units	Yes	-

5.3 Representativeness

The confidence (expressed qualitatively) that data are representative of each media present on the site.

The data sets were found to be acceptable.

5.3.1 Field

Consideration	Accepted	Comment
Appropriate media sampled	Yes	Sampled according to sampling and quality plan
All media identified	Yes	Soil sampling media identified in the sampling and quality plan

5.3.2 Laboratory

Consideration	Accepted	Comment
Samples analysed	Yes	Undertaken in NATA accredited laboratory.

5.4 Precision

A quantitative measure of the variability (or reproduced of the data)

The data sets were found to be acceptable.

5.4.1 Field

Consideration	Accepted	Comment
SOP	Yes	Complied
Field duplicates	Yes	Greater than 5% frequency

5.4.2 Laboratory

Consideration	Accepted	Comment
Laboratory duplicates	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Field duplicates (intra and inter laboratory)	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Laboratory prepared volatile trip spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required

5.5 Accuracy

A quantitative measure of the closeness of the reported data to the true value

The data sets were found to be acceptable.

5.5.1 Field

Consideration	Accepted	Comment
SOP	Yes	Complied
Field blanks	Yes	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Rinsate blanks	Yes	Frequency of 5%, <5 times the PQL, PQL may be adjusted

5.5.2 Laboratory

Consideration	Accepted	Comment
Method blanks	Yes	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Matrix spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Matrix duplicates	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Surrogate spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Laboratory control samples	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Laboratory prepared spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required Results outside limits due to laboratory instrumentation

6. Conclusion

All media appropriate to the objectives of this investigation have been adequately analysed and no area of significant uncertainty exist.

It is concluded the data is usable for the purposes of the investigation.

Appendix 3. Borelogs

Job: 12139 Client: Geolyse Site: Pybar Mining Accommodation Cobar		Borehole No: 11 Location: 55J E391726 N6514024 255m		Sampling method: EVH Auger Drill Logged by: AR Date: 02/05/2012					
Depth (m)	Graphic log strata	DESCRIPTION. Soil type/rock, grain size, structure, colour, minor components	Unified symbol	Samples	Moisture	Consistency	Density	Plasticity	Rock description
0.5		SILTY SAND with gravel, red	SM		M	F	M	L	-
		GRAVELLY SAND, pale red	SP		D	VSt	M	L	-
1.0		CLAYEY SAND, yellow	SC		D	VSt	M	VL	-
		Brownish yellow		D					
1.5		Coarse gravel identified at 1.2 - 1.5m				H	M	VL	VH
2.0		End of hole, refusal on hard rock							
2.5									
3.0									
3.5									
4.0									
Soil classification: Slope/nature of surface: Nil Ground water: No free water identified in the soil profile Soil salinity: Nil			Remarks (fill, odour, root holes): Nil						

Samples	Moisture	Consistency	Density	Plasticity	Rock strength
<i>U</i> - undisturbed <i>D</i> - disturbed <i>W</i> - water sample <i>B</i> - bulk <i>E</i> - environmental sample	<i>D</i> - Dry <i>M</i> - Moist, can be moulded <i>W</i> - Wet, free water on hands <i>Wp</i> - plastic limit <i>Wl</i> - liquid limit	<u>Shear strength (kPa)</u> <i>VS</i> - very soft, (<25) <i>S</i> - soft (<25-50) <i>F</i> - firm (<50-100) <i>St</i> - stiff (<100-150) <i>VSt</i> - very stiff (<200-300) <i>H</i> - hard (>300)	<i>VL</i> - very loose <i>L</i> - loose <i>M</i> - medium <i>D</i> - dense <i>VD</i> - very dense	<i>NP</i> - non plastic <i>T</i> - trace <i>VL</i> - very low <i>L</i> - low <i>M</i> - medium <i>H</i> - high <i>VH</i> - very high	<u>Point load (mPa)</u> <i>EL</i> - extremely low (<0.03) <i>VL</i> - very low (<0.1) <i>L</i> - low (<0.3) <i>M</i> - medium (<1.0) <i>H</i> - high (<3.0) <i>VH</i> - very high (<10) <i>EH</i> - extremely high (>10)

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Job: 12139 Client: Geolyse Site: Pybar Mining Accommodation Cobar		Borehole No: 12 Location: 55J E3917285 N6513981 255m		Sampling method: EVH Auger Drill Logged by: AR Date: 02/05/2012							
Depth (m)	Graphic log strata	DESCRIPTION. Soil type/rock, grain size, structure, colour, minor components			Unified symbol	Samples	Moisture	Consistency	Density	Plasticity	Rock description
		SILTY SAND with gravel, red GRAVELLY SAND, pale red			SM SP		M D	F VSt	M M	L L	- -
0.5		CLAYEY SAND, yellow			SC		D	VSt	M	VL	-
1.0		Brownish yellow				D					
1.5		Distinctly weathered rock identified at 1.3 - 1.5m						H	M	VL	DW VH
2.0		End of hole, refusal on hard rock									
2.5											
3.0											
3.5											
4.0											
Soil classification: Slope/nature of surface: Nil Ground water: No free water identified in the soil profile Soil salinity: Nil					Remarks (fill, odour, root holes): Nil						

Samples	Moisture	Consistency	Density	Plasticity	Rock strength
<i>U</i> - undisturbed <i>D</i> - disturbed <i>W</i> - water sample <i>B</i> - bulk <i>E</i> - environmental sample	<i>D</i> - Dry <i>M</i> - Moist, can be moulded <i>W</i> - Wet, free water on hands <i>Wp</i> - plastic limit <i>Wl</i> - liquid limit	<u>Shear strength (kPa)</u> <i>VS</i> - very soft (<25) <i>S</i> - soft (<25-50) <i>F</i> - firm (<50-100) <i>St</i> - stiff (<100-150) <i>VSt</i> - very stiff (<200-300) <i>H</i> - hard (>300)	<i>VL</i> - very loose <i>L</i> - loose <i>M</i> - medium <i>D</i> - dense <i>VD</i> - very dense	<i>NP</i> - non plastic <i>T</i> - trace <i>VL</i> - very low <i>L</i> - low <i>M</i> - medium <i>H</i> - high <i>VH</i> - very high	<u>Point load (mPa)</u> <i>EL</i> - extremely low (<0.03) <i>VL</i> - very low (<0.1) <i>L</i> - low (<0.3) <i>M</i> - medium (<1.0) <i>H</i> - high (<3.0) <i>VH</i> - very high (<10) <i>EH</i> - extremely high (>10)

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Job: 12139 Client: Geolyse Site: Pybar Mining Accommodation Cobar		Borehole No: 13 Location: 55J E391848 N6513946 257m		Sampling method: EVH Auger Drill Logged by: AR Date: 02/05/2012						
Depth (m)	Graphic log strata	DESCRIPTION. Soil type/rock, grain size, structure, colour, minor components		Unified symbol	Samples	Moisture	Consistency	Density	Plasticity	Rock description
0.5		SILTY SAND with gravel, red GRAVELLY SAND, pale red yellowish red		SM		M	T	M	L	-
		CLAYEY SAND, yellow White yellow with coarse gravel		SC		D	VSt	M	VL	-
1.5		End of hole, refusal on hard rock					H	M	VL	VH
2.0										
2.5										
3.0										
3.5										
4.0										
Soil classification: Slope/nature of surface: Nil Ground water: No free water identified in the soil profile Soil salinity: Nil				Remarks (fill, odour, root holes): Nil						

Samples U - undisturbed D - disturbed W - water sample B - bulk E - environmental sample	Moisture D - Dry M - Moist, can be moulded W - Wet, free water on hands Wp - plastic limit Wl - liquid limit	Consistency <u>Shear strength (kPa)</u> VS - very soft, (<25) S - soft (<25-50) F - firm (<50-100) St - stiff (<100-150) VSt - very stiff (<200-300) H - hard (>300)	Density VL - very loose L - loose M - medium D - dense VD - very dense	Plasticity NP - non plastic T - trace VL - very low L - low M - medium H - high VH - very high	Rock strength <u>Point load (mPa)</u> EL - extremely low (<0.03) VL - very low (<0.1) L - low (<0.3) M - medium (<1.0) H - high (<3.0) VH - very high (<10) EH - extremely high (>10)
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Job: 12139 Client: Geolyse Site: Pybar Mining Accommodation Cobar		Borehole No: 14 Location: 55J E391801 N6513881 257m		Sampling method: EVH Auger Drill Logged by: AR Date: 02/05/2012							
Depth (m)	Graphic log strata	DESCRIPTION. Soil type/rock, grain size, structure, colour, minor components			Unified symbol	Samples	Moisture	Consistency	Density	Plasticity	Rock description
0.5		SILTY SAND with gravel, red GRAVELLY SAND, pale red yellowish red			SM		M	T	M	L	-
		CLAYEY SAND, yellow			SC		D	VSt	M	VL	-
1.0		White yellow with medium gravel						VSt	M	VL	H
		GRAVELLY SAND, yellow			SP		D	VSt	M	VL	H XW
2.0		Extremely weathered rock									
		Brownish yellow						H			VH
3.0		Distinctly weathered rock						H			DW EH
		End of hole, refusal on hard rock									
Soil classification: Slope/nature of surface: Nil Ground water: No free water identified in the soil profile Soil salinity: Nil				Remarks (fill, odour, root holes): Nil							

Samples U - undisturbed D - disturbed W - water sample B - bulk E - environmental sample	Moisture D - Dry M - Moist, can be moulded W - Wet, free water on hands Wp - plastic limit Wl - liquid limit	Consistency <u>Shear strength (kPa)</u> VS - very soft, (<25) S - soft (<25-50) F - firm (<50-100) St - stiff (<100-150) VSt - very stiff (<200-300) H - hard (>300)	Density VL - very loose L - loose M - medium D - dense VD - very dense	Plasticity NP - non plastic T - trace VL - very low L - low M - medium H - high VH - very high	Rock strength <u>Point load (mPa)</u> EL - extremely low (<0.03) VL - very low (<0.1) L - low (<0.3) M - medium (<1.0) H - high (<3.0) VH - very high (<10) EH - extremely high (>10)
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Job: 12139 Client: Geolyse Site: Pybar Mining Accommodation Cobar		Borehole No: 42 Location: 55J E391652 N6514040 255m		Sampling method: EVH Auger Drill Logged by: AR Date: 02/05/2012													
Depth (m)	Graphic log strata	DESCRIPTION. Soil type/rock, grain size, structure, colour, minor components		Unified symbol	Samples	Moisture	Consistency	Density	Plasticity	Rock description							
		SANDY GRAVEL, rock on surface									GP		D	St	M	VL	H
		GRAVELLY SAND, yellow Extremely weathered rock Coarse gravel identified									SP		D	VSt	M	VL	H XW
		End of hole, refusal on hard rock															
0.5																	
1.0																	
1.5																	
2.0																	
2.5																	
3.0																	
3.5																	
4.0																	
Soil classification: Slope/nature of surface: Nil Ground water: No free water identified in the soil profile Soil salinity: Nil				Remarks (fill, odour, root holes): Nil													

Samples U - undisturbed D - disturbed W - water sample B - bulk E - environmental sample	Moisture D - Dry M - Moist, can be moulded W - Wet, free water on hands Wp - plastic limit Wl - liquid limit	Consistency <u>Shear strength (kPa)</u> VS - very soft, (<25) S - soft (<25-50) F - firm (<50-100) St - stiff (<100-150) VSt - very stiff (<200-300) H - hard (>300)	Density VL - very loose L - loose M - medium D - dense VD - very dense	Plasticity NP - non plastic T - trace VL - very low L - low M - medium H - high VH - very high	Rock strength <u>Point load (mPa)</u> EL - extremely low (<0.03) VL - very low (<0.1) L - low (<0.3) M - medium (<1.0) H - high (<3.0) VH - very high (<10) EH - extremely high (>10)
--	--	--	--	--	--

Envirowest Consulting Pty Ltd, 24 William St Orange, NSW

Appendix 4. Soil analysis results – ALS report number ES1210772 and chain of custody form.

CERTIFICATE OF ANALYSIS

Work Order	: ES1210772	Page	: 1 of 5
Client	: ENVIROWEST CONSULTING	Laboratory	: Environmental Division Sydney
Contact	: THE RESULTS ADDRESS	Contact	: Client Services
Address	: PO BOX 9158 ORANGE NSW, AUSTRALIA 2800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ec@envirowest.net.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 63614954	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 63603960	Facsimile	: +61-2-8784 8500
Project	: 12139	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 12139	Date Samples Received	: 03-MAY-2012
C-O-C number	: 12139	Issue Date	: 09-MAY-2012
Sampler	: AR	No. of samples received	: 8
Site	: 12139	No. of samples analysed	: 8
Quote number	: SY/400/11		

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Evie.Sidarta	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics



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

- **EG-005T:LCS recovery for Copper and Zinc falls outside ALS Dynamic Control Limit. However, it is within the acceptance criteria based on ALS DQO. No further action is required.**



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	PC1	PC2	PC3	PC4	PC5
				02-MAY-2012 15:00	02-MAY-2012 15:00	02-MAY-2012 15:00	02-MAY-2012 15:00	02-MAY-2012 15:00
				ES1210772-001	ES1210772-002	ES1210772-003	ES1210772-004	ES1210772-005
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	6.3	8.0	8.5	10.6	14.0
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	24	25	25	26	27
Copper	7440-50-8	5	mg/kg	25	18	39	38	27
Lead	7439-92-1	5	mg/kg	12	10	24	17	10
Nickel	7440-02-0	2	mg/kg	14	14	12	14	13
Zinc	7440-66-6	5	mg/kg	32	29	33	56	32
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	----	----	<10	<10
C10 - C14 Fraction	----	50	mg/kg	----	----	----	<50	<50
C15 - C28 Fraction	----	100	mg/kg	----	----	----	<100	<100
C29 - C36 Fraction	----	100	mg/kg	----	----	----	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	10	mg/kg	----	----	----	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	----	10	mg/kg	----	----	----	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	<50	<50
EP080: BTEX								
Benzene	71-43-2	0.2	mg/kg	----	----	----	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	----	----	----	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	<0.5	<0.5
EP080: BTEXN								
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	----	----	----	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	----	----	----	<1	<1
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	----	----	----	96.4	94.9
Toluene-D8	2037-26-5	0.1	%	----	----	----	102	103
4-Bromofluorobenzene	460-00-4	0.1	%	----	----	----	89.7	90.3



Analytical Results

Sub-Matrix: SOIL

Client sample ID
 Client sampling date / time

				PC6	PC7	PCA	----	----
				02-MAY-2012 15:00	02-MAY-2012 15:00	02-MAY-2012 15:00	----	----
Compound	CAS Number	LOR	Unit	ES1210772-006	ES1210772-007	ES1210772-008	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	23.7	18.4	6.2	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg	31	18	24	----	----
Copper	7440-50-8	5	mg/kg	74	26	26	----	----
Lead	7439-92-1	5	mg/kg	25	10	14	----	----
Nickel	7440-02-0	2	mg/kg	19	8	15	----	----
Zinc	7440-66-6	5	mg/kg	67	64	32	----	----



Surrogate Control Limits

Sub-Matrix: SOIL		<i>Recovery Limits (%)</i>	
<i>Compound</i>	<i>CAS Number</i>	<i>Low</i>	<i>High</i>
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

QUALITY CONTROL REPORT

Work Order	: ES1210772	Page	: 1 of 6
Client	: ENVIROWEST CONSULTING	Laboratory	: Environmental Division Sydney
Contact	: THE RESULTS ADDRESS	Contact	: Client Services
Address	: PO BOX 9158	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
	ORANGE NSW, AUSTRALIA 2800		
E-mail	: ec@envirowest.net.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 63614954	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 63603960	Facsimile	: +61-2-8784 8500
Project	: 12139	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: 12139		
C-O-C number	: 12139	Date Samples Received	: 03-MAY-2012
Sampler	: AR	Issue Date	: 09-MAY-2012
Order number	: 12139		
Quote number	: SY/400/11	No. of samples received	: 8
		No. of samples analysed	: 8

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Evie Sidarta	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics



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: 2290882)									
EN1201651-003	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	18.6	16.1	14.4	0% - 50%
ES1210688-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	63.1	64.2	1.7	0% - 20%
EA055: Moisture Content (QC Lot: 2290883)									
ES1210772-006	PC6	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	23.7	23.6	0.6	0% - 20%
ES1210902-009	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	19.4	19.9	2.5	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 2292064)									
ES1210739-017	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	20	16	21.6	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	12	11	15.6	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	10	10	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	14	14	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	67	60	11.4	0% - 50%
ES1210772-003	PC3	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	25	24	0.0	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	12	12	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	39	38	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	24	24	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	33	34	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2290375)									
ES1210473-008	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES1210951-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2290564)									
ES1210333-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	160	150	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	360	340	5.3	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES1210739-022	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2290375)									
ES1210473-008	Anonymous	EP080: C6 - C10 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES1210951-001	Anonymous	EP080: C6 - C10 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2290564)									
ES1210333-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	380	350	8.6	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: 2290564) - continued									
ES1210333-001	Anonymous	EP071: >C34 - C40 Fraction	----	100	mg/kg	560	610	9.3	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES1210739-022	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 2290375)									
ES1210473-008	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
ES1210951-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<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 Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)
Method: Compound	CAS Number	LOR	Unit				LCS	Low
EG005T: Total Metals by ICP-AES (QCLot: 2292064)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	93.4	70	130
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	88.9	83.3	111
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	90.8	89.2	117
EG005T: Copper	7440-50-8	5	mg/kg	<5	32.0 mg/kg	# 89.8	90.1	114
EG005T: Lead	7439-92-1	5	mg/kg	<5	40.0 mg/kg	86.5	85.2	111
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55.23 mg/kg	93.9	88.3	116
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	# 88.1	88.9	112
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2290375)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	94.2	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2290564)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	104	59	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	119	74	138
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	95.0	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2290375)								
EP080: C6 - C10 Fraction	----	10	mg/kg	<10	31 mg/kg	97.1	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2290564)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	105	59	131
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	111	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
		50	mg/kg	----	150 mg/kg	89.3	63	131
EP080: BTEXN (QCLot: 2290375)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	95.2	62	120
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	95.5	62	128
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	88.2	58	118
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	86.4	60	120
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	86.1	60	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	78.7	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 (%)	Recovery Limits (%)	
					MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2292064)							
ES1210739-017	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	91.4	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	91.2	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	82.6	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	95.1	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	85.1	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	95.3	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	90.1	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2290375)							
ES1210473-008	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	71.0	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2290564)							
ES1210333-001	Anonymous	EP071: C10 - C14 Fraction	----	640 mg/kg	96.6	73	137
		EP071: C15 - C28 Fraction	----	3140 mg/kg	102	53	131
		EP071: C29 - C36 Fraction	----	2860 mg/kg	72.4	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2290375)							
ES1210473-008	Anonymous	EP080: C6 - C10 Fraction	----	37.5 mg/kg	75.4	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2290564)							
ES1210333-001	Anonymous	EP071: >C10 - C16 Fraction	----	850 mg/kg	124	73	137
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	86.0	53	131
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	72.0	52	132
EP080: BTEXN (QCLot: 2290375)							
ES1210473-008	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	73.3	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	77.5	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	73.3	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	75.7	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	71.4	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	74.0	70	130

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1210772	Page	: 1 of 5
Client	: ENVIROWEST CONSULTING	Laboratory	: Environmental Division Sydney
Contact	: THE RESULTS ADDRESS	Contact	: Client Services
Address	: PO BOX 9158 ORANGE NSW, AUSTRALIA 2800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ec@envirowest.net.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 63614954	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 63603960	Facsimile	: +61-2-8784 8500
Project	: 12139	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: 12139	Date Samples Received	: 03-MAY-2012
C-O-C number	: 12139	Issue Date	: 09-MAY-2012
Sampler	: AR	No. of samples received	: 8
Order number	: 12139	No. of samples analysed	: 8
Quote number	: SY/400/11		

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) PC1, PC2, PC3, PC3, PC5, PC6, PC7, PCA	02-MAY-2012	----	----	----	07-MAY-2012	16-MAY-2012	✓	
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T) PC1, PC2, PC3, PC4, PC5, PC6, PC7, PCA	02-MAY-2012	08-MAY-2012	29-OCT-2012	✓	08-MAY-2012	29-OCT-2012	✓	
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071) PC4, PC5	02-MAY-2012	07-MAY-2012	16-MAY-2012	✓	08-MAY-2012	16-JUN-2012	✓	
EP080: BTEX								
Soil Glass Jar - Unpreserved (EP080) PC4, PC5	02-MAY-2012	07-MAY-2012	16-MAY-2012	✓	07-MAY-2012	16-MAY-2012	✓	
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) PC4, PC5	02-MAY-2012	07-MAY-2012	16-MAY-2012	✓	07-MAY-2012	16-MAY-2012	✓	
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080) PC4, PC5	02-MAY-2012	07-MAY-2012	16-MAY-2012	✓	07-MAY-2012	16-MAY-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 <i>Analytical Methods</i>	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	4	40	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	2	11	18.2	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Total Metals by ICP-AES	EG005T	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Total Metals by ICP-AES	EG005T	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Total Metals by ICP-AES	EG005T	1	16	6.3	5.0	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	11	9.1	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)
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
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	USEPA 200.2 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)
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, Na ₂ SO ₄ 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

Matrix: SOIL

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EG005T: Total Metals by ICP-AES	2714555-027	----	Copper	7440-50-8	89.8 %	90.1-114%	Recovery less than lower control limit
EG005T: Total Metals by ICP-AES	2714555-027	----	Zinc	7440-66-6	88.1 %	88.9-112%	Recovery less than lower control limit

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

Chain of Custody Form – Ref 12139

Sheet 1 of 2

Ref: 12139 Investigator: Envirowest Consulting 24 William Street PO Box 8158 (postal address) ORANGE NSW 2800 (02) 6361 4954 (02) 6360 3960 Email: ec@envirowest.net.au Contact Person: Andrew Ruming		Sample matrix Water Soil Sludge Cool HNO3/HCl Unpre-served		Analysis ALS Method Code S-1 S-4 Pb, Zn TP, BTEX As, Cd, Cr, Cu, Ni																												
Laboratory: Australian Laboratory Services 277 Woodpark Road SMITHFIELD NSW 2164 Quotation #: Courier/CN: SY-400-11		<div style="text-align: center; font-size: 2em; font-weight: bold;">TAT</div> Environmental Division Sydney Work Order ES1210772																														
<table border="1"> <thead> <tr> <th>Sample ID</th> <th>Container*</th> <th>Sampling Date/Time</th> </tr> </thead> <tbody> <tr><td>PC1</td><td>A</td><td>2/5/12</td></tr> <tr><td>PC2</td><td>A</td><td>2/5/12</td></tr> <tr><td>PC3</td><td>A</td><td>2/5/12</td></tr> <tr><td>PC4</td><td>A</td><td>2/5/12</td></tr> <tr><td>PC5</td><td>A</td><td>2/5/12</td></tr> <tr><td>PC6</td><td>A</td><td>2/5/12</td></tr> <tr><td>PC7</td><td>A</td><td>2/5/12</td></tr> <tr><td>PCA</td><td>A</td><td>2/5/12</td></tr> </tbody> </table>		Sample ID	Container*	Sampling Date/Time	PC1	A	2/5/12	PC2	A	2/5/12	PC3	A	2/5/12	PC4	A	2/5/12	PC5	A	2/5/12	PC6	A	2/5/12	PC7	A	2/5/12	PCA	A	2/5/12	<div style="text-align: center; font-size: 1.5em; font-weight: bold;">3 Day TAT please</div>			
Sample ID	Container*	Sampling Date/Time																														
PC1	A	2/5/12																														
PC2	A	2/5/12																														
PC3	A	2/5/12																														
PC4	A	2/5/12																														
PC5	A	2/5/12																														
PC6	A	2/5/12																														
PC7	A	2/5/12																														
PCA	A	2/5/12																														
Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.																																
Relinquished by: Andrew Ruming (print and signature)		Date: 3/5/12 Time: 17:00		Received by: David (print and signature)																												
		Date: 4/5 Time: 6:00		Sampler name: Andrew Ruming Date: 2/5/12 Time:																												

Please return completed form to Envirowest Consulting, *A = 200mL solvent rinsed glass jar with Teflon lined lid, B = 2x40mL vials solvent rinsed Teflon lined septum caps, C 1x500mL glass bottles, solvent rinsed, Teflon lined cap, D = 200mL plastic bottle with nitric acid.

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Appendix 5. Field sampling log

Client Geolyse Pty Ltd
 Contact -
 Job number R12139c
 Location 991 Barrier Highway, Cobar NSW
 Date 3 May 2012
 Investigator(s) Andrew Ruming
 Weather conditions Fine

Sample id	Matrix	Date	Analysis required	Observations/comments
PC1	Soil	02/05/12	As, Cd, Cr, Cu, Pb, Ni, Zn,	Composite of 11, 12,13,14
PC2	Soil	02/05/12	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 21,22,23,24
PC3	Soil	02/05/12	As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 31,32,33,34
PC4	Soil	02/05/12	TPH(C10-C36),BTEXN , As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 41,42,43,44
PC5	Soil	02/05/12	TPH(C10-C36),BTEXN , As, Cd, Cr, Cu, Pb, Ni, Zn	Composite of 51,52,53,54
PC6	Soil	02/05/12	As, Cd, Cr, Cu, Pb, Ni, Zn	Dam (borehole 6)
PC7	Soil	02/05/12	As, Cd, Cr, Cu, Pb, Ni, Zn	Fill (borehole 7)
PCA	Soil	02/05/12	As, Cd, Cr, Cu, Pb, Ni, Zn	Duplicate of PC1