

CLEAN TEQ SUNRISE PROJECT

ACCOMMODATION CAMP MODIFICATION

ENVIRONMENTAL ASSESSMENT

APPENDIX C

Land Contamination Assessment



Ground Doctor Pty Ltd

Stage 1 Land Contamination Assessment

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**Part of Lot 17 DP 752086
Sunrise Lane, Fifield, NSW**

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**On Behalf Of:
Clean TeQ Holdings Limited**



**20 December 2017
2017-GD012-RP1-FINAL**

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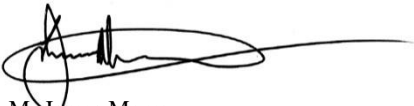
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1 Introduction

The Clean TeQ Sunrise Project (the Project) is an approved nickel cobalt scandium mining project situated approximately 350 kilometres (km) west-northwest of Sydney, near the village of Fifield, New South Wales (NSW). Scandium21 Pty Ltd owns the rights to develop the Project. Scandium21 Pty Ltd is a wholly owned subsidiary of Clean TeQ Holdings Limited (Clean TeQ).

Development Consent DA 374-11-00 for the Project was issued under Part 4 of the Environmental Planning and Assessment Act, 1979 (EP&A Act) in 2001. The Project includes the establishment and operation of the following mine (including the processing facility); limestone quarry; rail siding; gas pipeline; borefields and water pipeline; and associated transport activities and transport infrastructure (e.g. the Fifield Bypass, road and intersection upgrades).

An accommodation camp is approved to be located on the western side of the mine site in the vicinity of Wilmatha Road. Clean TeQ has identified an alternative location for the approved accommodation camp that would provide improved amenity for the workforce in the accommodation camp and minimise potential operational constraints at the mine site. Clean TeQ also identified the preference to maintain the accommodation camp (at reduced capacity) during operations for the short-term use of temporary contractors and visitors.

Clean TeQ is proposing a modification to Development Consent DA 374-11-00 under section 75W of the EP&A Act. The Modification would include:

- development of the accommodation camp (including supporting infrastructure) at an alternative location at the “Sunrise” property approximately 4km to the south of the mine site;
- construction of an electricity transmission line and water pipeline from the mine site to the modified accommodation camp site;
- minor road upgrades;
- increased accommodation camp capacity (from approximately 1,000 to 1,300 personnel); and
- the accommodation camp (at reduced capacity) would continue to be operated post-construction.

The Modification would not involve changes to any aspects of the approved mine and processing operations, limestone quarry, rail siding, borefields, water pipeline or gas pipeline.

Ground Doctor Pty Ltd (Ground Doctor) was commissioned by Clean TeQ to conduct a Stage 1 Land Contamination Assessment of part of the “Sunrise” property (Lot 17 of Deposited Plan (DP) 752086), Sunrise Lane, Fifield, NSW. The extent of the assessed area (the assessment area) is shown in *Figure 1* of *Annexure A*.

The Stage 1 Land Contamination Assessment was undertaken on behalf of Scandium21 Pty Ltd, which owns the “Sunrise” property.

At the time of this assessment the assessment area was used for agriculture (more specifically grazing of livestock and dryland cropping).

1.1 Assessment Objectives

Clause 7 of the NSW State Environmental Planning Policy (SEPP) No. 55 stipulates that contamination and remediation need to be considered in determining a development (or the Modification) application. Clause 7 of NSW SEPP No. 55 states:

- (1) A consent authority must not consent to the carrying out of any development on land unless:
 - (a) it has considered whether the land is contaminated, and*
 - (b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and*
 - (c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.**
- (2) Before determining an application for consent to carry out development that would involve a change of use on any of the land specified in subclause (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines.*
- (3) The applicant for development consent must carry out the investigation required by subclause (2) and must provide a report on it to the consent authority. The consent authority may require the applicant to carry out, and provide a report on, a detailed investigation (as referred to in the contaminated land planning guidelines) if it considers that the findings of the preliminary investigation warrant such an investigation.*

The objectives of the Stage 1 Land Contamination Assessment were to:

- identify past and present land uses within the assessment area and within adjoining land;
- identify potential sources of land contamination associated with past or present use of the assessment area and associated potential contaminants of concern;
- assess the assessment area setting, subsurface conditions and the environment surrounding the assessment area to allow development of a conceptual site model (CSM) relevant to assessing potential risks to human health and/or the environment; and
- use the previously mentioned information to assess the suitability of the assessment area for the proposed Modification or to recommend remediation works where land contamination proposed an unacceptable risk to human health or the environment.

1.2 Scope of Work

The scope of work performed was considered appropriate for assessment of land within a rural setting and was in general accordance with the NSW Office of Environment and Heritage (2011) *Guidelines for Consultants Reporting on Contaminated Sites*. Ground Doctor completed the following work.

- Inspected the assessment area to establish current conditions, surrounding land uses and potential human and environmental receptors.
- Reviewed several aerial photographs of the assessment area taken between 1966 and 2013.
- Reviewed available Lachlan Shire Council records related to the assessment area.

- Interviewed the former “Sunrise” property owner to obtain information related to previous uses with particular focus on use of the assessment area.
- Conducted a search of the NSW Environment Protection Authority (EPA) database for notices pertaining to the site under the Contaminated Land Management Act 1997.
- Conducted a search of the EPA public register of licences, applications and notices made under the Protection of the Environment Operations Act 1997.
- Conducted a search of the NSW Department of Primary Industries Water (DPI Water) registered groundwater works database to identify groundwater works located within 2km of the assessment area.
- Conducted a search of the NSW Safework dangerous goods licensing database for records of dangerous goods storage at the assessment area.
- Reviewed available geology maps to assess subsurface conditions at the assessment area.
- Used all of the reviewed data to prepare a sampling and analytical plan for a preliminary surface soil assessment.
- Collected surface soil samples at nine locations within selected regions of the assessment area most relevant to the proposed Modification.
- Analysed soil samples for potential contaminants of concern identified by the review of site history.
- Developed a CSM using the site history, the site setting, preliminary soil data and the proposed future land use. The CSM was used to assess the suitability of the assessment area for the proposed Modification.
- Prepared this report outlining the methodology and results of the assessment and providing conclusions with respect to the assessment objectives (Section 1.1).

2 Site Description

2.1 Assessment Area Details

The assessment area was situated in the north eastern portion of the “Sunrise” property (see *Figure 1 of Annexure A*).

The assessment area was located within Lot 17 DP 752086. The assessment area was irregularly shaped and covered an area of approximately 90ha. The assessment area is shown relative to the boundary of Lot 17 DP 752086 in *Figure 1 of Annexure A*.

The irregular shaped assessment area includes the footprint of the modified accommodation camp and associated infrastructure, as well as a buffer around these proposed developments.

The assessment area was traversed in a north-south direction by an easement which provides access to a survey marker situated immediately to the south within Lot 7001 DP 94035 (see *Figure 1 of Annexure A*).

The footprint of the modified accommodation camp is located in the assessment area. *Figure 2 of Annexure A* shows the footprint of the modified accommodation camp in relation to the assessment area. The modified accommodation camp footprint consists of three distinct areas. The central component of the modified accommodation camp would consist of accommodation camp buildings and site access road. The westernmost portion of the modified accommodation camp would be a treated effluent irrigation area. The easternmost portion would be an ETL and water pipeline.

The assessment area is located within the Lachlan Shire Council local government area (LGA). Lachlan Local Environment Plan (2013) indicated that the assessment area was zoned “RU1-Primary Production”. Zone RU1 allows for a wide range of development with consent including rural works dwellings, agriculture and residential use.

Property details are summarised in *Table 1*.

Table 1: Summary of Site Details

	Description
Street Address:	“Sunrise”, Sunrise Lane, Fifield, NSW, 2875
Lot and DP Number:	Part of Lot 17 DP 752086
Local Government Area:	Lachlan Shire Council
Zoning	RU1 – Primary Production
Geographical Coordinates (MGA94 Zone 55):	East 537700 North 6371550 (Approximate Assessment Area Site Centre)

2.2 Site Layout and Features

A site inspection was conducted by Mr James Morrow of Ground Doctor on 27 October 2017.

The majority of the assessment area was cleared open space occupied by cultivated pasture with sparsely placed trees. Native vegetation was situated on ridgelines to the south east, south, south west and west of the assessment area.

At the time of the inspection the only identified man-made features within the assessment area were as follows:

- An unsealed driveway provided access to the “Sunrise” property from Sunrise Lane. Other minor access tracks were located across the assessment area.
- Stock fencing was present across the assessment area.

The extent of the assessment area relative to “Sunrise” property is shown in *Figure 1* of *Annexure A*. The proposed layout and features of the assessment area are shown in *Figure 2* of *Annexure A*.

2.3 Adjoining Land-use

At the time of the site inspection use of land adjoining the assessment area was as follows.

- North – Part of the “Sunrise” outside of the assessment area and Sunrise Lane beyond which is privately owned agricultural land which appeared to be used for as a carbon farm.
- East – Wilmatha Road beyond which was agricultural land used for cropping and grazing. A former gravel quarry was situated immediately south east of the assessment area adjacent to Wilmatha Road.
- South – Part of “Sunrise” outside of the assessment area and other privately owned agricultural land which appeared to be used for grazing of livestock.
- West – Part of “Sunrise” outside of the assessment area that was predominantly remnant native vegetation and/or used for livestock grazing. The “Sunrise” homestead was situated close to the to the central western boundary of the assessment area.

At the time of the inspection the “Sunrise” homestead precinct included the following features.

- A single storey dwelling.
- A metal clad open sided machinery shed was present approximately 10 metres (m) to the south west of the dwelling. The shed was used to park vehicles, store equipment, store packaged farm chemicals and was used for maintenance work.
- A metal clad shearing shed was situated approximately 15m south of the dwelling. Additional undercover space used for machinery and equipment storage adjoined the western side of the shearing shed. The adjoining shed was used to park vehicles, store equipment, store packaged farm chemicals and was used for maintenance work.
- Several transportable metal grain silos were present approximately 70m south west of the dwelling.
- Three above ground fuel storage tanks were situated in the centre of a turning circle / laydown area to the south west of the dwelling. One of the tanks was approximately 2500 litres (L) capacity and was used to store diesel. One of the tanks was approximately 900L capacity and was used to store petrol. The third tank was approximately 900L capacity and was not in use at the time of the assessment. The tanks appeared to be single skinned. The tanks each featured a direct mounted hand operated dispenser. The tanks were situated above unsealed ground. Soil in the immediate vicinity of the above ground tanks had dark staining most likely caused by spills of fuel during vehicle refuelling.
- A horse burial area was situated approximately 150m to the south east of the dwelling. The area contained the remains of five horses that had previously lived at the property. Each horse grave site was clearly marked with a headstone.

- A former gravel quarry was situated in the eastern portion of “Sunrise”, immediately south east of the assessment area and adjacent to Wilmatha Road. The quarry was used by Lachlan Shire Council to supply roadbase for local roads. The quarry was situated on top of a ridgeline. It appeared that extraction had been limited to scraping of loose weathered bedrock from the ridgetop to a depth of less than 2m below the pre-extraction ground surface. The quarried area remained elevated in relation to the surrounding natural ground level and was not easy to distinguish from surrounding undisturbed ground level. At the time of the site inspection the quarried area was occupied by significant regrowth including shrubs and small trees.

2.4 Topography

Topographic information published on the NSW Government Spatial Information Exchange (NSW Government, 2017) indicated that the assessment area elevation ranged from approximately 320 metres Australian Height Datum (m AHD) in the south east to approximately 305m AHD in the centre of the northern boundary.

Areas along the eastern, western and southern boundaries were typically situated at an elevation of approximately 320m AHD. These areas drained toward the northern assessment area boundary via three relatively shallow drainage lines. The western portion of the assessment area sloped toward the north east. The centre of the assessment area sloped toward the north and the eastern portion of the assessment area drained toward the north west.

Drainages across the assessment area were typically less than 1m deep. The site drained to Bullock Creek, which was situated approximately 20km to the north east of the assessment area. Bullock Creek flows into the Bogan River approximately 50km to the north east of the assessment area.

2.5 Geology and Soils

The assessment area was located entirely within the Narromine 1:250,000 Geological Series Sheet SI 55-3, 2nd Edition (Geological Survey of NSW, 1997). The mapping indicates the site is situated on “*undifferentiated multiply deformed quartzite and phyllite with numerous quartz veins*” of the “*Girilambone Group*”.

Cainozoic alluvium overlays the Girilambone Group along the lower drainage lines in the centre of the assessment area. The Cainozoic alluvium is described as “*dominantly red silt with some pebble bands and quartz grit; includes relict meanders but is currently being eroded*”.

There was no obvious filling evident at the assessment area during the site inspection. The gently sloping topography of the assessment area did not lend itself to easy filling opportunities, such as steep gullies.

2.6 Hydrogeology

Ground Doctor reviewed the DPI-Water’s registered groundwater works database for works located within 2km of the assessment area (*Table 2*). Registered groundwater works were not identified within the assessment area.

Three registered groundwater works were identified within a 2km radius of the assessment area. The identified groundwater works are Clean TeQ monitoring bores.

The identified bores and a summary of groundwater works details are presented in *Annexure E*.

Table 2: Summary of Registered Groundwater Works within 2km

Bore ID	Distance From Assessment Area (m)	Direction	Depth (m bgl)	SWL (m bgl)	Water Bearing Zone	Registered Use
GW701197	1000m	North East	57.4	48.2	Gabbro / Diorite (48m+)	Monitoring - Mining
GW701195	1600m	North	57.4	45.2	Pyroxenite (45m+)	Monitoring - Mining
GW701194	1600m	North	48.2	27.5	Pyroxenite (27m+)	Monitoring - Mining

The identified bores were situated in areas underlain by 10-20m of weathered rock overlying bedrock. Bedrock was descriptions included ironstone, gabbro, diorite and pyroxenite. Driller's Logs for the identified groundwater works indicate that groundwater was encountered in fractured bedrock between 27m and 58m below ground level. Standing water levels ranged from 27m to 48m below ground level. Work summary forms for the identified groundwater works did not include any information on groundwater quality or yield (DPI-Water, 2017).

No registered potable or stock water supply bores were identified within 2km of the assessment area. This indicates that groundwater is likely to have quantity and/or quality limitations.

2.7 Sensitive Environments

No registered potable water supply bores were situated within 2km of the assessment area (Section 2.6).

The nearest residence is the "Sunrise" property dwelling which is situated to the immediate west of the assessment area (*Figure 2 of Annexure A*). There were no other residences within 2km of the assessment area.

There were no other sensitive environments identified within 2km of the assessment area.

3 Site History and Relevant Information

3.1 Interview with Former Property Owner

On 27 October 2017 James Morrow (of Ground Doctor) conducted an interview with Mr Brian Nelson. Information provided by Brian Nelson indicated the following.

Brian and Wendy Nelson owned the “Sunrise” property until recently when the property was sold to Clean TeQ. Brian Nelson was living at the “Sunrise” property at the time of the assessment and had lived at and farmed the property since he and his wife Wendy purchased it in 1979.

Brian Nelson indicated that the “Sunrise” property was initially part of the much larger “Melrose Plains Station”. The “Sunrise” property was subdivided from “Melrose Plains Station” in the 1930s. The “Sunrise” property was first owned and run by the Howe family. The “Sunrise” property was owned and operated by the Moon family from the mid 1960s to 1979.

The Nelson’s operation of the property consisted primarily of sheep grazing and growing of cereal fodder crops to support the livestock kept at the property. Brian indicated that cereal crops had been grown for sale on a few occasions but that cropping was typically undertaken to support the property’s livestock.

Brian indicated that herbicides and fertilisers had been applied as required within cropped areas of the property.

There was no plunge dipping of livestock within the assessment area.

Fuel Lubricants, fertilisers, herbicides, pesticides and chemicals used at the property were stored adjacent to the dwelling (i.e. outside the assessment area). There was no bulk liquid storage at the property with the exception of petroleum hydrocarbons, which were also situated outside of the assessment area.

Rubbish generated at the “Sunrise” property was disposed in an area more than 1km to the south west of the assessment area.

An easement exists through the assessment area providing access to a survey trig station situated on high ground immediately south east of the assessment area (*Figure 2 of Annexure A*).

The Nelson family had buried five horses in an area approximately 150m to the south east of the dwelling. The burial sites were each marked with a headstone. The horse burial area was situated outside of the assessment area.

3.2 Aerial Photography Review

In order to assess past land uses at the site and on adjoining properties, Ground Doctor reviewed aerial photographs taken in 1966, 1974, 1983, 1989, 1992, 2004, 2012 and 2013. The photographs reviewed are presented in *Annexure E*.

3.2.1 The Assessment Area

In all of the reviewed aerial photographs (1966 to 2017) the basic layout and operation of the assessment area appears to be consistent. The assessment area appears to be cleared of remnant native vegetation and used for agriculture (more specifically grazing of livestock and dryland cropping). In some photographs there is evidence of cropping within open areas of the assessment area.

In the 1974 aerial photograph patterns in the ground surface in open space indicate that cropping was undertaken across most of the open space of the assessment area at the time of the photograph. A bright area is apparent in open space within the centre of the assessment area. The light coloured area may indicate recent soil disturbance, could be related to spread of stock feed on the ground surface or may be a stockpile of fertiliser.

No other features of note were observed within the assessment area in the aerial photographs reviewed.

3.2.2 Adjacent Land Use

Land adjacent to the assessment area appeared to have been used for similar purposes to land within the assessment area. That is for agricultural purposes (predominantly grazing with some dryland cropping). Land clearing and later regeneration is apparent in areas of “Sunrise” that are close to the assessment area.

The “Sunrise” homestead and outbuildings are evident in all aerial photographs with various degrees of clarity depending on photo quality and scale. The photos indicate that the “built up” area of “Sunrise” was situated in the same area (outside of the assessment area) for the period 1966 to 2017, and most likely for the life of the property.

Quarry activity is evident adjacent to the south east corner of the assessment area in the 1992 aerial photograph. The quarry footprint appears to progressively rehabilitate (with regrowth of shrubs and trees) in subsequent aerial photographs spanning 2004 to 2013.

3.3 Council Document Review

Ground Doctor submitted a Government Information Public Access (GIPA) request to Lachlan Shire Council to access available council records that may be relevant to the assessment area. Ground Doctor visited the Lachlan Shire Council office at Condobolin on 27 October 2017 to view the property files made available by Lachlan Shire Council.

Two files were identified in the Lachlan Shire Council archives. The files viewed are summarised in *Table 3*.

Table 3: Lachlan Shire Council Files Reviewed

Reference	Description	Relevance
DA/2000/0085	Development application for addition and alterations to the dwelling.	The development application file did not contain any detail relevant to this assessment.
DA/2001/07	Development application for Gravel Pit.	This development application requested consent to recommence extraction of road base from the former quarry situated immediately south east of the assessment area. The development application was made by Brian and Wendy Nelson. The development application files did not contain any information relevant to this assessment.

3.4 NSW EPA Notified Contaminated Sites

Ground Doctor engaged Lotsearch Pty Ltd to conduct searches of the NSW EPA list of sites notified under section 60 of the Contaminated Land Management Act 1997, and other databases maintained by the NSW EPA identifying potentially contaminated land based on historical land use (Lotsearch Pty Ltd, 2017). The search was conducted on 25 October 2017. Search results are presented as *Annexure E*.

There were no notifications listed for the assessment area or within a 250m buffer of the assessment area.

3.5 NSW Protection of the Environment Operations Act Licenced Activities

Ground Doctor engaged Lotsearch Pty Ltd to conduct a search the NSW EPA register of licences made under the Protection of the Environment Operations Act 1997. These searches were conducted on 25 October 2017. Search results are presented in *Annexure E*.

The records search indicated the licenses formerly existed permitting the application of herbicides along waterways throughout NSW. The search identified drainage lines (waterways) within the assessment area and by default, indicated that application of herbicides was a licenced activity in these locations, as it was along any waterway in NSW. The search result does not imply that herbicides were applied along waterways within the site, but that it was permitted by one of more former licenses that cover waterways throughout NSW.

No other licensed activities were identified within the assessment area or within adjoining areas.

3.6 NSW Safework Dangerous Good Records

NSW Safework conducted a search of their database for records pertaining to the storage of dangerous goods within the “Sunrise” property (Lot 17 DP 752086). NSW Safework did not find any records. Results of the search are presented as *Annexure F*.

3.7 Section 149 Certificate

Ground Doctor reviewed Section 149 Certificate for the “Sunrise” property (Lot 17 DP 752086). The Section 149 Certificate is presented as *Annexure D*.

The certificate dated 24 October 2017 does not provide any information with regard to the land being contaminated. With respect to meanings outlined in the Contaminated Land Management Act 1997, Section 149 Certificates typically indicate whether a property is:

- significantly contaminated;
- subject to a management order;
- is subject to an approved voluntary management proposal;
- is subject to an ongoing maintenance order; and/or
- subject of a site audit.

The absence of information relating to the Contaminated Land Management Act 1997 is inferred to indicate that Lachlan Shire Council is not aware of significant contamination affecting the property.

3.8 Summary of Assessment Area History

The assessment area was within land described as the “Sunrise” property, Sunrise Lane, Fifield, NSW.

The “Sunrise” property was originally part of a much larger property referred to as “Melrose Plains Station”. The “Sunrise” property was subdivided out of “Melrose Plains Station” circa 1930s. The property has had a history of pastoral use. A large portion of the assessment area has been cleared for agriculture (more specifically grazing of livestock and dryland cropping).

The “Sunrise” property was recently purchased by Clean TeQ.

4 Potential Areas of Environmental Concern

Ground Doctor assessed potential areas of environmental concern at the assessment area based on the information presented in *Sections 2 and 3*. Potential areas of environmental concern are discussed in *Table 4*.

Table 4: Summary of Potential Areas of Environmental Concern

Potential Area of Concern	Summary of Issue	Potential Contaminants of Concern / Hazards
Cropping Areas	Cereal crops have been grown regularly across a large area of the assessment area. Brian Nelson indicated that he had applied herbicides and fertilisers to these areas periodically as required. Pesticides may also have been used in these areas. Former landowners may also have applied similar products.	Organochlorine pesticides (OCPs), Organophosphate pesticides (OPPs), metals, Phenoxo Acid Herbicides.

Cropping activity within the assessment area appears to have been conducted on a seasonal basis at a relatively small scale. It was considered unlikely that cropping would have resulted in significant land contamination. Cropping has been undertaken within the proposed footprint of the modified accommodation camp.

Several potential sources of contamination were identified outside of the assessment areas in close proximity to the “Sunrise” homestead. These included:

- Bulk petroleum hydrocarbon storage in above ground tanks;
- Grain storages, which may have been treated with fumigants (pesticides);
- Machinery and equipment storage sheds and laydown areas in which mechanical repairs or maintenance may have been undertaken; and
- Storage of packaged farm chemicals which may have included pesticides and herbicides.

These potential sources of land contamination were located outside of the assessment area. The identified sources of contamination outlined above were relatively minor in nature and were unlikely to impact on the assessment area. For example, the petroleum storage was relatively small, only used to fill farm machinery infrequently and were situated above ground. Mechanical repairs would have been limited to infrequent maintenance of “Sunrise” machinery and equipment only. Grain storages were relatively small. There was no bulk storage of farm chemicals, just retail sized packaged products.

5 Preliminary Sampling and Analytical Plan

The Data Quality Objectives (DQO) process was used to develop a preliminary sampling and analytical plan.

5.1 State the Problem

5.1.1 Potential Areas of Environmental Concern

One potentially contaminating activity was identified based on results of the desktop study of the site history (*Table 4*).

5.1.2 Site Conceptual Model

Clean TeQ proposes to use part of the assessment area for the establishment of an accommodation camp. The camp would house mine workers from the Project.

For the purpose of the assessment, the proposed landuse was assumed to be residential with access to soils. This is the most conservative landuse for the assessment of land contamination. It assumes that people live within the assessment area permanently and utilise unsealed open space for recreation, gardening, growing food and keeping poultry.

If contamination existed within the assessment area potential human health exposure pathways that would require consideration would include:

- Direct contact with soil; and
- Inhalation of dust.

The contaminants of concern within the assessment area do not pose a vapour intrusion risk as they are only semi-volatile.

The identified potential source of contamination within the assessment area was surface application of pesticides, herbicides and fertilisers. This is a diffuse source and if a significant problem existed it should exist relatively uniformly across the cropped areas of the assessment area. Near surface soil was most likely to have been impacted, if significant impacts had occurred. Therefore, collection of near surface soil samples was considered appropriate for preliminary assessment purposes.

With respect to potential environmental risks the proposed future use would be considered low density residential use. It is envisaged that landscaped open space would be established around the modified accommodation camp. Native vegetation or pasture would be encouraged to grow in the proposed treated effluent irrigation area.

5.2 Identify the Decision

The primary objective of this assessment was to assess the suitability of the assessment area for the proposed future use (i.e. the Modification) as required by NSW SEPP No. 55.

5.3 Identify Inputs to the Decision

A desktop assessment of site history was used to identify past land uses that had potential to have resulted in land contamination within the assessment area. The findings of the desktop assessment are summarised in *Section 4*.

Preliminary soil samples were collected at selected locations within footprint of the proposed accommodation camp and treated effluent irrigation area. The need for a more detailed Stage 2 assessment was to be evaluated based on the results of preliminary soil sampling and analysis. If significant impacts were not observed in near surface soil within the development footprints then it was unlikely that significant contamination existed in those areas.

5.4 Define the Assessment Area Boundary

The assessment area boundary is marked on *Figure 1* and *Figure 2* of *Annexure A*.

Characterisation of potential soil impacts by sampling and analysis was limited to the assessment area.

5.5 Decision Rule – How to Assess Risk

Ground Doctor used field observations to identify potential aesthetic impacts such as discolouration and odour.

Soil analytical data was assessed against thresholds published in the published in the National Environment Protection Council (NEPC) (1999) *National Environment Protection (Assessment of Contamination) Measure (NEPM)* (amended April 2013).

5.5.1 Health Investigation Levels

Ground Doctor adopted Health Investigation Levels (HILs) outlined in the NEPM (2013) for assessment of potential human health impacts in soil. Ground Doctor adopted the most conservative (lowest) of the published HILs (HIL A) as a preliminary screening threshold. The adopted screening thresholds are summarised in *Table 5*.

Where no HIL was published for analytes of concern, Ground Doctor used detection of any such compound as preliminary screening criteria.

5.5.2 Ecological Investigation Levels

Ground Doctor adopted Ecological Investigation Levels (EILs) outlined in the NEPM (2013) for assessment of potential ecological impacts in soil. Ground Doctor adopted the published EILs for “urban residential or public open space” as preliminary screening thresholds. This is an equivalent level of protection as “HIL A”. The adopted screening thresholds are summarised in *Table 5*.

5.5.3 Summary of Screening Thresholds

The adopted preliminary screening thresholds used to assess analytical data are summarised in *Table 5*.

Table 5: Preliminary Screening Threshold for Soil Analytical Data

Potential Contaminants / Analyte	Ecological Threshold	Health Based Threshold
Metals		
Arsenic	100	100
Cadmium	-	20
Chromium	190*	100
Copper	60*	6000
Lead	1100*	300
Mercury	-	40
Nickel	30*	400
Zinc	70*	7400
OCPs		
Hexachlorobenzene	-	10
Heptachlor	-	6
Aldrin	-	6a
gamma-chlordane	-	50b
alpha-chlordane	-	50b
Endosulfan I	-	270d
DDE	-	240c
Dieldrin	-	6a
Endrin	-	10
DDD	-	240c
Endosulfan II	-	270d
DDT	180	240c
Methoxychlor	-	300
OPPs		
Chlorpyrifos	-	160
Herbicides		
2,4,5-T	-	600
2,4-D	-	900
MCPA	-	600
MCPB	-	600
Picloram	-	4500
a Guideline applies to the sum of Aldrin and Dieldrin concentrations b Guideline applies to the sum of alpha and gamma chlordane concentrations c Guideline applies to the sum of DDE, DDD and DDT concentrations d Guideline applies to the sum of Endosulfan I and Endosulfan II concentrations * EIL is the most conservative "Added Contaminant Limit", not total concentration		

5.5.4 Soil Decision Rule

The adopted assessment criteria were not intended to be a site suitability criteria. The assessment criteria were intended to provide some preliminary limits which prompt further consideration of site specific conditions where exceeded.

A result exceeding the adopted assessment criteria required further consideration. If the contaminant concentration in any sample was not more than 250% of the assessment criteria the 95% upper confidence limit (95% UCL) of the mean contaminant concentration could be used to assess the soil within the assessment area.

5.6 Specify Limits on Decision Errors

Ground Doctor collected and analysed a field duplicate sample for quality assurance and quality control (QAQC) purposes. Ground Doctor adopted the following criteria with which to assess the results of duplicate sampling:

- Calculated relative percentage difference (RPD) values should be less than 50% where the reported concentrations of analytes are greater than 10 times the EQL;
- Calculated RPD values should be less than 75% where the reported concentrations of analytes are greater than 5 times the EQL but less than 10 times the EQL; and
- Calculated RPD values should be less than 100% where the reported concentrations of analytes are less than 5 times the EQL.

5.7 Optimise the Design for Collecting Data

The potential areas of concern identified within the assessment area were cropping areas. More specifically, the application of pesticides, herbicides and or fertilisers at the surface within the cropped areas.

Soil samples (SS1-SS9) were collected from the upper 0.2m of soil within the footprint of the assessment area. Near surface soil was considered appropriate as the samples were targeting application of agricultural chemicals at the surface.

Soil sampling locations were selected using an informal systematic pattern to achieve an even coverage of the cropping areas within the assessment area.

Soil sampling locations are shown in *Figure 2 of Annexure A*.

Each soil sample was analysed for OCPs, OPPs, phenoxy acid herbicides and heavy metals.

5.7.1 Quality Assurance and Quality Control

A field duplicate sample ("SS10") was collected at "SS1" to assess the repeatability of the adopted soil sampling and analytical procedures.

5.7.2 Sampling Methodology

Soil samples were collected by hand from near surface soils. A hand tool was used to break up near surface soil. Care was used to ensure the sampled soil had not come into direct contact with the hand tool.

The sampler wore a clean disposable nitrile gloves at each sampling location. Sample was placed directly into a new laboratory supplied 125 millilitres glass jar that was labelled with appropriate sample identification, the project identification and sampling date.

Soil samples were placed on ice inside an esky immediately after collection.

5.7.3 Soil Sample Analysis

Sample analysis was sub-contracted to Envirolab Services (Sydney). The soil samples were sent to Envirolab services (Sydney, NSW) by express overnight courier. Envirolab Services had National Association of Testing Authorities (NATA) accreditation for the proposed analysis and used analytical methods which comply with the NEPM (2013) guidelines.

6 Results

Analytical results are presented and compared to the preliminary assessment thresholds in *Table B1* and *Table B2* of *Annexure B*.

The laboratory certificate of analysis is presented as *Annexure C*.

6.1 Field Observations

Ground Doctor did not identify any areas of discolouration or staining within the assessment area. Soil samples were free of unnatural odour.

Soil was found to be relatively uniform across the assessment area. Soil had the texture of sandy gravelly silt, was light brown in colour and was dry at all locations.

6.2 Pesticides

The reported OCPs and OPPs concentrations in all soil samples were less than the laboratory estimated quantification limits (EQLs) and the adopted human health and ecological assessment thresholds.

6.3 Herbicides

The reported herbicide concentrations in all soil samples were less than the laboratory estimated quantification limits (EQLs) and the adopted human health and ecological assessment thresholds.

6.4 Metals

The reported concentrations of cadmium, chromium, copper, lead, mercury, nickel and zinc in each sample were less than the adopted human health and ecological assessment thresholds.

The reported concentrations of arsenic in all but one soil sample were less than the adopted human health and ecological assessment thresholds. The reported arsenic concentration in sample “SS3” was 120 milligram per kilogram (mg/kg), which exceeded the adopted HIL and EIL (both being 100mg/kg).

6.5 Discussion of Results

Evidence of pesticide and herbicide residue was not identified in any soil sample.

With the exception of one sample, reported concentrations of heavy metals were less than the adopted assessment criteria. The reported arsenic concentration in one of nine soil samples exceeded the adopted HIL and EIL.

The source of identified arsenic concentration at “SS3” is not known. The arsenic may be associated with prior use of agricultural chemicals at the property. Arsenic is present at trace levels in some fertilisers and is/was present in some pesticides used to treat sheep. It is also possible that the arsenic identified in soil is naturally occurring. Soil and rock in the vicinity of the assessment area is known to contain heavy metal mineralisation, and this is being targeted by Clean TeQ at Fifield.

The identified arsenic is unlikely to pose an unacceptable risk to human health or the environment for the following reasons:

- The reported arsenic concentration in sample “SS3” exceeded the adopted HIL and EIL by 20%. Sample SS3 was one of seven surface soil samples collected in the footprint of the proposed accommodation camp. Statistical assessment of the reported arsenic concentrations in seven samples within the accommodation camp footprint indicates that the 95% UCL of the mean arsenic concentration was 65mg/kg. The 95% UCL of the mean arsenic concentration was less than the adopted HIL and EIL, which were both 100mg/kg.
- The adopted HIL A is considered conservative. It has been calculated on the basis that a person lives permanently at the location for a considerable amount of their life. It assumes that the resident will maintain a garden, eat produce from the garden and potentially keep poultry. The proposed use of the Modification is much less sensitive. The modified accommodation camp would provide part time accommodation for mine workers who would only live in the facility part time. Mine works would not undertake any gardening. Produce would not be grown in accommodation camp area.

7 Quality Assurance and Quality Control

Multiple sources of information were used to establish the site history. Sources were cross checked and where overlap occurred and were found to be consistent.

Surface soil was sampled in a systematic manner across the proposed footprint of the mining camp and effluent reuse area. The sampling density was low but considered appropriate for assessing diffuse potential sources of environmental concern.

The sampler wore clean disposable nitrile gloves when collecting each sample to minimise cross contamination. Where a hand tool was used to break soil for sampling, care was taken to collect soil that had not come into direct contact with the hand tool.

Ground Doctor labelled samples appropriately and placed samples on ice in an esky immediately after collection. Samples remained on ice until they were sent to the analytical laboratory. Samples were sent by overnight courier service to minimise transit time and ensure samples remained on ice whilst in transit. Envirolab indicated that the esky was approximately 2 degrees Celsius upon receipt.

A field duplicate sample was analysed to assess the repeatability of the sampling and analytical procedure. Analytical results for the duplicate and primary sample are presented in *Table B3* of *Annexure B*. Reported concentrations of most analytes within the duplicate and primary sample were less than the EQL, so an RPD could not be calculated. Where analytes were detected the RPD were less than 12%, which indicated good agreement. Duplicate sample results indicated that field procedures and laboratory analysis could achieve repeatable results.

Envirolab performed a number of quality assurance checks as part of the analytical procedures. These include, adding and recovering surrogate compounds to each sample, spiking some samples to measure recovery, analysing blank samples to check for false positives and analysis laboratory duplicate samples. Ground Doctor reviewed lab QAQC data and found that all results were within the laboratory performance criteria.

The level of data QAQC was considered appropriate given the objective of the assessment. Results for QAQC parameters indicate that data was of acceptable quality to assess potential risks to human health and the environment associated with the assessment area. The data could be relied upon to make the conclusions outlined in *Section 8*.

8 Conclusions

The assessment area history and site setting were assessed using a range of data sources. The potential areas of concern identified within the assessment area were cropping areas. More specifically, the application of pesticides, herbicides and or fertilisers at the surface within the cropped areas.

Preliminary soil sampling and analysis was undertaken in the assessment area to quantify potential contamination associated with past cropping and pastoral activity. Results of soil sample analysis indicated that there was no significant (unacceptable) impacts to soil within the footprint of the modified accommodation camp and treated effluent irrigation area.

Ground Doctor believes that the assessment area is suitable for the proposed development (i.e. the Modification) in its current state.

9 Limitations of this Report

The findings of this report are based on the Scope of Work outlined in *Section 1.2*. Ground Doctor performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No warranties, express or implied are made.

The results of this assessment are based upon the information documented and presented in this report. All conclusions and recommendations regarding the site are the professional opinions of Ground Doctor personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, Ground Doctor assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of Ground Doctor, or developments resulting from situations outside the scope of this project.

Ground Doctor collected preliminary soil samples at nine locations within the assessment area to quantify potential areas of concern identified in the review of the site history. The absence of the compounds of concern in soil samples cannot be interpreted as a guarantee that such materials, or other potentially toxic or hazardous compounds, do not exist at the site in soil, water or other media.

Statements in this report regarding the suitability of the assessment area for future development relate to presence of land contamination only. Statements are made based on the data collected at the time of the assessment and presented in this report. Ground Doctor will not be liable to revise the report to account for any changes in site characteristics, regulatory requirements, guidelines or the availability of additional information, subsequent to the issue date of this report. Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

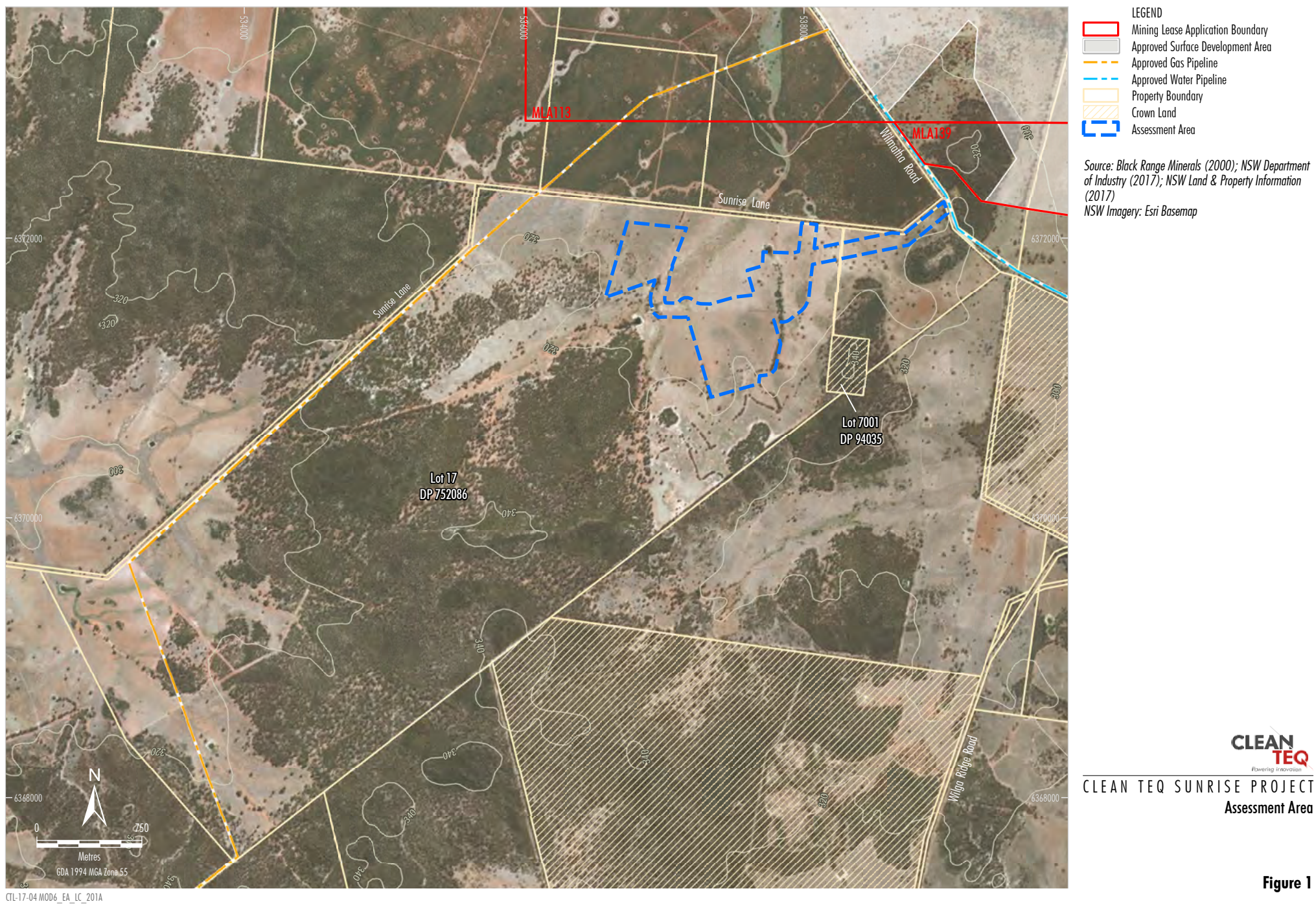
This report, including the data, findings and conclusions contained within it remains the intellectual property Ground Doctor Pty Ltd. A licence to use the report for the specific purpose identified is granted to Clean TeQ subject to full payment of the agreed project fees. Ground Doctor Pty Ltd accepts no liability for use or interpretation by any person or body other than Clean TeQ. This report should not be reproduced without prior approval by Clean TeQ. The report should not be amended in any way without prior approval by Ground Doctor Pty Ltd. The report should not be relied upon by other parties, who should make their own enquires.

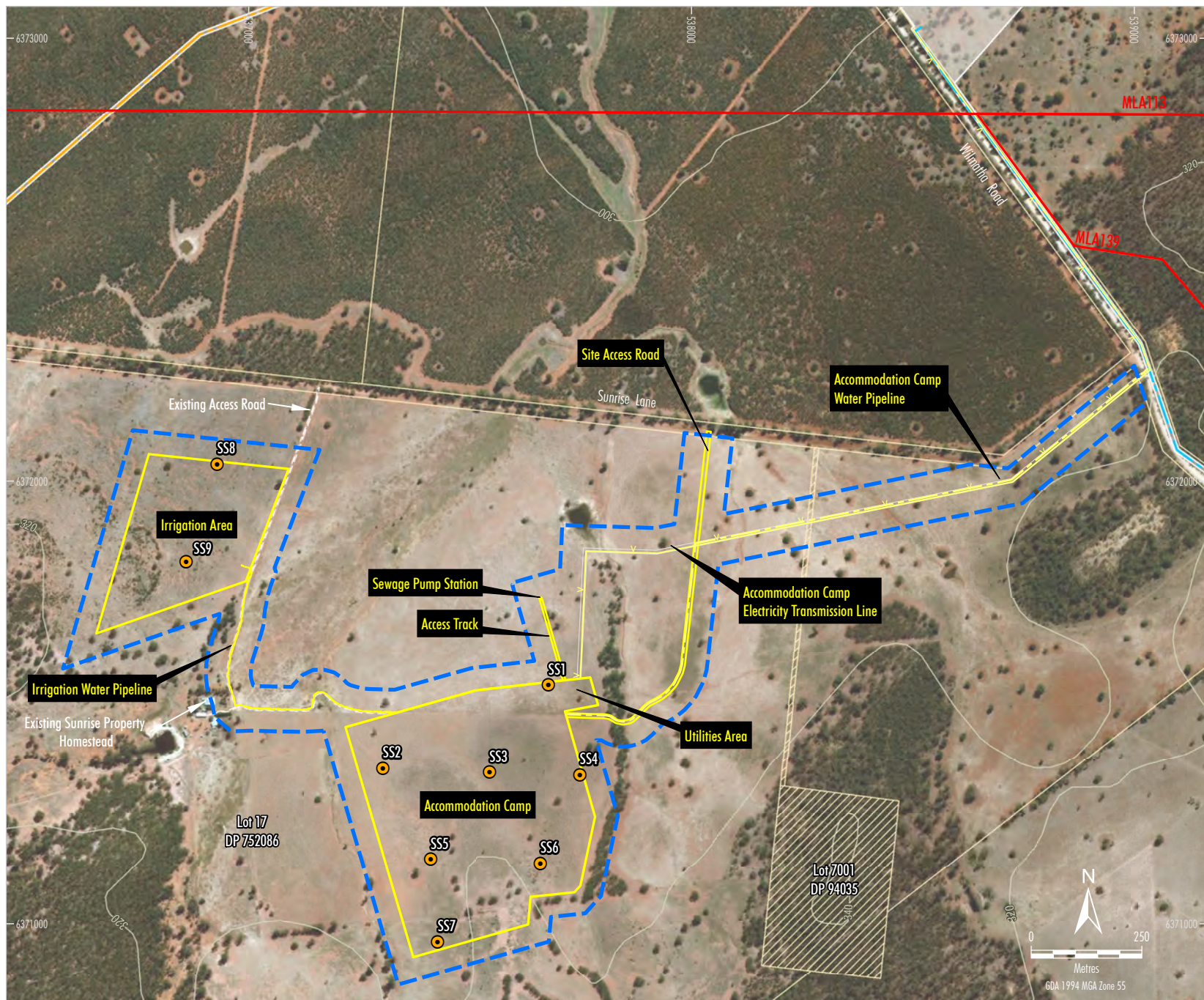
10 References

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Annexure A

Figures





LEGEND

- Mining Lease Application Boundary
- Approved Surface Development Area
- Approved Gas Pipeline
- Approved Water Pipeline
- Property Boundary
- Crown Land
- Modified Layout
- Assessment Area
- Sample Location

Source: Black Range Minerals (2000); NSW Department of Industry (2017); NSW Land & Property Information (2017)
NSW Imagery: Esri Basemap

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Sample Locations

Figure 2

Annexure B

Soil Analytical Results Summary Tables

TABLE B1
Reported Concentrations of Metals, OCPs and OPPs in Soil (mg/kg)
Stage 1 Contamination Assessment - Part of Lot 17 DP752086, Fifield, NSW

Sample ID	EQL	NEPM (1999) Ecological	NEPM (1999) Human Health	SS1 27/10/17	SS2 27/10/17	SS3 27/10/17	SS4 27/10/17	SS5 27/10/17	SS6 27/10/17	SS7 27/10/17	SS8 27/10/17	SS9 27/10/17
Phenoxy Acid Herbicides												
Clopyralid	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3,5-Dichlorobenzoic acid	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-chlorophenoxy acetic acid	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-CPA	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dicamba	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MCPP	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MCPA	0.5	-	600	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichlorprop	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-D	0.5	-	900	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoxynil	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Triclopyr	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-TP	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-T	0.5	-	600	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MCPB	0.5	-	600	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dinoseb	1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,4-DB	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ioxynil	1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Picloram	0.5	-	4500	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
DCPA (Chlorthal) Diacid	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acifluorfen	2	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
2,4,6-T	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,6-D	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
OCPs												
Hexachlorobenzene	0.1	-	10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
a-BHC	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
g-BHC (Lindane)	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
b-BHC	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	0.1	-	6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
d-BHC	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	0.1	-	6a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-chlordane	0.1	-	50b	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	0.1	-	50b	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	0.1	-	270d	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	0.1	-	240c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	0.1	-	6a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	0.1	-	10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	0.1	-	240c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	0.1	-	270d	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	0.1	180	240c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	0.1	-	300	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
OPPs												
Azinphos-methyl	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	0.1	-	160	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Shaded cell indicates concentration exceeds assessment criteria

a Guideline applies to the sum of Aldrin and Dieldrin concentrations

b Guideline applies to the sum of alpha and gamma chlordane concentrations

c Guideline applies to the sum of DDE, DDD and DDT concentrations

d Guideline applies to the sum of Endosulfan I and Endosulfan II concentrations

* EIL is the most conservative "Added Contaminant Limit", not total concentration

TABLE B2
Reported Concentrations of Phenoxy Acid Herbicides in Soil (mg/kg)
Stage 1 Contamination Assessment - Part of Lot 17 DP752086, Fifield, NSW

Sample ID	EQL	NEPM (1999) Ecological	NEPM (1999) Human Health	SS1 27/10/17	SS2 27/10/17	SS3 27/10/17	SS4 27/10/17	SS5 27/10/17	SS6 27/10/17	SS7 27/10/17	SS8 27/10/17	SS9 27/10/17
Metals												
Arsenic	4	100	100	20	38	120	41	8	10	5	4	4
Cadmium	0.5	-	20	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	1	190*	100	23	14	14	20	15	15	20	30	25
Copper	1	60*	6000	6	4	4	6	5	4	6	7	6
Lead	1	1100*	300	9	8	8	9	9	10	9	9	7
Mercury	0.1	-	40	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	1	30*	400	9	7	9	10	10	8	10	9	8
Zinc	5	70*	7400	13	10	15	19	16	39	16	15	8

Arsenic Statistical Analysis for Mining Camp Footprint (Samples SS1 - SS7)

No Samples	7
Average	35
St Dev	40.3
Coef Variation	1.15
T(7,0.05)	1.943

95% UCL Average	65
-----------------	----

Shaded cell indicates concentration exceeds assessment criteria

TABLE B3
Duplicate Sample Results - Metals, OCPs, OPPs and Herbicides in Soil (mg/kg)
Stage 1 Contamination Assessment - Part of Lot 17 DP752086, Fifield, NSW

Sample ID	EQL	SS1 27/10/17	SS10 27/10/17	RPD (%)
Metals				
Arsenic	4	20	19	5
Cadmium	0.5	<0.4	<0.4	-
Chromium	1	23	21	9
Copper	1	6	6	0
Lead	1	9	8	12
Mercury	0.1	<0.1	<0.1	-
Nickel	1	9	8	12
Zinc	5	13	12	8
OCPs				
Hexachlorobenzene	0.1	<0.1	<0.1	-
a-BHC	0.1	<0.1	<0.1	-
g-BHC (Lindane)	0.1	<0.1	<0.1	-
b-BHC	0.1	<0.1	<0.1	-
Heptachlor	0.1	<0.1	<0.1	-
d-BHC	0.1	<0.1	<0.1	-
Aldrin	0.1	<0.1	<0.1	-
Heptachlor epoxide	0.1	<0.1	<0.1	-
gamma-chlordane	0.1	<0.1	<0.1	-
alpha-chlordane	0.1	<0.1	<0.1	-
Endosulfan I	0.1	<0.1	<0.1	-
pp-DDE	0.1	<0.1	<0.1	-
Dieldrin	0.1	<0.1	<0.1	-
Endrin	0.1	<0.1	<0.1	-
pp-DDD	0.1	<0.1	<0.1	-
Endosulfan II	0.1	<0.1	<0.1	-
pp-DDT	0.1	<0.1	<0.1	-
Endrin Aldehyde	0.1	<0.1	<0.1	-
Endosulfan sulphate	0.1	<0.1	<0.1	-
Methoxychlor	0.1	<0.1	<0.1	-
OPPs				
Azinphos-methyl	0.1	<0.1	<0.1	-
Bromophos-ethyl	0.1	<0.1	<0.1	-
Chlorpyrifos	0.1	<0.1	<0.1	-
Chlorpyrifos-methyl	0.1	<0.1	<0.1	-
Diazinon	0.1	<0.1	<0.1	-
Dichlorvos	0.1	<0.1	<0.1	-
Dimethoate	0.1	<0.1	<0.1	-
Ethion	0.1	<0.1	<0.1	-
Fenitrothion	0.1	<0.1	<0.1	-
Malathion	0.1	<0.1	<0.1	-
Parathion	0.1	<0.1	<0.1	-
Ronnel	0.1	<0.1	<0.1	-
Phenoxy Acid Herbicides				
Clpyralid	0.5	<0.5	<0.5	-
3,5-Dichlorobenzoic acid	0.5	<0.5	<0.5	-
o-chlorophenoxy acetic acid	0.5	<0.5	<0.5	-
4-CPA	0.5	<0.5	<0.5	-
Dicamba	0.5	<0.5	<0.5	-
MCPP	0.5	<0.5	<0.5	-
MCPA	0.5	<0.5	<0.5	-
Dichlorprop	0.5	<0.5	<0.5	-
2,4-D	0.5	<0.5	<0.5	-
Bromoxynil	0.5	<0.5	<0.5	-
Triclopyr	0.5	<0.5	<0.5	-
2,4,5-TP	0.5	<0.5	<0.5	-
2,4,5-T	0.5	<0.5	<0.5	-
MCPB	0.5	<0.5	<0.5	-
Dinoseb	1	<1	<1	-
2,4-DB	0.5	<0.5	<0.5	-
Ioxynil	1	<1	<1	-
Picloram	0.5	<0.5	<0.5	-
DCPA (Chlorthal) Diacid	0.5	<0.5	<0.5	-
Acifluorfen	2	<2	<2	-
2,4,6-T	0.5	<0.5	<0.5	-
2,6-D	0.5	<0.5	<0.5	-

Annexure C

Laboratory Certificate of Analysis

SAMPLE RECEIPT ADVICE

Client Details

Client	Ground Doctor Pty Ltd
Attention	James Morrow

Sample Login Details

Your reference	Syerston Project
Envirolab Reference	178823
Date Sample Received	31/10/2017
Date Instructions Received	31/10/2017
Date Results Expected to be Reported	07/11/2017

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	10 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	2.1
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	Phone: 02 9910 6200
Fax: 02 9910 6201	Fax: 02 9910 6201
Email: ahie@envirolab.com.au	Email: jhurst@envirolab.com.au

Analysis Underway, details on the following page:



Envirolab Services Pty Ltd

ABN 37 112 535 645

12 Ashley St Chatswood NSW 2067

ph 02 9910 6200 fax 02 9910 6201

customerservice@envirolab.com.au

www.envirolab.com.au

Sample ID	VTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides	Acid Extractable metals in soil	Asbestos ID - soils	On Hold
SS1-0-0.2				✓	✓	✓		
SS2-0-0.2				✓	✓	✓		
SS3-0-0.2				✓	✓	✓		
SS4-0-0.2				✓	✓	✓		
SS5-0-0.2				✓	✓	✓		
SS6-0-0.2	✓	✓	✓			✓		
SS7-0-0.2	✓	✓	✓			✓		
SS8-0-0.2				✓	✓	✓		
SS9-0-0.2								✓
SS10-0-0.2							✓	

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

CERTIFICATE OF ANALYSIS 178823

Client Details

Client	Ground Doctor Pty Ltd
Attention	James Morrow
Address	PO Box 6278, Dubbo, NSW, 2830

Sample Details

Your Reference	<u>Syerston Project</u>
Number of Samples	10 Soil
Date samples received	31/10/2017
Date completed instructions received	07/11/2017

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	15/11/2017
Date of Issue	16/11/2017
Reissue Details	This report replaces R00 created on 06/11/2017 due to: revised report with additional results.
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Asbestos Approved By

Analysed by Asbestos Approved Identifier: Lucy Zhu
 Authorised by Asbestos Approved Signatory: Lulu Scott

Results Approved By

Dragana Tomas, Senior Chemist
 Long Pham, Team Leader, Metals
 Nancy Zhang, Assistant Lab Manager
 Steven Luong, Senior Chemist

Authorised By



David Springer, General Manager

Client Reference: Syerston Project

Organochlorine Pesticides in soil						
Our Reference		178823-1	178823-2	178823-3	178823-4	178823-5
Your Reference	UNITS	SS1	SS2	SS3	SS4	SS5
Depth		0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Date Sampled		27/10/2017	27/10/2017	27/10/2017	27/10/2017	27/10/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	01/11/2017	01/11/2017	01/11/2017	01/11/2017	01/11/2017
Date analysed	-	01/11/2017	01/11/2017	01/11/2017	01/11/2017	01/11/2017
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	77	71	85	77	76

Client Reference: Syerston Project

Organochlorine Pesticides in soil						
Our Reference		178823-6	178823-7	178823-8	178823-9	178823-10
Your Reference	UNITS	SS6	SS7	SS8	SS9	SS10
Depth		0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Date Sampled		27/10/2017	27/10/2017	27/10/2017	27/10/2017	27/10/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	01/11/2017	01/11/2017	01/11/2017	01/11/2017	01/11/2017
Date analysed	-	08/11/2017	08/11/2017	01/11/2017	08/11/2017	08/11/2017
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	85	82	81	79	79

Client Reference: Syerston Project

Organophosphorus Pesticides						
Our Reference		178823-1	178823-2	178823-3	178823-4	178823-5
Your Reference	UNITS	SS1	SS2	SS3	SS4	SS5
Depth		0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Date Sampled		27/10/2017	27/10/2017	27/10/2017	27/10/2017	27/10/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	01/11/2017	01/11/2017	01/11/2017	01/11/2017	01/11/2017
Date analysed	-	01/11/2017	01/11/2017	01/11/2017	01/11/2017	01/11/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	77	71	85	77	76

Organophosphorus Pesticides						
Our Reference		178823-6	178823-7	178823-8	178823-9	178823-10
Your Reference	UNITS	SS6	SS7	SS8	SS9	SS10
Depth		0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Date Sampled		27/10/2017	27/10/2017	27/10/2017	27/10/2017	27/10/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	01/11/2017	01/11/2017	01/11/2017	01/11/2017	01/11/2017
Date analysed	-	08/11/2017	08/11/2017	01/11/2017	08/11/2017	08/11/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	85	82	81	79	79

Client Reference: Syerston Project

Acid Extractable metals in soil						
Our Reference		178823-1	178823-2	178823-3	178823-4	178823-5
Your Reference	UNITS	SS1	SS2	SS3	SS4	SS5
Depth		0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Date Sampled		27/10/2017	27/10/2017	27/10/2017	27/10/2017	27/10/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	01/11/2017	01/11/2017	01/11/2017	01/11/2017	01/11/2017
Date analysed	-	01/11/2017	01/11/2017	01/11/2017	01/11/2017	01/11/2017
Arsenic	mg/kg	20	38	120	41	8
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	23	14	14	20	15
Copper	mg/kg	6	4	4	6	5
Lead	mg/kg	9	8	8	9	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	9	7	9	10	10
Zinc	mg/kg	13	10	15	19	16

Acid Extractable metals in soil						
Our Reference		178823-6	178823-7	178823-8	178823-9	178823-10
Your Reference	UNITS	SS6	SS7	SS8	SS9	SS10
Depth		0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Date Sampled		27/10/2017	27/10/2017	27/10/2017	27/10/2017	27/10/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	01/11/2017	01/11/2017	01/11/2017	07/11/2017	07/11/2017
Date analysed	-	01/11/2017	01/11/2017	01/11/2017	07/11/2017	07/11/2017
Arsenic	mg/kg	10	5	<4	<4	19
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	15	20	30	25	21
Copper	mg/kg	4	6	7	6	6
Lead	mg/kg	10	9	9	7	8
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	8	10	9	8	8
Zinc	mg/kg	39	16	15	8	12

Client Reference: Syerston Project

Moisture						
Our Reference	UNITS	178823-1	178823-2	178823-3	178823-4	178823-5
Your Reference		SS1	SS2	SS3	SS4	SS5
Depth		0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Date Sampled		27/10/2017	27/10/2017	27/10/2017	27/10/2017	27/10/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	01/11/2017	01/11/2017	01/11/2017	01/11/2017	01/11/2017
Date analysed	-	02/11/2017	02/11/2017	02/11/2017	02/11/2017	02/11/2017
Moisture	%	10	11	15	14	14

Moisture						
Our Reference	UNITS	178823-6	178823-7	178823-8	178823-9	178823-10
Your Reference		SS6	SS7	SS8	SS9	SS10
Depth		0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Date Sampled		27/10/2017	27/10/2017	27/10/2017	27/10/2017	27/10/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	01/11/2017	01/11/2017	01/11/2017	01/11/2017	01/11/2017
Date analysed	-	02/11/2017	02/11/2017	02/11/2017	02/11/2017	02/11/2017
Moisture	%	5.3	8.5	15	9.5	12

Client Reference: Syerston Project

Phenoxy Acid Herbicides in Soil						
Our Reference		178823-1	178823-2	178823-3	178823-4	178823-5
Your Reference	UNITS	SS1	SS2	SS3	SS4	SS5
Depth		0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Date Sampled		27/10/2017	27/10/2017	27/10/2017	27/10/2017	27/10/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	15/11/2017	15/11/2017	15/11/2017	15/11/2017	15/11/2017
Date analysed	-	15/11/2017	15/11/2017	15/11/2017	15/11/2017	15/11/2017
Clopyralid	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3,5-Dichlorobenzoic acid	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
o-chlorophenoxy acetic acid	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-CPA	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dicamba	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
MCPP	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
MCPA	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dichlorprop	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-D	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoxynil	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Triclopyr	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-TP	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-T	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
MCPB	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dinoseb	mg/kg	<1	<1	<1	<1	<1
2,4-DB	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ioxynil	mg/kg	<1	<1	<1	<1	<1
Picloram	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
DCPA (Chlorthal) Diacid	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acifluorfen	mg/kg	<2	<2	<2	<2	<2
2,4,6-T	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,6-D	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate 2,4- DCPA	%	91	85	93	93	94

Client Reference: Syerston Project

Phenoxy Acid Herbicides in Soil						
Our Reference		178823-6	178823-7	178823-8	178823-9	178823-10
Your Reference	UNITS	SS6	SS7	SS8	SS9	SS10
Depth		0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Date Sampled		27/10/2017	27/10/2017	27/10/2017	27/10/2017	27/10/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	15/11/2017	15/11/2017	15/11/2017	15/11/2017	15/11/2017
Date analysed	-	15/11/2017	15/11/2017	15/11/2017	15/11/2017	15/11/2017
Clopyralid	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3,5-Dichlorobenzoic acid	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
o-chlorophenoxy acetic acid	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-CPA	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dicamba	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
MCPP	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
MCPA	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dichlorprop	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-D	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoxynil	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Triclopyr	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-TP	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-T	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
MCPB	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dinoseb	mg/kg	<1	<1	<1	<1	<1
2,4-DB	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ioxynil	mg/kg	<1	<1	<1	<1	<1
Picloram	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
DCPA (Chlorthal) Diacid	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acifluorfen	mg/kg	<2	<2	<2	<2	<2
2,4,6-T	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2,6-D	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate 2,4- DCPA	%	100	92	94	96	94

Client Reference: Syerston Project

Method ID	Methodology Summary
Ext-054	Analysed by MPL Envirolab
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.

Client Reference: Syerston Project

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date extracted	-			01/11/2017	[NT]	[NT]	[NT]	[NT]	01/11/2017	[NT]
Date analysed	-			01/11/2017	[NT]	[NT]	[NT]	[NT]	01/11/2017	[NT]
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	82	[NT]
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	75	[NT]
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	79	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	82	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	77	[NT]
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	76	[NT]
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-005	90	[NT]	[NT]	[NT]	[NT]	99	[NT]

Client Reference: Syerston Project

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date extracted	-			01/11/2017	[NT]	[NT]	[NT]	[NT]	01/11/2017	[NT]
Date analysed	-			01/11/2017	[NT]	[NT]	[NT]	[NT]	01/11/2017	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyrifos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	81	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Dimethoate	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Fenitrothion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	83	[NT]
Malathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Parathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Ronnel	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Surrogate TCMX	%		Org-008	90	[NT]	[NT]	[NT]	[NT]	92	[NT]

Client Reference: Syerston Project

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			01/11/2017	[NT]	[NT]	[NT]	[NT]	01/11/2017	[NT]
Date analysed	-			01/11/2017	[NT]	[NT]	[NT]	[NT]	01/11/2017	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	120	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	108	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	115	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	123	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	117	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	116	[NT]

Client Reference: Syerston Project

QUALITY CONTROL: Phenoxy Acid Herbicides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	
Date extracted	-			15/11/2017	1	15/11/2017	15/11/2017		15/11/2017	[NT]
Date analysed	-			15/11/2017	1	15/11/2017	15/11/2017		15/11/2017	[NT]
Clopyralid	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
3,5-Dichlorobenzoic acid	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
o-chlorophenoxy acetic acid	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
4-CPA	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Dicamba	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	83	[NT]
MCPPP	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	88	[NT]
MCPA	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	87	[NT]
Dichlorprop	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
2,4-D	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	63	[NT]
Bromoxynil	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Triclopyr	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
2,4,5-TP	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
2,4,5-T	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	88	[NT]
MCPB	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Dinoseb	mg/kg	1	Ext-054	<1	1	<1	<1	0	[NT]	[NT]
2,4-DB	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Ioxynil	mg/kg	1	Ext-054	<1	1	<1	<1	0	[NT]	[NT]
Picloram	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
DCPA (Chlorthal) Diacid	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Acifluorfen	mg/kg	2	Ext-054	<2	1	<2	<2	0	[NT]	[NT]
2,4,6-T	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
2,6-D	mg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Surrogate 2,4- DCPA	%		Ext-054	85	1	91	90	1	88	[NT]

Client Reference: Syerston Project

QUALITY CONTROL: Phenoxy Acid Herbicides in Soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	178823-2
Date extracted	-			[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	15/11/2017
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	15/11/2017
Dicamba	mg/kg	0.5	Ext-054	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	89
MCPD	mg/kg	0.5	Ext-054	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	81
MCPA	mg/kg	0.5	Ext-054	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	73
2,4-D	mg/kg	0.5	Ext-054	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	68
2,4,5-T	mg/kg	0.5	Ext-054	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	82
Surrogate 2,4- DCPA	%		Ext-054	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	97

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.

Note: Sample 178823-10 was sub-sampled from jar provided by the client.

Acid Herbicides analysed by MPL Laboratories. Report No.203063.