



Initial Evaluation of Contamination Potential



Billard Leece Partnership

The New Primary School at Warnervale
75 Warnervale Road, Warnervale, NSW

5 June 2019

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Prepared for:

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**SUBJECT: LETTER REPORT - INITIAL EVALUATION OF CONTAMINATION
POTENTIAL**

Kleinfelder Australia Pty Ltd (Kleinfelder) was commissioned by Billard Leece Partnership (BLP) to undertake an initial evaluation of contamination potential at the proposed new school site, in support of the State Significant Development Application for the proposed school redevelopment (Lot 71 – DP7091, the Site) Warnervale Road, Warnervale, NSW, 2259. The location of the Site is shown on **Figure 1**.

Section 7 of this letter report provides a Summary Statement of the evaluation findings.

1. INTRODUCTION

1.1 Background

The proposed site, 75 Warnervale Road, comprises six buildings with ancillary car parking, landscaped/playground areas and is to be demolished to allow construction of a new school. The overall site comprises some 4.5 hectares of land with the existing school buildings and ancillary areas occupying the northern portion, some 1.5 hectares. The remainder of the site is occupied by dense native bushland and a cleared corridor of undeveloped land.

The proposed school will comprise demolition and removal of the current buildings, subsequent earthmoving, construction of new classrooms, school offices and associated infrastructure.

Information provided by BLP indicated that the site was previously undeveloped until the school was established in the 1950's. Recent geotechnical investigations by Douglas Partners (2018) identified Site soils to comprise natural sands and clays, indicating that previous contaminative land use was unlikely.

However, the existing school buildings are of substantial age and may have resulted in localised contamination of surficial soils within their vicinity, due to degradation of asbestos containing building products or lead paint during their history (if used).

Therefore, BLP requested that an initial evaluation be undertaken to confirm their understanding that contamination is unlikely to prove an impediment to the redevelopment of the new school and identify if further contamination investigation is warranted.

1.2 Objectives

The objectives of the initial evaluation are to:

- Undertake an initial assessment to identify if potential contaminants are present in surface soil that may require a further assessment under SEPP55 e.g. Stage 1 or Stage 2 site investigations; and
- Provide an initial assessment of the potential waste classification of surface soils, should off-site disposal be required during construction.

1.3 Scope of Works

The initial evaluation has been limited to the following agreed scope:

- Limited desk-based review of available information including:
 - Land Zoning;
 - Geology & Hydrology; and
 - Available previous investigations supplied by BLP.
- A walkover of accessible land within the vicinity of the school buildings, where safe to do so, to visually identify obvious potential contamination of the Site surface (e.g. waste stockpiles) that may require further investigation.
- Collection of 18 primary soil samples from 14 locations (and two QC samples) using a hand-trowel to a nominal depth of 150 to 300mm below ground surface to penetrate natural soils. All samples were screened for volatile contaminants using a Photoionization

Detector (PID) and submitted to a NATA accredited laboratory for the following common suite of analyses:

- Benzene, Toluene, Ethylbenzene, Total Xylenes, Naphthalene (BTEXN);
 - Total Recoverable Hydrocarbons (TRH) C₆ – C₄₀;
 - Total Metals (Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni) and Zinc (Zn));
 - Polycyclic Aromatic Hydrocarbons (PAH);
 - Polychlorinated Biphenyls (PCBs);
 - Organochlorine Pesticides/Organophosphorus Pesticides (OCP/OPP); and
 - Asbestos in bulk solids -30% of samples.
- Preparation of this letter report presenting the findings from the walkover and soil sampling, screening of the results against land-use suitability criteria for a school development (NEPM 2013 HIL/HSL) and NSW EPA (2014) Waste Classification Guidelines. Recommendations are also made as to the need, or otherwise, for further stages of site investigation if required by SEPP55.

2. SITE DESCRIPTION & ENVIRONMENTAL SETTING

2.1 Location and Site Details

The Site location and details are presented in **Table 1** and is shown on **Figure 1** and **Figure 2**.

Table 1: Site identification details

Site address	75 Warnervale Road, Warnervale, NSW 2259.
Current Title identification details	Lot 71 – DP7091
Current land use	The Site is currently used for special education services and by the Australian Air League
Total Site area	Approximately 4.5 ha
Investigation area	Approximately 1.5 ha comprising the existing school buildings and ancillary areas occupying the northern portion of the Site (herein referred to as the Site)
Zoning	R1 – General Residential R2 – Low Density Residential (Currently operated as a special education school)
Local council	Central Coast Council
Ward	Wyong
SEPP Strategic Land Use	Future Residential Growth Areas
Proposed site use	New School

2.2 Local Environmental Plan Zoning

- A review of the Local Environmental Plan (LEP) zoning (Central Coast Environmental Plan 2018) has identified that the Site is zoned R1 – General Residential and R2 – Low Density Residential. The following surrounding land zones include:

Table 2: Surrounding land zones

Direction	Land Zoning (with approximate distances)
North	R1 – General Residential (Adjacent) R2 – Low Density Residential (Adjacent) RE1 – Public Recreation (62m)
East	R1 – General Residential (Adjacent) R2 – Low Density Residential (Adjacent) RE1 – Public Recreation (Adjacent) E3 – Environmental Management (318m) E2 – Environmental Conservation (480m)
South	R2 – Low Density Residential (Adjacent) RU6 – Transition (340m) RE1 – Public Recreation (652m) E3 – Environmental Management (650m)
West	R1 – General Residential (Adjacent) R2 – Low Density Residential (Adjacent) RE2 – Private Recreation (522m) B1 – Neighbourhood Centre (320m) E3 – Environmental Management (480m) E2 – Environmental Conservation (465m)

2.3 Site Walkover & Sample Rationale

The site walkover was undertaken on the 9th of September 2018 by an experienced Kleinfelder field scientist within the northern portion of the site (**Figure 2**). Weather conditions during the site walkover were clear with a maximum temperature of 18 degrees Celsius. Approximately 60% of the investigation area is covered with soft standing (maintained grass, vegetation, trees etc.) with 40% being hard standing (buildings, driveway etc.). Photographs taken during the Site walkover are presented in **Attachment A**. Sample locations were identified as potential discrete points of interest where Chemicals of Potential Concern (COPC) were most likely to be found (if present) based on visual observations. The soil sample locations described in this section are presented in **Figure 2**.

In summary, the Site walkover did not identify actual or potential areas of gross wide-scale contamination that may impede the proposed development and warranting further detailed investigation during this initial evaluation stage.

2.3.1 Key Site Features

Generally, the northern portion of the Site occupied by the existing school comprises two distinct areas:

1. A managed area containing school buildings (west); and
2. A disused area (former school yard) with no buildings (east).

Area 1 – Existing School Buildings

This area has five main buildings that are currently used as special education classrooms, administration offices, toilets and storage (cleaning and equipment). The buildings are single story consisting of weatherboard and brick external walls, with the exception of a more recently installed demountable building which has steel clad walls and is located in the north-east corner of this area. There is a large undercover area with concrete flooring and covered pathways connecting buildings.

Along the northern boundary, there is an access road running parallel to Warnervale Road and is frequently used for transitioning school vehicles and staff parking (See **Photos 1 and 2**). The access road consisted of two surfaces, compacted aggregate/road base and concrete hardstand. Sample KLF01 was taken at the base of the compacted aggregate (**Photo 3**). No obvious staining was evident within the gravel road base or on the concrete access road.

A grassed area adjacent to the parked school vehicles was identified as a likely washdown area for basic cleaning and vehicle upkeep (**Photo 4**). Sample KLF02 was taken from this location. The area has isolated large overhanging trees and a garden bed lining the school perimeter. Along the north-western boundary of the Site, is a continuation of the concrete access road with parked school vehicles evident. A smaller building located here shows evidence of paint peeling from the weatherboard (**Photo 5**). Sample KLF03 was taken within the garden bed directly adjacent to the western side of the building.

The central part of this area has a grassed area surrounded by mulched garden beds, a large open undercover area with concrete flooring and connecting undercover pathways. Several trees are located within the central area. Sample points KLF04A and KLF04B (**Photo 6**) were taken within the central grassed area given its proximity to surrounding buildings and potential fill used as a base for turfing. Sample KLF05 was taken beneath the mulched garden bed between the two southern buildings (**Photo 7**).

A surface water runoff area was evident at the eastern fence line between the two areas. The runoff drained from the northern access road southeast under the building. Building material

was evident (crumbled plastic and wood chips) under the demountable (**Photo 8**). Sample KLF06 was taken in this area.

A mound of potential fill material was located to the south of the open undercover area. Glass, plastic material and woodchips were observed (**Photo 9**) on the surface along with disused timber and furniture. Samples KLF07A and KLF07B were taken at this point.

The southern portion of this area had open grassland with isolated large trees. A small vegetable garden was in use, sample KLF08 was taken between the vegetable garden and southern buildings (**Photo 10**). The south-western corner of this area is used as a storage area for mulch, timber, corrugated iron sheeting and composting leaf material (**Photos 11 & 12**). Sample KLF09A and KLF09B were taken from a small soil mound adjacent to the corrugated sheeting and timber (**Photo 13**).

Further building and disused school equipment was located within a chain fence compound containing rubber hoses, plastic crates, timber, PVC piping, gutter and roofing material, cardboard and desk chairs (**Photo 14**). Sample KLF11 was taken within a mound of leaf and soil debris adjacent to the south western building (**Photo 15**).

The most southern boundary (adjacent to fenced perimeter) appeared to be where a former building or structure may have stood. Two concrete pathways lead out to what looks to have been a building or structure. Evenly spaced holes within the area suggest that footings may have been present at some stage (**Photo 16**). Sample point KLF10 was taken at this point.

Area 2 – Disused Area

The disused area to the east of the investigation area has a concrete surface sports court that is now in a state of disrepair with open grass lands and isolated stands of trees. The open grassland appears to have been a former playground/sports field which had been levelled (**Photo 17**) to the south-west (sample point KLF12A and KLF12B).

Small piles of decomposing vegetative matter were observed between the south-eastern and south-western areas of this area (**Photo 18**). The south-eastern corner had a fenced power mains box that appeared to have been decommissioned (**Photo 19**). A concrete surface with no obvious staining was also located in this area where sample point KLF13 was taken (**Photo 20**).

A small amount of copper logs most likely used for children's climbing equipment was observed in piles along the eastern side of this area mixed with plastic sheeting (**Photo 21**). A small fire pit was identified within the north-eastern area of the disused portion of the Site, displaying charred remains of timber ash and soil. Sample KLF14A and KLF14B were taken at this point (**Photo 22**).

2.3.2 Surrounding Land Use

A summary of the surrounding land use has been provided from observations during the Site walkover and reviewing regional imagery (Nearmap 18/09/18). An overview of the surrounding land use is summarised in **Table 3**.

Table 3: Surrounding Land Use

Direction	Land Use
North	The area to the north of the Site is predominantly residential. Warnervale Rural Fire Brigade is directly opposite the Site along Warnervale Road. Warnervale Oval is approximately 90m from the Site with surrounding vegetation.
East	Directly adjacent is a rural block followed on by heavily vegetated bushland approximately 277m from the Site. Beyond the bushland is more rural properties and newly established housing estates.
South	Adjacent to the Southern boundary of the Site is densely vegetated bushland followed on by grazing lands (approximately 403m).
West	Adjacent to the western boundary is a densely vegetated parcel of land. A densely vegetated bushland block lies directly adjacent to the Site with residential properties occurring approximately 175m from the Site.. Warnervale Station Park and Playground is approximately 520m to the west.

2.4 Topography

Publicly available information (SIX Maps 18/09/18) outlines a gentle slope from approximately 22m Australian Height Datum (AHD) in the west of the Site to approximately 18m AHD along the eastern boundary.

The Site walkover identified a slight downward gradient across the Site dipping from west to east.

2.5 Geology

2.5.1 Local Geology

Douglas Partners identified the general soil characteristics of the Site through a series of Borehole Logs (**Attachment B**). A total of 9 locations were investigated using Dynamic Push Tube as part of a geotechnical study. 3 borehole locations were within Area 1. The other 6 locations were within the lot boundary to the south of the Site along both the western and eastern perimeter.

Table 4 presents a summary of the borehole characteristics.

Table 4: Douglas Partners Borehole Log Characterisation

Bore Number	Description	Depth (m)
North-east corner of the Site	SAND: Dense to very dense, grey brown and yellow brown sand with trace clay and rootlets	0.0 - 0.7
	SANDY CLAY: Very stiff to hard, orange brown mottled grey brown sandy clay	0.7 – 2.5
South-east corner of the site	SAND: Medium dense, grey brown sand with some rootlets, humid	0.0 – 0.2
	CLAY: Hard, yellow brown clay with trace sand and organics	0.2 – 0.6
	SANDY CLAY: Very Stiff to hard, orange brown sandy clay	0.6 – 0.75
Located within the levelled sports field	FILLING: Generally comprising, brown clayey sand with some rootlets, humid (reworked natural soil)	0.0 – 0.35
	SAND: Dense, grey brown and yellow brown sand with trace clay and organics	0.35 – 0.5
	SANDY CLAY: Hard, orange brown sandy clay with trace organics	0.5 – 0.7
	CLAY: Stiff, orange brown clay	0.7 – 1.15
	SANDY CLAY: Very stiff, grey brown sandy clay	1.15 – 1.25

2.5.2 Regional Geology

Table 5 provides a summary of the geological units under or in close proximity to the Site.

Table 5: Geological Units

Unit Name	Description	Location
250,000 Geological Map		
Clifton Sub-group	Claystone, sandstone and shale.	Underlies the entire site.
Soil Landscapes (eSpade 18/09/18) (Attachment C)		
Gorokan (gk)	Landscape—undulating low hills and rises on lithic sandstones of the Tuggerah Formation. Local relief <30 m; slope gradients <15%. Broad crests and ridges, long	Regional summary.

Unit Name	Description	Location
	<p>gently inclined slopes and broad drainage lines. Partially cleared low open-forest.</p> <p>Soils - moderately deep (50–150 cm) Soloths (Dy2.41, Dy3.41), Yellow Podzolic Soils (Dy3.11, Dy3.21) on ridges and crests; Soloths (Dy2.41, Dy3.41), Yellow Podzolic Soils (Dy3.11, Dy3.21) and Grey-brown Podzolic Soils (Db1.21, Db2.21) on slopes with Gleyed Podzolic Soils (Dg2.41) along drainage lines.</p> <p>Limitations—very high erosion hazard, foundation hazard (localised), seasonal waterlogging, hardsetting, strongly acid, low fertility, plastic, impermeable soils.</p>	
Tuggerah Lakes Soil Landscapes Survey (1000384) Profile 28 (Attachment C)		
Layer 0 0.00m-0.00m	Coarse Fragments: few (2-10%), sedimentary, dispersed, weakly weathered, subrounded, sub-angular, fine gravel (2-6 mm), gravel (6-20 mm).	777m North east within the Clifton Sub-group.
Layer 1 0.00m – 0.09m	<p>Coarse sandy loam, very dark greyish brown (brownish black) (10YR 3/2) [moist] with no recorded mottles, Moderate pedality Few coarse fragments (2-10%), sedimentary, dispersed, weakly weathered, subrounded, Sub-angular, fine gravel (2-6 mm), gravel (6-20 mm), Moderately moist, slightly sticky, texture modifier test result was no change, disruptive test result was moderately weak force, Field pH is 6.0 (Raupach).</p>	
Layer 2 0.09m – 0.25m	<p>Coarse clayey sand Brown (dull yellowish brown) (10YR 5/3) [moist] or light grey (dull yellow orange) (10YR 7/2) [dry] with 20% - 50% distinct unspecified orange mottles Massive (fabric is sandy), ped coatings are none Few coarse fragments (2-10%), sedimentary, dispersed, weakly weathered, subrounded, sub-angular, fine gravel (2-6 mm), gravel (6-20 mm), very few segregations (< 2%), organic, nodules, medium (2-6 mm), coarse (6 -20 mm), dry, slightly sticky, texture modifier test result was no change, disruptive test result was moderately firm force, Field pH is 5.5 (Raupach).</p>	
Layer 3 0.25m – 0.55m	Medium clay.	

2.6 Regional Hydrogeology

A search of the WaterNSW database (WaterNSW 17/09/18), identified 17 registered groundwater bores within a 2km radius of the Site. Two bores were located within 500m of the Site (Attachment C) and described as:

- GW080833 – Test Bore (120m to the north-east, adjacent to the Warnervale Oval). No details were provided on the well construction detail or water bearing zones; and
- GW200569 – Test Bore for irrigation (154m south-east, within adjacent property). The bore log identified that the well was drilled to 66m bgs, with the first water bearing zone comprising a sand deposit at substantial depth (24m bgs).

The cluster of five wells east of the site are listed as test wells and the cluster of nine wells to the north-east are listed as monitoring wells.

2.7 Hydrology/surface water features

The Site walkover or map search did not reveal any obvious surface water features (i.e. creeks or dams). The gradient across the Site moves down and away in an easterly direction. A natural surface drain is located approximately 485m to the east. The adjacent easterly property has a small dam (approximately 185m from the eastern boundary of the Site). Several small dams are also located to the south within grazing lands.

3. HISTORICAL SETTING

3.1 Historical Activities

BLP has advised that the Site was operated by NSW Education as a primary school prior to its current operation as a special education school. Analysis of historical satellite imagery (Nearmap 19/09/18) identified that a building in the north-eastern portion of the site was removed between March and August 2010. A demountable building was installed within the same location as the building demolished, between August 2010 and October 2010. Deterioration and eventual removal of a covered pathway within the southernmost area of the managed site occurred between January 2017 and September 2017.

3.2 NSW EPA Records

3.2.1 Contaminated Sites Notified to the NSW EPA

A search of the NSW EPA Contaminated Land entry list did not identify any records (NSW EPA 18/09/18) pertaining to the Site or immediately surrounding the Site.

4. INVESTIGATION RESULTS

4.1 Summary of Field Activities

Field activities undertaken as part of the completed scope of works are summarised in **Table 6**.

Table 6: Summary of Field Activities

Activity	Description
Date	Site works were conducted on the 18 August 2018.
Soil Sampling	<p>A Site walkover was undertaken by Kleinfelder's staff, Daniel Kousbroek. Daniel has over 4 years of experience undertaking similar contamination assessments. The project was supervised by Brendan Grant who has over 20 years' experience in the contaminated lands industry.</p> <p>During the Site walkover observations were made on potential areas of environmental concern (AEC). Judgmental sampling was undertaken based on the observations made and professional judgement. A PID was utilised to identify potential volatile hydrocarbons. Samples were taken from either the surface (<150mm) or at approximately 300mm below the surface.</p> <p>A total of 18 primary and 2 QA/QC soil samples were collected and scheduled for analysis at NATA accredited Laboratories.</p> <p>Soil samples were collected using hand tools and placed in clean, laboratory-supplied glass jars. Soil laboratory summary results are presented in Table 8, with full laboratory certificates of analysis in Attachment D.</p>
Sample Preservation	Soil samples were stored on ice, in eskies whilst onsite and in transit to the NATA-accredited laboratory. Samples were transported using strict chain of custody protocols. Soil laboratory results and chain of custody documentation are presented in Attachment D .
QA/QC (Field/Laboratory)	An intra-laboratory duplicate, and an inter-laboratory triplicate sample were taken for Quality Assurance purposes and assessed for relative percentage difference (RPD) of 30%. Exceedance of the RPD was detected for some analytes and is attributed to soil heterogeneity. A review of the laboratory QC reports for the primary laboratory recorded some non-conformances with laboratory duplicate samples. However closer inspection confirmed that all RPDs were reported as 30% which is compliant with the criteria adopted for field QC. In summary, the field and laboratory QC results confirm that the data is reliable and suitable for decision making.
Global Positioning System (GPS) and Photolog	All sampling locations were recorded using a GPS and camera. Locations of all samples are provided on Figure 2 . Photographs obtained during this investigation are provided in Attachment A .

Table 7: Field notes

Sample Point	Sample Depth (mm)	PID (ppm)	Description
KLF01	100	0	<ul style="list-style-type: none"> Vehicle transition area Compacted aggregate, medium sized stones to fine sand, brown grey in colour
KLF02	50	0	<ul style="list-style-type: none"> Organic rich, moist, dark sandy loam soils Garden hose adjacent to vehicle parking area
KLF03	100	0	<ul style="list-style-type: none"> Garden bed adjacent to building Paint flaking from wall Sandy loam organic fine to medium soils

Sample Point	Sample Depth (mm)	PID (ppm)	Description
KLF04A	50	0	<ul style="list-style-type: none"> Grassed area Light coloured sandy soil
KLF04B	300	0	<ul style="list-style-type: none"> Sandy dry with some fine dry material Grey light orange in colour
KLF05	50	0	<ul style="list-style-type: none"> Garden area heavily mulched (50mm) Sandy grey organic soil with roots present
KLF06	50	0	<ul style="list-style-type: none"> Run off point deriving from front car park Grey sandy loam – some organic material Mixture of grass and bare soil
KLF07A	50	0	<ul style="list-style-type: none"> Soil mound with glass, plastic and wood chips present Sandy clay, organic rich, dark brown
KLF07B	300	0	<ul style="list-style-type: none"> Moist sandy clay with orange to white mottling. Some large stones were also present
KLF08	50	0	<ul style="list-style-type: none"> Grassed surface Organic rich moist sandy clay, brown in colour Some specs of charcoal/ash present
KLF9A	50	0	<ul style="list-style-type: none"> Soil mound Sandy loam soils, light brown with finer sands present Organic material with leaf litter
KLF09B	100	0	<ul style="list-style-type: none"> Hard clayey sand brown in colour
KLF10	50	0	<ul style="list-style-type: none"> Grey <5mm aggregate Soil red to brown sandy clay Surface has bare patches with some grass
KLF11	50	0	<ul style="list-style-type: none"> Vegetative leaf litter material Plastic liner at base Grey sandy soil fine grained
KLF12A	50	0	<ul style="list-style-type: none"> Sandy soil organic fine-grained brown to grey in colour Area looks to have been levelled.
KLF12B	300	0	<ul style="list-style-type: none"> Fine grained clayey sand red to orange with some white mottling moist soil
KLF13	50	0	<ul style="list-style-type: none"> Organic rich sandy clay Surface grassed
KLF14A	50	11	<ul style="list-style-type: none"> Ash mixed with rich organic soils Dark sandy loam, fine grained
KLF14B	300	2.1	<ul style="list-style-type: none"> Light grey sandy loam, organic rich. Some ash present.

4.2 Identified AEC

Following the Site walkover and Kleinfelder's preliminary review of historical information pertaining to the school, the following areas were identified as potential AEC within the northern portion of the Site associated with former school use:

1. The potential use of pesticides in managed areas;
2. Potential contaminants from ash from a bonfire area (PAH), specifically where potentially harmful products may have been burnt e.g. fuels;
3. Potential fill material within irregular, but discrete, soil mounds; and
4. Presence of lead paint flakes and asbestos on the ground surface / surficial soils derived from the degradation of historical exterior building materials.

4.3 Assessment Criteria & Analytical Results

A total of 18 primary soil samples were collected by Kleinfelder personnel and submitted to the laboratory for analysis. All samples were analysed for metals and asbestos in soil to take into consideration the COPC originating from aging building materials. A further limited analyses including BTEXN, TRH, PAH, PCB and OCP/OPP were taken from 6 sample points within identified potential AEC.

Soil sample locations are illustrated in **Figure 2**. The soil samples were submitted to Eurofins Mgt Laboratories (Eurofins) located in Newcastle, NSW. Soil samples collected were analysed for the following COPC:

- BTEXN;
- TRH C₆ – C₄₀;
- Total Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
- PAH;
- PCB;
- OCP/OPP; and
- Asbestos in Soils (Presence/Absence).

QC samples in the form of one duplicate and one triplicate were collected and submitted to Eurofins and ALS respectively for analysis.

During Kleinfelder's Site walkover we did not observe potential bulk solid samples of ACM in soils, therefore we did not take any sample for bulk asbestos. It is noted that a separate Hazmat survey was undertaken to identify the potential for asbestos to be present in buildings. Please refer to the separate Hazmat report for further details on potential asbestos on site.

4.3.1 Protection of highly modified ecosystems

Schedule B5a of the National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013) provides a range of investigation levels for the protection of ecosystems, referred to as Ecologically Based Investigation Levels (EILs) and Ecological Screening Levels (ESLs) and are applicable for assessment of potential contamination risks to terrestrial ecosystems in the upper 2m of soil.

The Site has historically been used for public schooling with the proposed works aiming to redevelop the Site as a new school. Conservative screening criteria adopted to assess the suitability of soils beneath the site based on land use are "Urban Residential/Public Open Space (NEPM 2013)" which applies an 80% species and soil processes protection level.

Criteria relating to urban residential space have been used to assess on-site environmental impacts, by direct comparison with soil concentrations found at each sampling location assuming coarse soil. It is noted that the use of screening criteria in this study is not prescriptive, however it provides a priority to areas that may require further assessment. The adopted investigation levels are provided in **Table 8**. It should be noted that the most conservative criteria have been used for preliminary screening purpose e.g. no account is taken of ambient background concentrations.

4.3.2 Protection of human health

Schedule B1 of the NEPM 2013 provides a range of investigation levels for the protection of human health, referred to as Health Investigation Levels (HILs) and Health Screening Levels (HSL).

HIL A and HSL A – Residential have been selected for screening purposes given that the Site is proposed to be developed for educational purposes, more specifically a primary school. Adopted soil investigation levels for the human health beneficial use are provided in **Table 8** and generally apply to the top 3m of soil for residential use. The criteria selected for Vapour is Sand (based on Douglas Partners logs which recorded sand as the dominant soil type, and site observations) and depth of 0 to <1m.

For preliminary screening purposes, the adopted HSL criteria assumes a petroleum source (e.g. petrol or diesel).

4.3.3 Soil analytical results

The number of soil samples analysed, analytes tested, minimum/maximum constituent concentrations and samples that exceeded the investigation levels are detailed in **Table 8**. Comprehensive summary tables of soil analytical results and copies of laboratory certificates and signed chain of custody forms are included in **Attachment D**.

Table 8: Summary of soil analytical results exceeding adopted investigation levels*

Number of Samples Analysed	Analyte	EIL/ESL (mg/kg)	HIL/HSL-A (mg/kg)	Min Conc. (mg/kg)	Max Conc. (mg/kg)	Samples Exceeding Adopted Investigation Levels
Metals and metalloids						
18	Copper	60	6000	<5.0	65	EIL – KLF01 @ 65 mg/kg
18	Nickel	30	400	<0.5	68	EIL – KLF01 @ 45 mg/kg EIL – KLF10 @ 68 mg/kg
18	Zinc	70	7,400	13	270	EIL – KLF02 @ 100 mg/kg EIL – KLF05 @ 77 mg/kg EIL – KLF07A @ 210 mg/kg EIL – KLF08 @ 210 mg/kg EIL – KLF09A @ 270 mg/kg EIL – KLF11 @ 190 mg/kg
Total Recoverable Hydrocarbons						
6	>C16 - C34	300	-	<100	350	ESL- KLF01 @ 350m mg/kg
PAH						
6	Benzo(a)pyrene TEQ (upper bound)	-	3	1.2	8.0	HIL – KLF01 @ 8.0 mg/kg
6	Benzo(a)pyrene	0.7	-	<0.5	5.6	ESL – KLF01 @ 5.6 mg/kg

Note: * Results recorded by the laboratory <LOR for all samples, or where no exceedance of the adopted criteria was recorded for a particular analyte, have not been included in this summary (e.g. BTEX, TRH C₆ – C₁₀). All LORs are below the adopted screening criteria
 - no published Australian criteria

5. PRELIMINARY WASTE CLASSIFICATION

To provide a tentative waste classification of the upper 300mm of soils encountered at the locations sampled during this preliminary sampling program, analytical results were compared to the NSW EPA Waste Classification Guidelines to facilitate management and appropriate disposal. Soil analytical results were measured against Contaminant Threshold (CT) values CT1 - General Solid Waste and CT2 - Restricted Solid Waste.

A summary of results exceeding the General Solid Waste and Restricted Solid Waste classifications are described below and are outlined in more detail within **Attachment D**.

KLF01 exceeded the CT2 for Benzo(a)pyrene (5.6mg/kg). The upper limit classification for CT2 is 3.2mg/kg, classifying this sample as Hazardous Waste.

KLF01 exceeded the CT1 classification for Nickel (45mg/kg). The upper limit classification for CT1 is 40mg/kg, classifying this sample as Restricted Solid Waste.

KLF10 exceeded the CT1 classification for Nickel (68mg/kg). The upper limit classification for CT1 is 40mg/kg, classifying this sample as Restricted Solid Waste.

Should the above in-situ sample locations be representative of site-wide conditions, the majority of proposed cut/fill soils (possibly excluding tarmac hardstand or road base), may be classified as General Solid Waste. However, the in-situ sample results have also recorded localised areas of Restricted Solid and Hazardous Waste. It is noted that this is a preliminary screening and more detailed Toxicity Characteristics Leaching Procedure (TCLP) and ex-situ testing would be required during construction to make a final determination of waste classification prior to disposal.

6. INITIAL EVALUATION OF CONTAMINATION POTENTIAL

The criteria adopted in this initial stage of assessment have been used to provide an initial understanding of likely soil conditions within identified AEC, which are deemed representative of general conditions across the Site. The data obtained as part of this investigation has been used to make an initial evaluation as to whether further assessment is required under the guidance of SEPP 55 (i.e. Stage 1 or 2 site investigations).

6.1.1 Terrestrial Ecology

The following samples were identified to be present exceeding the adopted screening criteria:

- Benzo(a)pyrene in KLF01 @ 5.6 mg/kg;
- Total Recoverable Hydrocarbons in KLF01 @ 350 mg/kg;
- Copper in KLF01;
- Nickel in KLF01 & KLF10; and
- Zinc in KLF02, KLF05, KLF07A, KLF08, KLF09A & KLF11.

KLF01 was sampled within a small gravel aggregate section of the northern access road most likely used by vehicles transitioning between school drop off/pick-up. The sample was taken at the base of the gravel aggregate where a change in soil profile was evident (100mm). Low concentrations of Benzo(a)pyrene have most likely occurred through incidental oil leakages from transitioning vehicles, rather from a large contaminant source. A soil sample taken adjacent to the gravel aggregate within a grassed area (KLF02) recorded Benzo(a)pyrene below the LOR, providing evidence of a discrete area of impact.

Given there relatively low concentrations and/or widespread occurrence in natural soil samples, the elevated concentrations of nickel, copper and zinc are considered to be ubiquitous to the environment and representative of ambient background concentrations.

Human Health

Only one sample was identified to be present exceeding the selected human health screening criteria:

- Benzo(a)pyrene TEQ (upper bound) in KLF01.

As discussed above, this sample location is attributed to minor leaks from transitioning vehicles and likely to be of minor magnitude. Low concentrations of heavy-end petroleum hydrocarbons (TRH) and PAH were also detected in this sample, confirming a likely degraded fuel or oil source from vehicle use. This is not uncommon in existing school parking/transitioning areas. An adjacent grass sample was used to delineate the likely extent of the source.

7. SUMMARY STATEMENT

1. Based on the findings of this initial evaluation stage, it is considered that there is limited potential for contamination to be present within the proposed area of school redevelopment that would result in an increased risk of harm to terrestrial ecology or human health in the long-term.

2. With the exception of road infrastructure, anthropogenic fill comprising waste materials were not identified in the subsurface during soil investigations conducted by Kleinfelder or Douglas Partners.
3. Consequently, it is considered that further Stage 1 and Stage 2 Site Investigations are not warranted at this stage of assessment to inform the Development Application.
4. Notwithstanding, the following suggestions are made to ensure the proposed development takes cognisance of potential contamination and waste classification issues during construction, to allow a practicable management response prior to occupation of the new school:
5. Additional step-out testing within the local of sample KLF01 to further delineate this localised impact to inform if the material should be re-used within non-sensitive areas of the development (e.g. road base) or disposed off-site to a suitably licensed facility, if detected substantially above acceptability criteria;
6. Preparation of an unexpected finds protocol for the redevelopment works (e.g. demolition, site clearance and construction work) to manage unforeseen contamination issues not disclosed from this or previous investigations at the Site. The unexpected finds protocol should adopt procedures for the conduct of additional site investigations in the event that contamination issues are identified that could have a substantial impact on the proposed land use (e.g. building demolition encounters leaking underground fuel storage tanks);
7. Preparation of a Construction Environmental Management Plan (CEMP) to ensure that the proposed development does not impact upon the environment (e.g. control of noise and dust); and
8. Fill and natural soils proposed for cut/fill be stockpiled separately based on sensory observations and subject to ex-situ waste classification testing using TCLP analysis. The areas local to KLF01 and KLF10 should be stockpiled separately (noting they could be classified in-situ in the first instance to provide more confidence in potential waste classification).

Yours sincerely,



Daniel Kousbroek B.Env.Sc (Hons)

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Attachment A	Photo Logs
Attachment B	Geological data
Attachment C	Groundwater bore search data
Attachment D	Laboratory Certificates
Attachment E	QA/QC Review

5. PRELIMINARY WASTE CLASSIFICATION

To provide a tentative waste classification of the upper 300mm of soils encountered at the locations sampled during this preliminary sampling program, analytical results were compared to the NSW EPA Waste Classification Guidelines to facilitate management and appropriate disposal. Soil analytical results were measured against Contaminant Threshold (CT) values CT1 - General Solid Waste and CT2 - Restricted Solid Waste.

A summary of results exceeding the General Solid Waste and Restricted Solid Waste classifications are described below and are outlined in more detail within **Attachment D**.

KLF01 exceeded the CT2 for Benzo(a)pyrene (5.6mg/kg). The upper limit classification for CT2 is 3.2mg/kg, classifying this sample as Hazardous Waste.

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The criteria adopted in this initial stage of assessment have been used to provide an initial understanding of likely soil conditions within identified AEC, which are deemed representative of general conditions across the Site. The data obtained as part of this investigation has been used to make an initial evaluation as to whether further assessment is required under the guidance of SEPP 55 (i.e. Stage 1 or 2 site investigations).

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Only one sample was identified to be present exceeding the selected human health screening criteria:

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3. Consequently, it is considered that further Stage 1 and Stage 2 Site Investigations are not warranted at this stage of assessment to inform the Development Application.
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Yours sincerely,



Daniel Kousbroek B.Env.Sc (Hons)

Environmental Scientist – Contaminated Lands

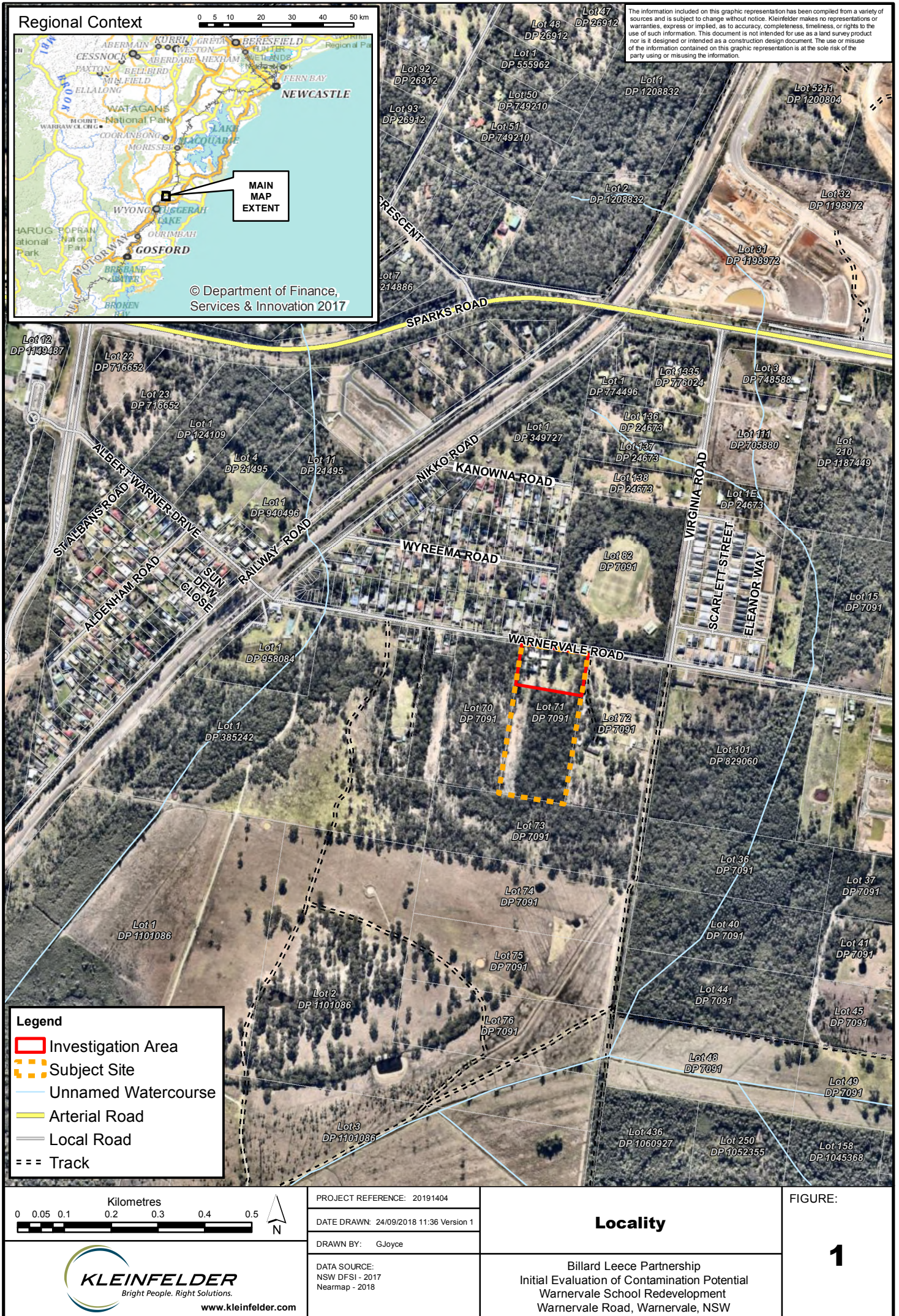
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Attachment A	Photo Logs
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FIGURES



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ATTACHMENT A PHOTO LOGS



Photo 1: View east looking at parked vehicles within the access road.



Photo 2: View North looking at vehicle parking within the access road.



Photo 3: Compacted gravel aggregate (Sample KLF01).



Photo 4: Washdown Area looking north west (Sample KLF02).



Photo 5: Small building located in the north west corner of the Site showing signs of paint peeling from the weatherboard (Sample KLF03).



Photo 6: Grassed area adjacent to mulched garden beds (Sample KLF04A & KLF04B).



Photo 7: Mulched garden bed between the two southern buildings looking north (Sample KLF05).



Photo 8: View looking north under the demountable building (Sample KLF06).



Photo 9: Mound of soil and building material looking west (Sample KLF07A & KLF07B).



Photo 10: Looking north east towards the southernmost buildings (Sample KLF08).



Photo 11: Looking south along the western boundary of the Site.

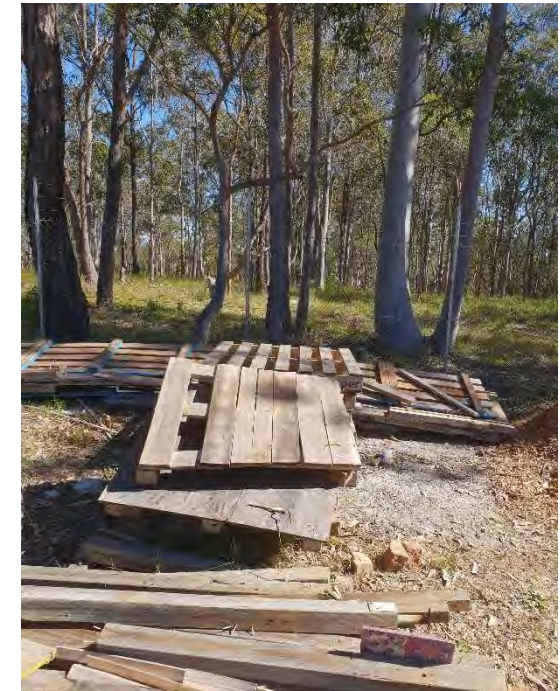


Photo 12: Looking west at dis-used pallets.



Photo 13: Small mound of soil surrounded by building material (Sample KLF09A & KLF09B).



Photo 14: Small storage compound containing building material and dis-used school equipment



Photo 15: Mound of vegetative material looking west (Sample KLF11).



Photo 16: Image looking east identifying potential former building site (Sample KLF10).



Photo 17: Levelled field looking north (Sample KLF12A & KLF12B).



Photo 18: Pile of vegetative material looking east



Photo 19: Decommissioned power mains box looking south west.



Photo 20: Concrete surface looking west (Sample KLF13).



Photo 21: Copper logs and plastic waste looking east.



Photo 22: Small fire pit (Sample KLF14A & KLF14B).

ATTACHMENT B GEOLOGICAL DATA

gk

GOROKAN



Landscape—undulating low hills and rises on lithic sandstones of the Tuggerah Formation. Local relief <30 m; slope gradients <15%. Broad crests and ridges, long gently inclined slopes and broad drainage lines. Partially cleared low open-forest.

Soils—moderately deep (50–150 cm) Soloths (Dy2.41, Dy3.41), Yellow Podzolic Soils (Dy3.11, Dy3.21) on ridges and crests; Soloths (Dy2.41, Dy3.41), Yellow Podzolic Soils (Dy3.11, Dy3.21) and Grey-brown Podzolic Soils (Db1.21, Db2.21) on slopes with Gleyed Podzolic Soils (Dg2.41) along drainage lines.

Limitations—very high erosion hazard, foundation hazard (localised), seasonal waterlogging, hardsetting, strongly acid, low fertility, plastic, impermeable soils.

LOCATION

Undulating low hills and rises on the Central Coast Lowlands north of Wyong on Tuggerah Formation. It includes the areas of Warnervale, Wyongah, Kanwal, Gorokan, Toukley and along the eastern side footslopes of Jilliby Jilliby Creek Catchment. Small areas occur at Norah Head.

LANDSCAPE

Geology

Narrabeen Group—Clifton Subgroup—Tuggerah Formation: light coloured lithic sandstone, pebbly in part, red brown and grey green claystone and siltstone with rare conglomerate.

Topography

Undulating low hills and rises with local relief <30 m and slope gradients <15%. Broad crests and ridges with long gently inclined slopes and broad drainage lines. Rock outcrop is absent.

Vegetation

Generally partially cleared low open-forest. Extensive clearing has occurred in urban and grazing areas. Common tree species include smooth barked-apple (*Angophora costata*), scribbly gum (*Eucalyptus haemastoma*), red bloodwood (*E. gummifera*), brown stringybark (*E. capitellata*), and forest oak (*Allocasuarina torulosa*). Common understorey species include mountain devil (*Lambertia formosa*), hill banksia (*Banksia spinulosa* var. *collina*), banksia (*Banksia oblongifolia*), flaky-barked tea-tree (*Leptospermum attenuatum*), broad-leaf drumsticks (*Isopogon anemonifolius*). Paperbarks (*Melaleuca* spp.) occur in poorly drained areas and along drainage lines.

Land Use

Predominantly native or improved pasture with some uncleared woodland. The pastures are used mainly for horse grazing with some cattle grazing. Small hobby farms are numerous, and urban areas are common including Warnervale, Gorokan and Toukley.

Existing Erosion

Moderate sheet erosion and the removal of the sandy topsoil have occurred where the protective vegetative cover has been disturbed. This results in a hardsetting layer being exposed at the surface which inhibits plant growth and increases surface runoff and subsequent erosion.

Included Soil Landscapes

Small areas of Woodburys Bridge (**wo**) and Doyalson (**do**) soil landscapes have been included.

SOILS

Dominant Soil Materials

gk1—Loose dark brown loamy sand. Dark brown loamy sand to sandy loam with single-grained structure and sandy fabric. It occurs as topsoil (A₁ horizon).

This material is often water repellent. Peds, when present, are weakly developed sub-angular blocky, 5–20 mm, with a rough porous ped fabric. Surface condition is friable to loose. Colour is commonly dark brown (10YR 3/3) but can range from brownish black (10YR 2/3) to dull yellowish brown (10YR 4/3). The pH ranges from strongly acid (pH 5.0) to moderately acid (pH 5.0–5.5). Charcoal and ironstone rock fragments are common. Roots are common.

gk2—Yellowish brown hardsetting clayey sand. Dull yellowish brown clayey sand with massive structure and earthy fabric. This material usually occurs as shallow subsoil (A₂ horizon).

This material is hardsetting when dry. Texture is usually clayey sand but can range from loamy sand to fine sandy clay loam. Colour ranges from dull yellowish brown (10YR 4/3) to dull yellow orange (10YR 6/3). This material often shows bleached colours when dry (10YR 7/2, 10YR 7/3). Pale yellow or orange mottles are often present and follow root channels. pH is usually moderately acid (pH 5.0) but can range to slightly acid (pH 6.0). Ironstone rock fragments are common. Charcoal fragments are few and roots are common.

gk3—Yellowish brown strongly pedal clay. Yellowish brown light to medium clay with strong angular blocky structure and rough ped fabric. It occurs as subsoil (B horizon).

Texture is commonly a medium clay but can range from light clay to heavy clay. Peds range in size from 20–50 mm. Brown clay ped coatings (cutans) are distinctive and common. Colour is commonly yellowish brown (10YR 5/6, 10YR 5/8) or a bright yellowish brown (10YR 6/6, 10YR 6/8). Mottles may be present and often increase with depth. The pH ranges from strongly acid (pH 4.0) to moderately acid (pH 5.5). Few ironstone or sandstone rock fragments are present. Charcoal fragments are absent and roots are few.

gk4—Light grey massive clay. Light grey light medium to medium clay with massive structure and dense earthy fabric. It occurs as deep subsoil (B/C horizon) above sandstone bedrock.

Occasionally a weak large prismatic structure (peds 20–100 mm) with rough ped surfaces is present. Colour is commonly light grey (10YR 7/1, 10YR 8/1, 10YR 8/2) but can range to dull yellow orange (10YR 6/3). Red yellow or orange mottles are often present. The pH is usually moderately acid (pH 5.0) but can range from strongly acid (pH 4.0) to slightly acid (pH 6.0). Rock fragments and roots are few and charcoal fragments are absent.

Associated Soil Materials

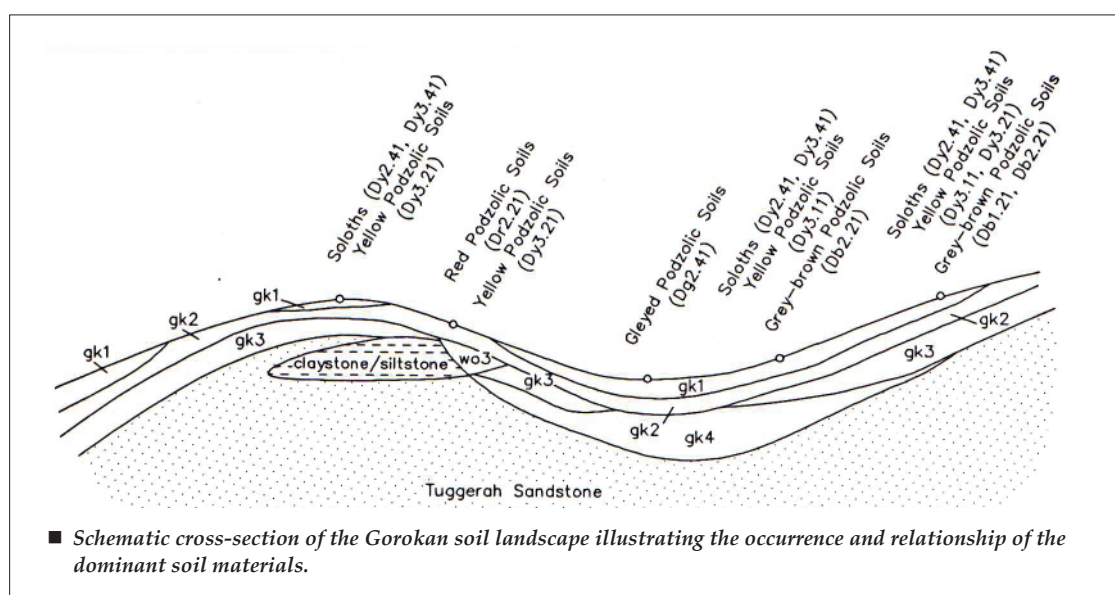
wo3—Reddish brown slaking pedal clay. Occasional mudstone lenses occur in the Tuggerah Formation, and the subsoil is similar to Woodburys Bridge soil material **wo3** which is commonly a reddish brown light medium to medium clay with a strong angular blocky or prismatic structure and a smooth ped fabric. It has a low wet bearing strength, is dispersible, and has a moderate shrink-swell.

Occurrence and Relationships

The occurrence of the dominant soil materials is fairly uniform across the landscape. However, soil depths of materials do vary considerably. Shallower soils generally occur on crests and upper slopes whilst deeper soils are found on the lower slopes.

Crests ridges and upper slopes. Generally, up to 15 cm of loose dark brown sandy loam (**gk1**) overlies up to 30 cm of yellowish brown hardsetting clayey sand (**gk2**) and up to 60 cm of yellowish brown strongly pedal clay (**gk3**). **gk3** is often underlain by >20 cm of light grey massive clay (**gk4**) [Soloths (Dy2.41), Dy3.41), Yellow Podzolic Soils (Dy3.21)]. In disturbed areas **gk1** is often absent and **gk2** is exposed at the surface. The boundaries between the soil materials are sharp or clear except between **gk3** and **gk4** which is gradual. Total soil depth ranges from 50–150 cm.

Midslopes. Usually <15 cm of **gk1** overlies 10–50 cm of **gk2** and 20–50 cm of **gk3**. **gk3** often overlies >50 cm of **gk4** [Soloths (Dy2.41, Dy3.41), Yellow Podzolic Soils (Dy3.21, Dy3.11) and Grey-brown Podzolic Soils (Db1.21, Db2.21)]. All boundaries are sharp or clear with the exception of **gk3** to **gk4** which is gradual. Total soil depth is 100–200 cm.



Lower slopes. 10–50 cm of **gk1** overlies 10–50 cm of **gk2** and 20–50 cm of **gk3**. **gk3** overlies >50 cm of **gk4** [Soloths Dy2.41, Dy3.41), Yellow Podzolic Soils (Dy3.11) and Grey-brown Podzolic Soils (Db2.21)]. The boundaries are all clear to sharp except between **gk3** and **gk4** which is gradual. Total soil depth is >150 cm.

Drainage lines. Up to 10 cm of **gk1** overlies 30 cm of **gk2** and >30 cm of **gk4** [Gleyed Podzolic Soils (Dg2.41)]. Total soil depth ranges from 50–>150 cm.

Claystone and siltstone lenses. Occasionally claystone and siltstone lenses occur and soils are similar to the Woodburys Bridge (**wo**) soil landscape except the topsoils are often sandier. Up to 10 cm of **gk1** overlies up to 30 cm of **gk2** and 40–>150 cm of **wo3** [Red Podzolic Soils (Dr2.21) and Yellow Podzolic Soils (Dy 3.21)]. Boundaries between soil materials are sharp. Total soil depth ranges from 50–>150 cm.

LIMITATIONS TO DEVELOPMENT

Landscape Limitations

Very high erosion hazard
Mine subsidence district (localised)
Run-on (localised)
Seasonal waterlogging (localised)
High foundation hazard (localised)
Moderate foundation hazard

Soil Limitations

gk1	Strongly acid Low fertility High erodibility Sodicity High permeability Potential aluminium toxicity Low available water-holding capacity
gk2	Hardsetting surface Low fertility Strongly acid Sodicity High erodibility Potential aluminium toxicity Low available water-holding capacity
gk3	Low fertility High erodibility Strongly acid High potential aluminium toxicity High plasticity

gk4	Low wet bearing strength (localised) Very high erodibility Low fertility High plasticity Sodicity
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Fertility

The fertility of the soil materials is low. Soils are low in organic matter, low in available nutrients, with low to moderate CECs and available water-holding capacities. **gk1, gk2, gk4** are sodic and have high potential aluminium toxicity. Hardsetting topsoils (**gk2**) are often exposed at the surface. Soil volumes for root penetration are often limited on crests and upper slopes. Soil depths range considerably from shallow on crests and ridges and upper slopes to moderately deep to deep on footslopes.

Erodibility

	K factor	Non-concentrated flows	Concentrated flows	Wind
gk1	0.035	moderate	high	low
gk2	0.050	high	high	low
gk3	0.031	moderate	high	low
gk4	0.041	high	very high	low

Erosion Hazard

	Non-concentrated flows	Concentrated flows	Wind
grazing	moderate–high	moderate	slight
cultivation	very high	very high	slight
urban	very high	very high	slight

Foundation Hazard

The foundation hazard is generally moderate except on claystone and siltstone lenses where >50 cm of **wo3** occurs and a high foundation hazard may be present. Limitations include plastic subsoils with a moderate shrink-swell potential, localised areas of high run-on and seasonal waterlogging. Depth to subsoil is 30–50 cm, and total soil depth ranges from 50–>150 cm.

Land Capability

Generally moderate limitations for urban development.

Rural Capability

High to severe limitations for regular cultivation but low limitations for grazing.



Soil Profile Report

SITE DETAILS

Site Location:	WOLLCRAH RD WARNERVALE
Profile Details:	Tuggerah Lakes soil landscapes Survey (1000384), Profile 28, collected from a batter by Mr Casey Murphy on 14 November, 1989
Map Reference:	MGA Grid Reference: Zone 56, 356605E, 6320790N. 9131 GOSFORD (1:100000) map sheet.
Physiography:	dry sclerophyll forest on sandstone-lithic lithology and used for volun./native pasture. Slope 4.0% (measured), elevation 20.0 m, aspect south. Surface condition is soft, profile is mod. well drained, erosion hazard is moderate, and no salting evident
Vegetation/Land Use:	extensive clearing at the site, used for volun./native pasture, with volun./native pasture in the general area
Surface Condition:	soft when described, ground cover is 85%
Erosion/Land Degradation:	moderate; wind erosion at site is none; no salting evident
Soil Hydrology:	profile is mod. well drained, , run on is moderate and runoff is moderate
Soil Type:	Soloth (Solod) (GSG), Dy3.41 (PPF)
Base of observation:	
Profile Field Notes:	Surface firm. Long slopes.. Semi rural. Sand fraction medium. Brown ped coatings.

SOIL DESCRIPTION

Layer 0

0.00 - 0.00 m

Coarse Fragments: few (2-10%), sedimentary, dispersed, weakly weathered, sub-rounded, sub-angular, fine gravel (2-6 mm), gravel (6-20 mm),

Layer 1 Horizon: A1

0.00 - 0.09 m

Texture: coarse sandy loam

Colour: very dark greyish brown (brownish black) (10YR 3/2) [moist] with no recorded mottles

Structure: moderate pedality (10 - 20 mm, also 5 - 10 mm, fabric is rough-faced peds), ped coatings are none

Coarse Fragments: few (2-10%), sedimentary, dispersed, weakly weathered, sub-rounded, sub-angular, fine gravel (2-6 mm), gravel (6-20 mm),

Pans: not evident

Segregations: very few (< 2%), organic, nodules, medium (2-6 mm), coarse (6-20 mm),

	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are evident(width <5 mm), macropores are nil
	Moisture/Consistence:	moderately moist, slightly sticky, texture modifier test result was no change, disruptive test result was moderately weak force,
	Field chemical tests:	Field pH is 6.0 (Raupach),
	Layer Notes:	Under 2cm litter, Casuarina regrowth.
Layer 2	Horizon: A2	
0.09 - 0.25 m	Texture:	coarse clayey sand
	Colour:	brown (dull yellowish brown) (10YR 5/3) [moist] or light grey (dull yellow orange) (10YR 7/2) [dry] with 20% - 50% distinct unspecified orange mottles
	Structure:	massive (fabric is sandy), ped coatings are none
	Coarse Fragments:	few (2-10%), sedimentary, dispersed, weakly weathered, sub-rounded, sub-angular, fine gravel (2-6 mm), gravel (6-20 mm),
	Pans:	not evident
	Segregations:	very few (< 2%), organic, nodules, medium (2-6 mm), coarse (6-20 mm),
	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are evident(width <5 mm), macropores are nil
	Moisture/Consistence:	dry, slightly sticky, texture modifier test result was no change, disruptive test result was moderately firm force,
	Field chemical tests:	Field pH is 5.5 (Raupach),
	Layer Notes:	A2 hardsetting where exposed.
Layer 3	Horizon: B2	
0.25 - 0.55 m	Texture:	medium clay
	Colour:	brownish yellow (bright yellowish brown) (10YR 6/6) [moist] with 20% - 50% distinct unspecified yellow mottles
	Structure:	strong pedality (20 - 50 mm, fabric is rough-faced peds), ped coatings are common (10-50%)
	Coarse Fragments:	not evident,
	Pans:	not evident
	Segregations:	not evident,
	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are evident(width <5 mm), macropores are nil
	Moisture/Consistence:	moist, slightly sticky, texture modifier test result was no change, disruptive test result was very firm force,
	Field chemical tests:	Field pH is 5.5 (Raupach),
	Layer Notes:	Dominant peds 10-50mm.
Layer 4	Horizon: B3	
0.55 - 0.70 m	Texture:	sandy clay loam
	Colour:	light grey (greyish yellow) (2.5Y 7/2) [moist] with 2% - 10% prominent unspecified red mottles, and 2% - 10% distinct unspecified yellow subdominant mottles
	Structure:	massive
	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are nil, macropores are nil

Moisture/Consistence: moist,
Field chemical tests: Field pH is 5.5 (Raupach),
Layer Notes: B3/C horizon. *** Layer depth given as
+0.70m. Sugery, could not dig deeper. Texture
sandy clay loam to sandy clay.

Layer 5

0.70 - 1.00 m

Colour: colour not recorded with no recorded mottles
Soil fauna: Activity is nil
Cracks/Macropores: Cracks are nil, macropores are nil
Layer Notes: Unknown layer(s) - created due to gap in layer depths;
adjusted subsequent layer numbers to be sequential.

LABORATORY TESTS

None available

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

Report generated on 24/09/2018 at 10:11 AM

To contact us, email: soils@environment.nsw.gov.au

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BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Central Coast Schools - Warnervale
LOCATION: 75 Warnervale Road, Warnervale

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 83313.00
DATE: 21/12/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per 150mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
		SAND: Dense to very dense, grey brown and yellow brown sand with trace clay and rootlets		D	0.2							
					0.4							
				B	0.5							
				D	0.6							
	0.7	SANDY CLAY: Very stiff to hard, orange brown mottled grey brown sandy clay, M<Wp			0.7							
				B	0.8		pp >400					
					0.9							
	1			D	1.0							
		- clayey sand/sandy clay band from 1.4m - 1.5m			1.3		pp = 350-380					
		- becoming red brown and grey at 1.55m			1.7		pp = 350-380					
	2			D	2.0							
					2.2		pp = 320-370					
	2.5	Bore discontinued at 2.5m. Limit of investigation										
	3											

RIG: Toyota 4WD

DRILLER: M Harrison

LOGGED: M Harrison

CASING:

TYPE OF BORING: 60mm ϕ Dynamic Push Tube (continuous sample)

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND




A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	>	Water seep	S	Standard penetration test
E	Environmental sample	≡	Water level	V	Shear vane (kPa)

BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Central Coast Schools - Warnervale
LOCATION: 75 Warnervale Road, Warnervale

SURFACE LEVEL: --
EASTING: 356180
NORTHING: 6319998
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 83313.00
DATE: 21/12/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per 150mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
	0.2	SAND: Medium dense, grey brown sand with some rootlets, humid		D	0.1							
	0.2	CLAY: Hard, yellow brown clay with trace sand and organics, M<Wp		B	0.2							
	0.6			D	0.5		pp >400					
	0.75	SANDY CLAY: Very stiff to hard, orange brown sandy clay, M<Wp		D	0.7		pp >400					
	0.75	Bore discontinued at 0.75m. Refusal on sandstone										

RIG: Toyota 4WD
DRILLER: M Harrison
TYPE OF BORING: 60mm ϕ Dynamic Push Tube (continuous sample)
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

LOGGED: M Harrison **CASING:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND					
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	>	Water seep	S	Standard penetration test
E	Environmental sample	≡	Water level	V	Shear vane (kPa)

BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Central Coast Schools - Warnervale
LOCATION: 75 Warnervale Road, Warnervale

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 83313.00
DATE: 21/12/2017
SHEET 1 OF 1

[illegible]

RIG: Toyota 4WD

DRILLER: M Harrison

LOGGED: M Harrison

CASING:

TYPE OF BORING: 60mm ϕ Dynamic Push Tube (continuous sample)

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	G	Gas sample
B	Bulk sample	P	Piston sample
BLK	Block sample	U ₁	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W _{seep}	Water seep
E	Environmental sample	W _{level}	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)








BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Central Coast Schools - Warnervale
LOCATION: 75 Warnervale Road, Warnervale

SURFACE LEVEL: --
EASTING: 356180
NORTHING: 6319943
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 83313.00
DATE: 21/12/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per 150mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
	0.15	FILLING: Green grey and brown gravelly sand roadbase filling, humid		D	0.1							
		SAND: Very dense, grey brown sand with trace rootlets, humid		D	0.2							
	0.35	CLAY: Hard, orange brown and red brown clay with trace organics and some sand		U ₅₀	0.4							
					0.55							
	1.05	SANDSTONE: Extremely low strength, extremely weathered, grey sandstone with soil like properties		D	1.0							
	1.1	Bore discontinued at 1.1m. Refusal on sandstone		D	1.1							

RIG: Toyota 4WD
DRILLER: M Harrison
TYPE OF BORING: 60mm ϕ Dynamic Push Tube (continuous sample)
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

LOGGED: M Harrison
CASING:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND					
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	>	Water seep	S	Standard penetration test
E	Environmental sample	≡	Water level	V	Shear vane (kPa)

BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Central Coast Schools - Warnervale
LOCATION: 75 Warnervale Road, Warnervale

SURFACE LEVEL: --
EASTING: 356080
NORTHING: 6320017
DIP/AZIMUTH: 90°/--

BORE No: 5
PROJECT No: 83313.00
DATE: 21/12/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per 150mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
	0.18	SAND: Medium dense, grey brown sand with trace clay, humid		D	0.1							
		SANDY CLAY: Stiff, yellow brown sandy clay with trace organics, M<Wp			0.25		pp = 220-280					
		- grading to red brown at 0.5m		B	0.3							
				D	0.5		pp = 120-150					
	0.65				0.6		pp = 280-320					
	0.7	SANDSTONE: Extremely low strength, extremely weathered, grey sandstone with soil like properties		D	0.7							
		Bore discontinued at 0.7m. Refusal on sandstone										

RIG: Toyota 4WD
DRILLER: M Harrison
TYPE OF BORING: 60mm ϕ Dynamic Push Tube (continuous sample)
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

LOGGED: M Harrison **CASING:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

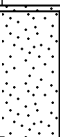

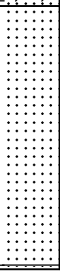
SAMPLING & IN SITU TESTING LEGEND					
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	>	Water seep	S	Standard penetration test
E	Environmental sample	≡	Water level	V	Shear vane (kPa)

BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Central Coast Schools - Warnervale
LOCATION: 75 Warnervale Road, Warnervale

SURFACE LEVEL: --
EASTING: 356180
NORTHING: 6319902
DIP/AZIMUTH: 90°/--

BORE No: 6
PROJECT No: 83313.00
DATE: 21/12/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per 150mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
		SAND: Dense, grey brown sand with trace rootlets, humid		D	0.1							
	0.35	CLAY: Very stiff, orange brown and red brown clay with trace organics and some sand, M<Wp		D	0.4		pp >400					
					0.5							
					0.8		pp >400					
1	1.0	SANDSTONE: Extremely low strength, extremely weathered, grey and yellow brown sandstone with soil like properties		D	1.5		pp >500					
	1.7	Bore discontinued at 1.7m. Refusal on sandstone										
	2											
	3											

RIG: Toyota 4WD

DRILLER: M Harrison

LOGGED: M Harrison

CASING:

TYPE OF BORING: 60mm ϕ Dynamic Push Tube (continuous sample)

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	>	Water seep	S	Standard penetration test
E	Environmental sample	≡	Water level	V	Shear vane (kPa)

BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Central Coast Schools - Warnervale
LOCATION: 75 Warnervale Road, Warnervale

SURFACE LEVEL: --
EASTING: 356060
NORTHING: 6319943
DIP/AZIMUTH: 90°/--

BORE No: 7
PROJECT No: 83313.00
DATE: 21/12/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per 150mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
		SANDY CLAY: Stiff, yellow brown sandy clay with some organics		D	0.1		pp = 90-150					
	0.25			D	0.2							
	0.35	SAND: Medium dense, grey brown sand with trace rootlets, humid		D	0.3							
		CLAYEY SAND: Very dense, orange brown clayey sand with decomposed organics and blue grey staining, humid		D/E	0.5							
	0.7			D/E	0.65							
	0.75	SANDSTONE: Extremely low strength, extremely weathered, grey sandstone with soil like properties Bore discontinued at 0.75m. Refusal on sandstone										
1												
2												
3												

RIG: Toyota 4WD
DRILLER: M Harrison
LOGGED: M Harrison
CASING:
TYPE OF BORING: 60mm ϕ Dynamic Push Tube (continuous sample)
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

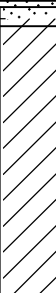
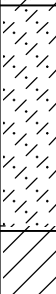


SAMPLING & IN SITU TESTING LEGEND					
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	>	Water seep	S	Standard penetration test
E	Environmental sample	≡	Water level	V	Shear vane (kPa)

BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Central Coast Schools - Warnervale
LOCATION: 75 Warnervale Road, Warnervale

SURFACE LEVEL: --
EASTING: 356060
NORTHING: 6319878
DIP/AZIMUTH: 90°/--

BORE No: 8
PROJECT No: 83313.00
DATE: 21/12/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per 150mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
	0.05	SAND: Loose, grey brown sand with trace clay, humid										
		CLAY: Firm to stiff, orange brown clay with trace organics, M~Wp			0.2		pp = 130-160					
				U ₅₀	0.3		pp = 140-180					
					0.5							
	0.8	CLAYEY SAND: Very dense, orange brown mottled grey clayey sand, humid										
				D	1.0							
	1.4	CLAY: Very stiff, grey clay, M<Wp										
					1.5		pp = 280-350					
				D	1.6							
	1.7	SANDSTONE: Extremely low strength, extremely weathered, grey sandstone with soil like properties										
	1.75	Bore discontinued at 1.75m. Refusal on sandstone										
	2											
	3											

RIG: Toyota 4WD

DRILLER: M Harrison

LOGGED: M Harrison

CASING:

TYPE OF BORING: 60mm ϕ Dynamic Push Tube (continuous sample)

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND




A Auger sample	G Gas sample	PID Photo ionisation detector (ppm)
B Bulk sample	P Piston sample	PL(A) Point load axial test Is(50) (MPa)
BLK Block sample	U ₅₀ Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)
C Core drilling	W Water sample	pp Pocket penetrometer (kPa)
D Disturbed sample	> Water seep	S Standard penetration test
E Environmental sample	≡ Water level	V Shear vane (kPa)

BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Central Coast Schools - Warnervale
LOCATION: 75 Warnervale Road, Warnervale

SURFACE LEVEL: --
EASTING: 356066
NORTHING: 6319799
DIP/AZIMUTH: 90°/--

BORE No: 9
PROJECT No: 83313.00
DATE: 21/12/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per 150mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
		SAND: Loose, grey brown sand with trace rootlets, humid		D	0.4							
	0.5	CLAYEY SAND: Medium dense, orange brown clayey sand with some organics, moist		D	0.7							
1	1.0	SANDY CLAY: Stiff to very stiff, yellow brown mottled grey sandy clay, M<Wp			1.2		pp = 190-240					
				D	1.5							
					1.7		pp = 350-380					
-2					2.3		pp = 380-400					
	2.5	Bore discontinued at 2.5m. Limit of investigation		D	2.5							
-3												

RIG: Toyota 4WD

DRILLER: M Harrison

LOGGED: M Harrison

CASING:

TYPE OF BORING: 60mm ϕ Dynamic Push Tube (continuous sample)

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	>	Water seep	S	Standard penetration test
E	Environmental sample	≡	Water level	V	Shear vane (kPa)



Soil Profile Report

SITE DETAILS

Site Location:	WOLLCRAH RD WARNERVALE		
Profile Details:	Tuggerah Lakes soil landscapes Survey (1000384), Profile 28, collected from a batter by Mr Casey Murphy on 14 November, 1989		
Map Reference:	MGA Grid Reference: Zone 56, 356605E, 6320790N. 9131 GOSFORD (1:100000) map sheet.		
Physiography:	dry sclerophyll forest on sandstone-lithic lithology and used for volun./native pasture. Slope 4.0% (measured), elevation 20.0 m, aspect south. Surface condition is soft, profile is mod. well drained, erosion hazard is moderate, and no salting evident		
Vegetation/Land Use:	extensive clearing at the site, used for volun./native pasture, with volun./native pasture in the general area		
Surface Condition:	soft when described, ground cover is 85%		
Erosion/Land Degradation:	moderate; wind erosion at site is none; no salting evident		
Soil Hydrology:	profile is mod. well drained, , run on is moderate and runoff is moderate		
Soil Type:	Soloth (Solod) (GSG), Dy3.41 (PPF)		
Base of observation:			
Profile Field Notes:	Surface firm. Long slopes.. fraction medium.	Semi rural. Brown ped coatings.	Sand

SOIL DESCRIPTION

Layer 0

0.00 - 0.00 m

Coarse Fragments: few (2-10%), sedimentary, dispersed, weakly weathered, sub-rounded, sub-angular, fine gravel (2-6 mm), gravel (6-20 mm),

Layer 1

Horizon: A1

0.00 - 0.09 m

Texture: coarse sandy loam

Colour: very dark greyish brown (brownish black) (10YR 3/2) [moist] with no recorded mottles

Structure: moderate pedality (10 - 20 mm, also 5 - 10 mm, fabric is rough-faced peds), ped coatings are none

Coarse Fragments: few (2-10%), sedimentary, dispersed, weakly weathered, sub-rounded, sub-angular, fine gravel (2-6 mm), gravel (6-20 mm),

Pans: not evident

Segregations: very few (< 2%), organic, nodules, medium (2-6 mm), coarse (6-20 mm),

	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are evident(width <5 mm), macropores are nil
	Moisture/Consistence:	moderately moist, slightly sticky, texture modifier test result was no change, disruptive test result was moderately weak force,
	Field chemical tests:	Field pH is 6.0 (Raupach),
	Layer Notes:	Under 2cm litter, Casuarina regrowth.
Layer 2	Horizon: A2	
0.09 - 0.25 m	Texture:	coarse clayey sand
	Colour:	brown (dull yellowish brown) (10YR 5/3) [moist] or light grey (dull yellow orange) (10YR 7/2) [dry] with 20% - 50% distinct unspecified orange mottles
	Structure:	massive (fabric is sandy), ped coatings are none
	Coarse Fragments:	few (2-10%), sedimentary, dispersed, weakly weathered, sub-rounded, sub-angular, fine gravel (2-6 mm), gravel (6-20 mm),
	Pans:	not evident
	Segregations:	very few (< 2%), organic, nodules, medium (2-6 mm), coarse (6-20 mm),
	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are evident(width <5 mm), macropores are nil
	Moisture/Consistence:	dry, slightly sticky, texture modifier test result was no change, disruptive test result was moderately firm force,
	Field chemical tests:	Field pH is 5.5 (Raupach),
	Layer Notes:	A2 hardsetting where exposed.
Layer 3	Horizon: B2	
0.25 - 0.55 m	Texture:	medium clay
	Colour:	brownish yellow (bright yellowish brown) (10YR 6/6) [moist] with 20% - 50% distinct unspecified yellow mottles
	Structure:	strong pedality (20 - 50 mm, fabric is rough-faced peds), ped coatings are common (10-50%)
	Coarse Fragments:	not evident,
	Pans:	not evident
	Segregations:	not evident,
	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are evident(width <5 mm), macropores are nil
	Moisture/Consistence:	moist, slightly sticky, texture modifier test result was no change, disruptive test result was very firm force,
	Field chemical tests:	Field pH is 5.5 (Raupach),
	Layer Notes:	Dominant peds 10-50mm.
Layer 4	Horizon: B3	
0.55 - 0.70 m	Texture:	sandy clay loam
	Colour:	light grey (greyish yellow) (2.5Y 7/2) [moist] with 2% - 10% prominent unspecified red mottles, and 2% - 10% distinct unspecified yellow subdominant mottles
	Structure:	massive
	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are nil, macropores are nil

Moisture/Consistence: moist,
Field chemical tests: Field pH is 5.5 (Raupach),
Layer Notes: B3/C horizon. *** Layer depth given as
+0.70m. Sugery, could not dig deeper. Texture
sandy clay loam to sandy clay.

Layer 5

0.70 - 1.00 m

Colour: colour not recorded with no recorded mottles
Soil fauna: Activity is nil
Cracks/Macropores: Cracks are nil, macropores are nil
Layer Notes: Unknown layer(s) - created due to gap in layer depths;
adjusted subsequent layer numbers to be sequential.

LABORATORY TESTS

None available

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

Report generated on 04/09/2018 at 03:28 PM

To contact us, email: soils@environment.nsw.gov.au

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ATTACHMENT C GROUNDWATER BORE SEARCH DATA

NSW Office of Water

Work Summary

GW080833

Licence: 20BL169377

Licence Status: CANCELLED

Authorised Purpose(s): TEST BORE
Intended Purpose(s): TEST BORE

Work Type: Bore

Work Status:

Construct.Method:

Owner Type: Local Govt

Commenced Date:

Completion Date: 06/08/2004

Final Depth:

Drilled Depth:

Contractor Name:

Driller:

Assistant Driller:

Property: WARNERVALE OVAL WARNERVALE
ROAD WARNERVALE 2259

Standing Water Level (m):

GWMA: -

GW Zone: -

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County
Form A: NORTH
Licensed: NORTHUMBERLAND

Parish
NORTH.42
MUNMORAH

Cadaastre
LT82 DP7091
Whole Lot 82//7091

Region: 20 - Hunter

River Basin: 211 - MACQUARIE - TUGGERAH LAKES
Area/District:

CMA Map: 9131-1S

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: (Unknown)

Northing: 6320133.0
Easting: 356274.0

Latitude: 33°14'53.6"S
Longitude: 151°27'25.9"E

GS Map: -

MGA Zone: 0

Coordinate Source: Map Interpretation

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralsers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

06/08/2004: Form A Remarks:
Location map received
No Form A received
02/12/2009: Reviewed data - nothing to update.

*** End of GW080833 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

NSW Office of Water

Work Summary

GW200569

Licence: 20BL169377

Licence Status: CANCELLED

Authorised Purpose(s): TEST BORE
Intended Purpose(s): IRRIGATION

Work Type: Bore

Work Status: Abandoned, Plugged

Construct.Method: Rotary - Percussion (Down Hole Hammer)

Owner Type: Local Govt

Commenced Date:

Completion Date: 07/10/2004

Final Depth: 66.00 m

Drilled Depth: 66.00 m

Contractor Name: Slade Drilling

Driller: Paul Edwin Slade

Assistant Driller:

Property: WARNERVALE OVAL WARNERVALE
ROAD WARNERVALE 2259

Standing Water Level:

GWMA:

GW Zone:

Salinity:

Yield: 1.100

Site Details

Site Chosen By:

County
Form A: NORTH
Licensed:

Parish
NORTH.42

Cadastre
82/7091

Region: 20 - Hunter
River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6319969.0
Easting: 356279.0

Latitude: 33°14'58.9"S
Longitude: 151°27'25.9"E

GS Map: -

MGA Zone: 0

Coordinate Source: Map Interpretation

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralsers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	1.00	270			Rotary - Percussion (Down Hole Hammer)
1		Hole	Hole	1.00	66.00	150			Rotary - Percussion (Down Hole Hammer)
1	1	Casing	Steel	0.00	1.00	219	206		

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
24.00	30.00	6.00	Unknown			0.75			4550.00
42.00	48.00	6.00	Unknown			0.25			4200.00
60.00	66.00	6.00	Unknown			0.10			4750.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.40	0.40	clay (white)	Clay	
0.40	9.00	8.60	sandstone	Sandstone	
9.00	30.00	21.00	sand (light grey)	Sand	
30.00	39.00	9.00	shale (red, brown)	Shale	
39.00	61.00	22.00	shale (brown)	Shale	
61.00	64.00	3.00	sandstone (grey)	Sandstone	
64.00	66.00	2.00	shale (dark grey)	Shale	

Remarks

07/10/2004: Form A Remarks:
Bore abandoned, cap used to plug.
08/05/2009: Net Carling, 8-May-2009: Updated Lat's & Long's using existing Easting & Northing's.

*** End of GW200569 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

ATTACHMENT D LABORATORY CERTIFICATES



Client:				SITE, COC AND CONTACT DATA				Laboratory:			
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff NSW 2285 Phone: 03 9507 6000				Warrawee Primary School PSI Site Name: QUOTE NUMBER Job No.: 20191404 Required TAT: Data QA level:				Daniel Kousbroek Contact Number: 0458 197 676 Contact e-mail: dkousbroek@kleinfelder.com Brendan Grant Email: bgrant@kleinfelder.com			
24 hrs				48 hrs				3 days			
LAB minimum unless specified:				5 days				7 days			
CHAIN OF CUSTODY				Relinquished by (print):				Received by (print):			
D. Kousbroek (sign)				15/10/18				15/10/18			
Date / Time: 15.00				Date / Time:				Date / Time:			
Notes:				Temp. (°C):				Temp. (°C):			
				Notes:				Notes:			
				Ice present / no ice seals intact / no seal				Ice present / no ice seals intact / no seal			
Sample ID				Lab ID				Sample Point			
Sample Type				Date				Start Depth			
End Depth				Units				# Containers			
g-13 OC-OP Pesticides / PCB				g-17 (TRH / BTEXN / PAH)				Organic Analytes			
S-2 (8 Metals - As, Cd, Cr, Cu, Ni, Pb, Zn, Hg)				Metals				Asbestos			
Asbestos (Presence/Absence)				Asbestos in Bulk				Solid (abs/prs)			
Comments											

A/B/18 20/9/18 9am

613361

[illegible]

[illegible]

Sample Receipt Advice

Company name: **Kleinfelder Aust Pty Ltd (NEWCASTLE)**
Contact name: **Brendan Grant**
Project name: **WARNERVALE PRIMARY SCHOOL PSI**
Project ID: **20191404**
COC number: **Not provided**
Turn around time: **5 Day**
Date/Time received: **Aug 20, 2018 8:00 AM**
Eurofins | mgt reference: **613361**

Sample information

- ☒ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☒ All samples have been received as described on the above COC.
- ☒ COC has been completed correctly.
- ☒ Attempt to chill was evident.
- ☒ Appropriately preserved sample containers have been used.
- ☒ All samples were received in good condition.
- ☒ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☒ Appropriate sample containers have been used.
- ☒ Split sample sent to requested external lab.
- ☒ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

QC2 sent to ALS

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Brendan Grant - BGrant@kleinfelder.com.

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285
Project Name: WARNERVALE PRIMARY SCHOOL PSI
Project ID: 20191404

Order No.:
Report #: 613361
Phone: 02 4949 5200
Fax:

Received: Aug 20, 2018 8:00 AM
Due: Aug 27, 2018
Priority: 5 Day
Contact Name: Brendan Grant

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorus Pesticides	Polychlorinated Biphenyls	Metals M8	BTEX	Moisture Set	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271							X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217						X									
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
External Laboratory															
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID										
1	KLF01	Aug 18, 2018		Soil	M18-Au26338	X		X	X	X	X	X	X	X	X
2	KLF02	Aug 18, 2018		Soil	M18-Au26339	X						X		X	
3	KLF03	Aug 18, 2018		Soil	M18-Au26340	X						X		X	
4	KLF04A	Aug 18, 2018		Soil	M18-Au26341	X						X		X	
5	KLF04B	Aug 18, 2018		Soil	M18-Au26342	X						X		X	
6	KLF05	Aug 18, 2018		Soil	M18-Au26343	X						X		X	
7	KLF06	Aug 18, 2018		Soil	M18-Au26344	X		X	X	X	X	X	X	X	X
8	KLF07A	Aug 18, 2018		Soil	M18-Au26345	X						X		X	
9	KLF07B	Aug 18, 2018		Soil	M18-Au26346	X						X		X	

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
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Project Name: WARNERVALE PRIMARY SCHOOL PSI
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Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorus Pesticides	Polychlorinated Biphenyls	Metals M8	BTEX	Moisture Set	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271							X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217						X									
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
10	KLF08	Aug 18, 2018		Soil	M18-Au26347	X						X		X	
11	KLF09A	Aug 18, 2018		Soil	M18-Au26348	X		X	X	X	X	X	X	X	X
12	KLF09B	Aug 18, 2018		Soil	M18-Au26349	X		X	X	X	X	X	X	X	X
13	KLF10	Aug 18, 2018		Soil	M18-Au26350	X						X		X	
14	KLF11	Aug 18, 2018		Soil	M18-Au26351	X						X		X	
15	KLF12A	Aug 18, 2018		Soil	M18-Au26352	X						X		X	
16	KLF13	Aug 18, 2018		Soil	M18-Au26353	X						X		X	
17	KLF14A	Aug 18, 2018		Soil	M18-Au26354	X		X	X	X	X	X	X	X	X
18	KLF14B	Aug 18, 2018		Soil	M18-Au26355	X		X	X	X	X	X	X	X	X
19	QC1	Aug 18, 2018		Soil	M18-Au26356	X						X		X	
20	KLF12B	Aug 18, 2018		Soil	M18-Au26357		X								
Test Counts						19	1	6	6	6	6	19	6	19	6

Certificate of Analysis



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025-Testing
 The results of the tests, calibrations and/or
 measurements included in this document are traceable
 to Australian/national standards.

Kleinfelder Australia Pty Ltd (NEWC)
95 Mitchell Rd
Cardiff
NSW 2285

Attention: Brendan Grant
Report 613361-V2-AID
Project Name WARNERVALE PRIMARY SCHOOL PSI
Project ID 20191404
Received Date Aug 20, 2018
Date Reported Aug 27, 2018

Methodology:

Asbestos Fibre
 Identification

Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques.

NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.

Unknown Mineral
 Fibres

Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity.

NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.

Subsampling Soil
 Samples

The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed.

NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.

Bonded asbestos-
 containing material
 (ACM)

The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination. The resultant material is then further examined in accordance with AS 4964 - 2004.

NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.

Limit of Reporting

The performance limitation of the AS4964 method for inhomogeneous samples is around 0.1 g/kg (0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis where required, this is considered to be at the nominal reporting limit of 0.01 % (w / w). The examination of large sample sizes (500 mL is recommended) may improve the likelihood of identifying ACM in the > 2mm fraction. The NEPM screening level of 0.001 % (w / w) asbestos in soil for FA (friable asbestos) and AF (asbestos fines) then applies where they are able to be quantified by gravimetric procedures. This quantitative screening is not generally applicable to FF (free fibres) and results of Trace Analysis are referred.

NOTE: NATA News March 2014, p.7, states in relation to AS4964: "This is a qualitative method with a nominal reporting limit of 0.01%" and that currently in Australia "there is no validated method available for the quantification of asbestos". Accordingly, NATA Accreditation does not cover the performance of this service (indicated with an asterisk). This report is consistent with the analytical procedures and reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended) and the Western Australia Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, 2009, including supporting document Recommended Procedures for Laboratory Analysis of Asbestos in Soil, June 2011.

Project Name WARNERVALE PRIMARY SCHOOL PSI
Project ID 20191404
Date Sampled Aug 18, 2018
Report 613361-V2-AID

Client Sample ID	Eurofins mgt Sample No.	Date Sampled	Sample Description	Result
KLF01	18-Au26338	Aug 18, 2018	Approximate Sample 77g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF02	18-Au26339	Aug 18, 2018	Approximate Sample 36g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF03	18-Au26340	Aug 18, 2018	Approximate Sample 39g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF04A	18-Au26341	Aug 18, 2018	Approximate Sample 67g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF04B	18-Au26342	Aug 18, 2018	Approximate Sample 59g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF05	18-Au26343	Aug 18, 2018	Approximate Sample 36g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF06	18-Au26344	Aug 18, 2018	Approximate Sample 45g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF07A	18-Au26345	Aug 18, 2018	Approximate Sample 39g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF07B	18-Au26346	Aug 18, 2018	Approximate Sample 51g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF08	18-Au26347	Aug 18, 2018	Approximate Sample 68g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins mgt Sample No.	Date Sampled	Sample Description	Result
KLF09A	18-Au26348	Aug 18, 2018	Approximate Sample 50g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF09B	18-Au26349	Aug 18, 2018	Approximate Sample 93g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF10	18-Au26350	Aug 18, 2018	Approximate Sample 89g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF11	18-Au26351	Aug 18, 2018	Approximate Sample 44g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF12A	18-Au26352	Aug 18, 2018	Approximate Sample 78g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF13	18-Au26353	Aug 18, 2018	Approximate Sample 60g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF14A	18-Au26354	Aug 18, 2018	Approximate Sample 42g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
KLF14B	18-Au26355	Aug 18, 2018	Approximate Sample 58g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
QC1	18-Au26356	Aug 18, 2018	Approximate Sample 54g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Sydney	Aug 27, 2018	Indefinite

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285
Project Name: WARNERVALE PRIMARY SCHOOL PSI
Project ID: 20191404

Order No.:
Report #: 613361
Phone: 02 4949 5200
Fax:

Received: Aug 20, 2018 8:00 AM
Due: Aug 27, 2018
Priority: 5 Day
Contact Name: Brendan Grant

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorus Pesticides	Polychlorinated Biphenyls	Metals M8	BTEX	Moisture Set	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271							X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217						X									
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
External Laboratory															
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID										
1	KLF01	Aug 18, 2018		Soil	M18-Au26338	X		X	X	X	X	X	X	X	X
2	KLF02	Aug 18, 2018		Soil	M18-Au26339	X						X		X	
3	KLF03	Aug 18, 2018		Soil	M18-Au26340	X						X		X	
4	KLF04A	Aug 18, 2018		Soil	M18-Au26341	X						X		X	
5	KLF04B	Aug 18, 2018		Soil	M18-Au26342	X						X		X	
6	KLF05	Aug 18, 2018		Soil	M18-Au26343	X						X		X	
7	KLF06	Aug 18, 2018		Soil	M18-Au26344	X		X	X	X	X	X	X	X	X
8	KLF07A	Aug 18, 2018		Soil	M18-Au26345	X						X		X	
9	KLF07B	Aug 18, 2018		Soil	M18-Au26346	X						X		X	

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285
Project Name: WARNERVALE PRIMARY SCHOOL PSI
Project ID: 20191404

Order No.:
Report #: 613361
Phone: 02 4949 5200
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Received: Aug 20, 2018 8:00 AM
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Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorus Pesticides	Polychlorinated Biphenyls	Metals M8	BTEX	Moisture Set	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271							X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217						X									
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
10	KLF08	Aug 18, 2018		Soil	M18-Au26347	X						X		X	
11	KLF09A	Aug 18, 2018		Soil	M18-Au26348	X		X	X	X	X	X	X	X	X
12	KLF09B	Aug 18, 2018		Soil	M18-Au26349	X		X	X	X	X	X	X	X	X
13	KLF10	Aug 18, 2018		Soil	M18-Au26350	X						X		X	
14	KLF11	Aug 18, 2018		Soil	M18-Au26351	X						X		X	
15	KLF12A	Aug 18, 2018		Soil	M18-Au26352	X						X		X	
16	KLF13	Aug 18, 2018		Soil	M18-Au26353	X						X		X	
17	KLF14A	Aug 18, 2018		Soil	M18-Au26354	X		X	X	X	X	X	X	X	X
18	KLF14B	Aug 18, 2018		Soil	M18-Au26355	X		X	X	X	X	X	X	X	X
19	QC1	Aug 18, 2018		Soil	M18-Au26356	X						X		X	
20	KLF12B	Aug 18, 2018		Soil	M18-Au26357		X								
Test Counts						19	1	6	6	6	6	19	6	19	6

Internal Quality Control Review and Glossary

General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w: weight for weight basis	grams per kilogram
Filter loading:	fibres/100 graticule areas
Reported Concentration:	fibres/mL
Flowrate:	L/min

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Western Australia Department of Health
NOHSC	National Occupational Health and Safety Commission
ACM	Bonded asbestos-containing material means any material containing more than 1% asbestos and comprises asbestos-containing-material which is in sound condition, although possibly broken or fragmented, and where the asbestos is bound in a matrix such as cement or resin. Common examples of ACM include but are not limited to: pipe and boiler insulation, sprayed-on fireproofing, troweled-on acoustical plaster, floor tile and mastic, floor linoleum, transite shingles, roofing materials, wall and ceiling plaster, ceiling tiles, and gasket materials. This term is restricted to material that cannot pass a 7 mm x 7 mm sieve. This sieve size is selected because it approximates the thickness of common asbestos cement sheeting and for fragments to be smaller than this would imply a high degree of damage and hence potential for fibre release.
FA	FA comprises friable asbestos material and includes severely weathered cement sheet, insulation products and woven asbestos material. This type of friable asbestos is defined here as asbestos material that is in a degraded condition such that it can be broken or crumbled by hand pressure. This material is typically unbonded or was previously bonded and is now significantly degraded (crumbling).
PACM	Presumed Asbestos-Containing Material means thermal system insulation and surfacing material found in buildings, vessels, and vessel sections constructed no later than 1980 that are assumed to contain greater than one percent asbestos but have not been sampled or analyzed to verify or negate the presence of asbestos.
AF	Asbestos fines (AF) are defined as free fibres, or fibre bundles, smaller than 7mm. It is the free fibres which present the greatest risk to human health, although very small fibres (< 5 microns in length) are not considered to be such a risk. AF also includes small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve. (Note that for bonded ACM fragments to pass through a 7 mm x 7 mm sieve implies a substantial degree of damage which increases the potential for fibre release.)
AC	Asbestos cement means a mixture of cement and asbestos fibres (typically 90:10 ratios).

Comments

The samples received were not collected in an approved asbestos bag and was therefore sub-sampled from the 250mL glass jar. Valid sub-sampling procedures were applied so as to ensure that the sub-samples to be analysed accurately represented the samples received.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N/A	Not applicable

Asbestos Counter/Identifier:

Sayed Abu Senior Analyst-Asbestos (NSW)

Authorised by:

Laxman Dias Senior Analyst-Asbestos (NSW)



Glenn Jackson
National Operations Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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Certificate of Analysis

Kleinfelder Australia Pty Ltd (NEWC)
95 Mitchell Rd
Cardiff
NSW 2285



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: **Brendan Grant**

Report **613361-S-V2**
Project name WARNERVALE PRIMARY SCHOOL PSI
Project ID 20191404
Received Date Aug 20, 2018

Client Sample ID			KLF01	KLF02	KLF03	KLF04A
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26338	M18-Au26339	M18-Au26340	M18-Au26341
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	-	-
TRH C10-C14	20	mg/kg	< 20	-	-	-
TRH C15-C28	50	mg/kg	190	-	-	-
TRH C29-C36	50	mg/kg	230	-	-	-
TRH C10-36 (Total)	50	mg/kg	420	-	-	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	-
Toluene	0.1	mg/kg	< 0.1	-	-	-
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	-
o-Xylene	0.1	mg/kg	< 0.1	-	-	-
Xylenes - Total	0.3	mg/kg	< 0.3	-	-	-
4-Bromofluorobenzene (surr.)	1	%	86	-	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	-	-	-
TRH C6-C10	20	mg/kg	< 20	-	-	-
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	-	-	-
TRH >C10-C16	50	mg/kg	< 50	-	-	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	-	-	-
TRH >C16-C34	100	mg/kg	350	-	-	-
TRH >C34-C40	100	mg/kg	320	-	-	-
TRH >C10-C40 (total)*	100	mg/kg	670	-	-	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	8.0	-	-	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	8.0	-	-	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	8.0	-	-	-
Acenaphthene	0.5	mg/kg	< 0.5	-	-	-
Acenaphthylene	0.5	mg/kg	< 0.5	-	-	-
Anthracene	0.5	mg/kg	0.7	-	-	-
Benz(a)anthracene	0.5	mg/kg	2.8	-	-	-
Benzo(a)pyrene	0.5	mg/kg	5.6	-	-	-
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	3.7	-	-	-
Benzo(g,h,i)perylene	0.5	mg/kg	4.8	-	-	-
Benzo(k)fluoranthene	0.5	mg/kg	3.6	-	-	-
Chrysene	0.5	mg/kg	3.6	-	-	-

Client Sample ID			KLF01	KLF02	KLF03	KLF04A
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26338	M18-Au26339	M18-Au26340	M18-Au26341
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Dibenz(a,h)anthracene	0.5	mg/kg	0.9	-	-	-
Fluoranthene	0.5	mg/kg	6.0	-	-	-
Fluorene	0.5	mg/kg	< 0.5	-	-	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	3.8	-	-	-
Naphthalene	0.5	mg/kg	< 0.5	-	-	-
Phenanthrene	0.5	mg/kg	2.8	-	-	-
Pyrene	0.5	mg/kg	6.8	-	-	-
Total PAH*	0.5	mg/kg	45.1	-	-	-
2-Fluorobiphenyl (surr.)	1	%	80	-	-	-
p-Terphenyl-d14 (surr.)	1	%	77	-	-	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	-	-
4.4'-DDD	0.05	mg/kg	< 0.05	-	-	-
4.4'-DDE	0.05	mg/kg	< 0.05	-	-	-
4.4'-DDT	0.05	mg/kg	< 0.05	-	-	-
a-BHC	0.05	mg/kg	< 0.05	-	-	-
Aldrin	0.05	mg/kg	< 0.05	-	-	-
b-BHC	0.05	mg/kg	< 0.05	-	-	-
d-BHC	0.05	mg/kg	< 0.05	-	-	-
Dieldrin	0.05	mg/kg	< 0.05	-	-	-
Endosulfan I	0.05	mg/kg	< 0.05	-	-	-
Endosulfan II	0.05	mg/kg	< 0.05	-	-	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	-	-
Endrin	0.05	mg/kg	< 0.05	-	-	-
Endrin aldehyde	0.05	mg/kg	< 0.05	-	-	-
Endrin ketone	0.05	mg/kg	< 0.05	-	-	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	-	-	-
Heptachlor	0.05	mg/kg	< 0.05	-	-	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	-	-	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	-	-	-
Methoxychlor	0.05	mg/kg	< 0.05	-	-	-
Toxaphene	1	mg/kg	< 1	-	-	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	-	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	-	-	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	-	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	-	-	-
Dibutylchloroendate (surr.)	1	%	int	-	-	-
Tetrachloro-m-xylene (surr.)	1	%	80	-	-	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	-	-	-
Bolstar	0.2	mg/kg	< 0.2	-	-	-
Chlorfenvinphos	0.2	mg/kg	< 0.2	-	-	-
Chlorpyrifos	0.2	mg/kg	< 0.2	-	-	-
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	-	-	-
Coumaphos	2	mg/kg	< 2	-	-	-
Demeton-S	0.2	mg/kg	< 0.2	-	-	-
Demeton-O	0.2	mg/kg	< 0.2	-	-	-
Diazinon	0.2	mg/kg	< 0.2	-	-	-
Dichlorvos	0.2	mg/kg	< 0.2	-	-	-

Client Sample ID			KLF01	KLF02	KLF03	KLF04A
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26338	M18-Au26339	M18-Au26340	M18-Au26341
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Dimethoate	0.2	mg/kg	< 0.2	-	-	-
Disulfoton	0.2	mg/kg	< 0.2	-	-	-
EPN	0.2	mg/kg	< 0.2	-	-	-
Ethion	0.2	mg/kg	< 0.2	-	-	-
Ethoprop	0.2	mg/kg	< 0.2	-	-	-
Ethyl parathion	0.2	mg/kg	< 0.2	-	-	-
Fenitrothion	0.2	mg/kg	< 0.2	-	-	-
Fensulfothion	0.2	mg/kg	< 0.2	-	-	-
Fenthion	0.2	mg/kg	< 0.2	-	-	-
Malathion	0.2	mg/kg	< 0.2	-	-	-
Merphos	0.2	mg/kg	< 0.2	-	-	-
Methyl parathion	0.2	mg/kg	< 0.2	-	-	-
Mevinphos	0.2	mg/kg	< 0.2	-	-	-
Monocrotophos	2	mg/kg	< 2	-	-	-
Naled	0.2	mg/kg	< 0.2	-	-	-
Omethoate	2	mg/kg	< 2	-	-	-
Phorate	0.2	mg/kg	< 0.2	-	-	-
Pirimiphos-methyl	0.2	mg/kg	< 0.2	-	-	-
Pyrazophos	0.2	mg/kg	< 0.2	-	-	-
Ronnel	0.2	mg/kg	< 0.2	-	-	-
Terbufos	0.2	mg/kg	< 0.2	-	-	-
Tetrachlorvinphos	0.2	mg/kg	< 0.2	-	-	-
Tokuthion	0.2	mg/kg	< 0.2	-	-	-
Trichloronate	0.2	mg/kg	< 0.2	-	-	-
Triphenylphosphate (surr.)	1	%	60	-	-	-
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	-	-	-
Aroclor-1221	0.1	mg/kg	< 0.1	-	-	-
Aroclor-1232	0.1	mg/kg	< 0.1	-	-	-
Aroclor-1242	0.1	mg/kg	< 0.1	-	-	-
Aroclor-1248	0.1	mg/kg	< 0.1	-	-	-
Aroclor-1254	0.1	mg/kg	< 0.1	-	-	-
Aroclor-1260	0.1	mg/kg	< 0.1	-	-	-
Total PCB*	0.1	mg/kg	< 0.1	-	-	-
Dibutylchlorendate (surr.)	1	%	int	-	-	-
Tetrachloro-m-xylene (surr.)	1	%	80	-	-	-
Heavy Metals						
Arsenic	2	mg/kg	3.0	3.6	7.6	2.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	33	7.0	8.9	< 5
Copper	5	mg/kg	65	8.2	12	9.4
Lead	5	mg/kg	17	19	25	< 5
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	45	< 5	< 5	< 5
Zinc	5	mg/kg	69	100	66	33
% Moisture	1	%	3.8	17	14	1.0

Client Sample ID			KLF04B	KLF05	KLF06	KLF07A
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26342	M18-Au26343	M18-Au26344	M18-Au26345
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	< 20	-
TRH C10-C14	20	mg/kg	-	-	< 20	-
TRH C15-C28	50	mg/kg	-	-	< 50	-
TRH C29-C36	50	mg/kg	-	-	< 50	-
TRH C10-36 (Total)	50	mg/kg	-	-	< 50	-
BTEX						
Benzene	0.1	mg/kg	-	-	< 0.1	-
Toluene	0.1	mg/kg	-	-	< 0.1	-
Ethylbenzene	0.1	mg/kg	-	-	< 0.1	-
m&p-Xylenes	0.2	mg/kg	-	-	< 0.2	-
o-Xylene	0.1	mg/kg	-	-	< 0.1	-
Xylenes - Total	0.3	mg/kg	-	-	< 0.3	-
4-Bromofluorobenzene (surr.)	1	%	-	-	78	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	-	-	< 0.5	-
TRH C6-C10	20	mg/kg	-	-	< 20	-
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	-	-	< 20	-
TRH >C10-C16	50	mg/kg	-	-	< 50	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	-	-	< 50	-
TRH >C16-C34	100	mg/kg	-	-	< 100	-
TRH >C34-C40	100	mg/kg	-	-	< 100	-
TRH >C10-C40 (total)*	100	mg/kg	-	-	< 100	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	-	-	< 0.5	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	-	-	0.6	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	-	-	1.2	-
Acenaphthene	0.5	mg/kg	-	-	< 0.5	-
Acenaphthylene	0.5	mg/kg	-	-	< 0.5	-
Anthracene	0.5	mg/kg	-	-	< 0.5	-
Benz(a)anthracene	0.5	mg/kg	-	-	< 0.5	-
Benzo(a)pyrene	0.5	mg/kg	-	-	< 0.5	-
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	-	-	< 0.5	-
Benzo(g,h,i)perylene	0.5	mg/kg	-	-	< 0.5	-
Benzo(k)fluoranthene	0.5	mg/kg	-	-	< 0.5	-
Chrysene	0.5	mg/kg	-	-	< 0.5	-
Dibenz(a,h)anthracene	0.5	mg/kg	-	-	< 0.5	-
Fluoranthene	0.5	mg/kg	-	-	< 0.5	-
Fluorene	0.5	mg/kg	-	-	< 0.5	-
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	-	-	< 0.5	-
Naphthalene	0.5	mg/kg	-	-	< 0.5	-
Phenanthrene	0.5	mg/kg	-	-	< 0.5	-
Pyrene	0.5	mg/kg	-	-	< 0.5	-
Total PAH*	0.5	mg/kg	-	-	< 0.5	-
2-Fluorobiphenyl (surr.)	1	%	-	-	88	-
p-Terphenyl-d14 (surr.)	1	%	-	-	97	-

Client Sample ID			KLF04B	KLF05	KLF06	KLF07A
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26342	M18-Au26343	M18-Au26344	M18-Au26345
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	-	< 0.1	-
4,4'-DDD	0.05	mg/kg	-	-	< 0.05	-
4,4'-DDE	0.05	mg/kg	-	-	< 0.05	-
4,4'-DDT	0.05	mg/kg	-	-	< 0.05	-
a-BHC	0.05	mg/kg	-	-	< 0.05	-
Aldrin	0.05	mg/kg	-	-	< 0.05	-
b-BHC	0.05	mg/kg	-	-	< 0.05	-
d-BHC	0.05	mg/kg	-	-	< 0.05	-
Dieldrin	0.05	mg/kg	-	-	< 0.05	-
Endosulfan I	0.05	mg/kg	-	-	< 0.05	-
Endosulfan II	0.05	mg/kg	-	-	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	-	-	< 0.05	-
Endrin	0.05	mg/kg	-	-	< 0.05	-
Endrin aldehyde	0.05	mg/kg	-	-	< 0.05	-
Endrin ketone	0.05	mg/kg	-	-	< 0.05	-
g-BHC (Lindane)	0.05	mg/kg	-	-	< 0.05	-
Heptachlor	0.05	mg/kg	-	-	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	-	-	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	-	-	< 0.05	-
Methoxychlor	0.05	mg/kg	-	-	< 0.05	-
Toxaphene	1	mg/kg	-	-	< 1	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	-	< 0.05	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	-	< 0.05	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	-	< 0.1	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	-	< 0.1	-
Dibutylchloroendate (surr.)	1	%	-	-	80	-
Tetrachloro-m-xylene (surr.)	1	%	-	-	100	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	-	< 0.2	-
Bolstar	0.2	mg/kg	-	-	< 0.2	-
Chlorfenvinphos	0.2	mg/kg	-	-	< 0.2	-
Chlorpyrifos	0.2	mg/kg	-	-	< 0.2	-
Chlorpyrifos-methyl	0.2	mg/kg	-	-	< 0.2	-
Coumaphos	2	mg/kg	-	-	< 2	-
Demeton-S	0.2	mg/kg	-	-	< 0.2	-
Demeton-O	0.2	mg/kg	-	-	< 0.2	-
Diazinon	0.2	mg/kg	-	-	< 0.2	-
Dichlorvos	0.2	mg/kg	-	-	< 0.2	-
Dimethoate	0.2	mg/kg	-	-	< 0.2	-
Disulfoton	0.2	mg/kg	-	-	< 0.2	-
EPN	0.2	mg/kg	-	-	< 0.2	-
Ethion	0.2	mg/kg	-	-	< 0.2	-
Ethoprop	0.2	mg/kg	-	-	< 0.2	-
Ethyl parathion	0.2	mg/kg	-	-	< 0.2	-
Fenitrothion	0.2	mg/kg	-	-	< 0.2	-
Fensulfothion	0.2	mg/kg	-	-	< 0.2	-
Fenthion	0.2	mg/kg	-	-	< 0.2	-
Malathion	0.2	mg/kg	-	-	< 0.2	-
Merphos	0.2	mg/kg	-	-	< 0.2	-

Client Sample ID			KLF04B	KLF05	KLF06	KLF07A
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26342	M18-Au26343	M18-Au26344	M18-Au26345
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Methyl parathion	0.2	mg/kg	-	-	< 0.2	-
Mevinphos	0.2	mg/kg	-	-	< 0.2	-
Monocrotophos	2	mg/kg	-	-	< 2	-
Naled	0.2	mg/kg	-	-	< 0.2	-
Omethoate	2	mg/kg	-	-	< 2	-
Phorate	0.2	mg/kg	-	-	< 0.2	-
Pirimiphos-methyl	0.2	mg/kg	-	-	< 0.2	-
Pyrazophos	0.2	mg/kg	-	-	< 0.2	-
Ronnel	0.2	mg/kg	-	-	< 0.2	-
Terbufos	0.2	mg/kg	-	-	< 0.2	-
Tetrachlorvinphos	0.2	mg/kg	-	-	< 0.2	-
Tokuthion	0.2	mg/kg	-	-	< 0.2	-
Trichloronate	0.2	mg/kg	-	-	< 0.2	-
Triphenylphosphate (surr.)	1	%	-	-	86	-
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1221	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1232	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1242	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1248	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1254	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1260	0.1	mg/kg	-	-	< 0.1	-
Total PCB*	0.1	mg/kg	-	-	< 0.1	-
Dibutylchlorendate (surr.)	1	%	-	-	80	-
Tetrachloro-m-xylene (surr.)	1	%	-	-	100	-
Heavy Metals						
Arsenic	2	mg/kg	3.2	7.2	3.0	8.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	5.7	7.8	12	15
Copper	5	mg/kg	10	15	7.5	13
Lead	5	mg/kg	< 5	21	9.6	14
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	5.4	7.7	7.4
Zinc	5	mg/kg	35	77	64	210
% Moisture	1	%	3.8	12	5.8	14

Client Sample ID			KLF07B	KLF08	KLF09A	KLF09B
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26346	M18-Au26347	M18-Au26348	M18-Au26349
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	< 20	< 20
TRH C10-C14	20	mg/kg	-	-	< 20	< 20
TRH C15-C28	50	mg/kg	-	-	71	< 50
TRH C29-C36	50	mg/kg	-	-	51	< 50
TRH C10-36 (Total)	50	mg/kg	-	-	122	< 50

Client Sample ID			KLF07B	KLF08	KLF09A	KLF09B
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26346	M18-Au26347	M18-Au26348	M18-Au26349
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	-	-	< 0.1	< 0.1
Toluene	0.1	mg/kg	-	-	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	-	-	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	-	-	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	-	-	81	90
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	-	-	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	-	-	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	-	-	< 20	< 20
TRH >C10-C16	50	mg/kg	-	-	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	-	-	< 50	< 50
TRH >C16-C34	100	mg/kg	-	-	< 100	< 100
TRH >C34-C40	100	mg/kg	-	-	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	-	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	-	-	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	-	-	1.2	1.2
Acenaphthene	0.5	mg/kg	-	-	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	-	-	< 0.5	< 0.5
Anthracene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	-	-	< 0.5	< 0.5
Chrysene	0.5	mg/kg	-	-	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	-	-	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	-	-	< 0.5	< 0.5
Fluorene	0.5	mg/kg	-	-	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	-	-	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Pyrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	-	-	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	-	-	106	100
p-Terphenyl-d14 (surr.)	1	%	-	-	119	118
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	-	< 0.1	< 0.1
4,4'-DDD	0.05	mg/kg	-	-	< 0.05	< 0.05
4,4'-DDE	0.05	mg/kg	-	-	< 0.05	< 0.05
4,4'-DDT	0.05	mg/kg	-	-	< 0.05	< 0.05
a-BHC	0.05	mg/kg	-	-	< 0.05	< 0.05
Aldrin	0.05	mg/kg	-	-	< 0.05	< 0.05
b-BHC	0.05	mg/kg	-	-	< 0.05	< 0.05
d-BHC	0.05	mg/kg	-	-	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	-	-	< 0.05	< 0.05

Client Sample ID			KLF07B	KLF08	KLF09A	KLF09B
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26346	M18-Au26347	M18-Au26348	M18-Au26349
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endosulfan I	0.05	mg/kg	-	-	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	-	-	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	-	< 0.05	< 0.05
Endrin	0.05	mg/kg	-	-	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	-	-	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	-	-	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	-	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	-	-	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	-	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	-	-	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	-	-	< 0.05	< 0.05
Toxaphene	1	mg/kg	-	-	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	-	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	-	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	-	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	-	< 0.1	< 0.1
Dibutylchloroendate (surr.)	1	%	-	-	102	92
Tetrachloro-m-xylene (surr.)	1	%	-	-	70	106
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	-	< 0.2	< 0.2
Bolstar	0.2	mg/kg	-	-	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	-	-	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	-	< 0.2	< 0.2
Coumaphos	2	mg/kg	-	-	< 2	< 2
Demeton-S	0.2	mg/kg	-	-	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	-	-	< 0.2	< 0.2
Diazinon	0.2	mg/kg	-	-	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	-	-	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	-	-	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	-	-	< 0.2	< 0.2
EPN	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethion	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	-	-	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	-	-	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	-	-	< 0.2	< 0.2
Fenthion	0.2	mg/kg	-	-	< 0.2	< 0.2
Malathion	0.2	mg/kg	-	-	< 0.2	< 0.2
Merphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	-	-	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Monocrotophos	2	mg/kg	-	-	< 2	< 2
Naled	0.2	mg/kg	-	-	< 0.2	< 0.2
Omethoate	2	mg/kg	-	-	< 2	< 2
Phorate	0.2	mg/kg	-	-	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	-	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	-	-	< 0.2	< 0.2
Ronnel	0.2	mg/kg	-	-	< 0.2	< 0.2

Client Sample ID			KLF07B	KLF08	KLF09A	KLF09B
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26346	M18-Au26347	M18-Au26348	M18-Au26349
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Terbufos	0.2	mg/kg	-	-	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	-	-	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	-	-	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	-	-	108	100
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	-	< 0.1	< 0.1
Aroclor-1221	0.1	mg/kg	-	-	< 0.1	< 0.1
Aroclor-1232	0.1	mg/kg	-	-	< 0.1	< 0.1
Aroclor-1242	0.1	mg/kg	-	-	< 0.1	< 0.1
Aroclor-1248	0.1	mg/kg	-	-	< 0.1	< 0.1
Aroclor-1254	0.1	mg/kg	-	-	< 0.1	< 0.1
Aroclor-1260	0.1	mg/kg	-	-	< 0.1	< 0.1
Total PCB*	0.1	mg/kg	-	-	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	-	-	102	92
Tetrachloro-m-xylene (surr.)	1	%	-	-	70	106
Heavy Metals						
Arsenic	2	mg/kg	2.1	4.1	3.2	5.2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	9.7	10	13	15
Copper	5	mg/kg	5.3	< 5	11	< 5
Lead	5	mg/kg	7.7	12	15	19
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	9.3	6.4
Zinc	5	mg/kg	32	210	270	60
% Moisture	1	%	13	14	8.6	6.9

Client Sample ID			KLF10	KLF11	KLF12A	KLF13
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26350	M18-Au26351	M18-Au26352	M18-Au26353
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	2.4	5.1	3.4	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	25	9.8	33	12
Copper	5	mg/kg	38	10	15	8.4
Lead	5	mg/kg	6.2	24	5.9	6.4
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	68	5.8	24	7.7
Zinc	5	mg/kg	68	190	44	29
% Moisture	1	%	3.7	15	8.6	12

Client Sample ID			KLF14A	KLF14B	QC1
Sample Matrix			Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26354	M18-Au26355	M18-Au26356
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	20	mg/kg	< 20	< 20	-
TRH C10-C14	20	mg/kg	< 20	< 20	-
TRH C15-C28	50	mg/kg	< 50	< 50	-
TRH C29-C36	50	mg/kg	< 50	< 50	-
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	-
BTEX					
Benzene	0.1	mg/kg	< 0.1	< 0.1	-
Toluene	0.1	mg/kg	< 0.1	< 0.1	-
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	-
4-Bromofluorobenzene (surr.)	1	%	75	84	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	-
TRH C6-C10	20	mg/kg	< 20	< 20	-
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	-
TRH >C10-C16	50	mg/kg	< 50	< 50	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	-
TRH >C16-C34	100	mg/kg	< 100	< 100	-
TRH >C34-C40	100	mg/kg	< 100	< 100	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	-
Polycyclic Aromatic Hydrocarbons					
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	-
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	-
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	-
Anthracene	0.5	mg/kg	< 0.5	< 0.5	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-
Chrysene	0.5	mg/kg	< 0.5	< 0.5	-
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	-
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-
Fluorene	0.5	mg/kg	< 0.5	< 0.5	-
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	-
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	-
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	-
Pyrene	0.5	mg/kg	< 0.5	< 0.5	-
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	-
2-Fluorobiphenyl (surr.)	1	%	119	105	-
p-Terphenyl-d14 (surr.)	1	%	144	124	-

Client Sample ID			KLF14A	KLF14B	QC1
Sample Matrix			Soil	Soil	Soil
Eurofins mgt Sample No.			M18-Au26354	M18-Au26355	M18-Au26356
Date Sampled			Aug 18, 2018	Aug 18, 2018	Aug 18, 2018
Test/Reference	LOR	Unit			
Organochlorine Pesticides					
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	-
4,4'-DDD	0.05	mg/kg	< 0.05	< 0.05	-
4,4'-DDE	0.05	mg/kg	< 0.05	< 0.05	-
4,4'-DDT	0.05	mg/kg	< 0.05	< 0.05	-
a-BHC	0.05	mg/kg	< 0.05	< 0.05	-
Aldrin	0.05	mg/kg	< 0.05	< 0.05	-
b-BHC	0.05	mg/kg	< 0.05	< 0.05	-
d-BHC	0.05	mg/kg	< 0.05	< 0.05	-
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	-
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	-
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	-
Endrin	0.05	mg/kg	< 0.05	< 0.05	-
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	-
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	-
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	-
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	-
Toxaphene	1	mg/kg	< 1	< 1	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	-
Dibutylchloredate (surr.)	1	%	99	92	-
Tetrachloro-m-xylene (surr.)	1	%	104	108	-
Organophosphorus Pesticides					
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	-
Bolstar	0.2	mg/kg	< 0.2	< 0.2	-
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	-
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	-
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	-
Coumaphos	2	mg/kg	< 2	< 2	-
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	-
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	-
Diazinon	0.2	mg/kg	< 0.2	< 0.2	-
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	-
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	-
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	-
EPN	0.2	mg/kg	< 0.2	< 0.2	-
Ethion	0.2	mg/kg	< 0.2	< 0.2	-
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	-
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	-
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	-
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	-
Fenthion	0.2	mg/kg	< 0.2	< 0.2	-
Malathion	0.2	mg/kg	< 0.2	< 0.2	-
Merphos	0.2	mg/kg	< 0.2	< 0.2	-

Client Sample ID Sample Matrix Eurofins mgt Sample No. Date Sampled Test/Reference	LOR	Unit	KLF14A Soil M18-Au26354 Aug 18, 2018	KLF14B Soil M18-Au26355 Aug 18, 2018	QC1 Soil M18-Au26356 Aug 18, 2018
Organophosphorus Pesticides					
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	-
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	-
Monocrotophos	2	mg/kg	< 2	< 2	-
Naled	0.2	mg/kg	< 0.2	< 0.2	-
Omethoate	2	mg/kg	< 2	< 2	-
Phorate	0.2	mg/kg	< 0.2	< 0.2	-
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	-
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	-
Ronnel	0.2	mg/kg	< 0.2	< 0.2	-
Terbufos	0.2	mg/kg	< 0.2	< 0.2	-
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	-
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	-
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	-
Triphenylphosphate (surr.)	1	%	117	107	-
Polychlorinated Biphenyls					
Aroclor-1016	0.1	mg/kg	< 0.1	< 0.1	-
Aroclor-1221	0.1	mg/kg	< 0.1	< 0.1	-
Aroclor-1232	0.1	mg/kg	< 0.1	< 0.1	-
Aroclor-1242	0.1	mg/kg	< 0.1	< 0.1	-
Aroclor-1248	0.1	mg/kg	< 0.1	< 0.1	-
Aroclor-1254	0.1	mg/kg	< 0.1	< 0.1	-
Aroclor-1260	0.1	mg/kg	< 0.1	< 0.1	-
Total PCB*	0.1	mg/kg	< 0.1	< 0.1	-
Dibutylchlorodate (surr.)	1	%	99	92	-
Tetrachloro-m-xylene (surr.)	1	%	104	108	-
Heavy Metals					
Arsenic	2	mg/kg	42	6.3	8.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	25	5.5	12
Copper	5	mg/kg	27	< 5	11
Lead	5	mg/kg	6.8	< 5	18
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5
Zinc	5	mg/kg	55	13	200
% Moisture	1	%	20	14	14

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C36	Melbourne	Aug 22, 2018	14 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Aug 22, 2018	14 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Aug 22, 2018	14 Day
BTEX - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Aug 22, 2018	14 Day
Polycyclic Aromatic Hydrocarbons - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water	Melbourne	Aug 22, 2018	14 Day
Organochlorine Pesticides - Method: LTM-ORG-2220 OCP & PCB in Soil and Water	Melbourne	Aug 22, 2018	14 Day
Organophosphorus Pesticides - Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS	Melbourne	Aug 22, 2018	14 Day
Polychlorinated Biphenyls - Method: LTM-ORG-2220 OCP & PCB in Soil and Water	Melbourne	Aug 22, 2018	28 Days
Metals M8 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Aug 28, 2018	28 Days
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Aug 22, 2018	14 Day

Repeat Samples

Description	Testing Site	Extracted	Holding Time
Metals M8 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Aug 28, 2018	28 Days

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285
Project Name: WARNERVALE PRIMARY SCHOOL PSI
Project ID: 20191404

Order No.:
Report #: 613361
Phone: 02 4949 5200
Fax:

Received: Aug 20, 2018 8:00 AM
Due: Aug 27, 2018
Priority: 5 Day
Contact Name: Brendan Grant

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorus Pesticides	Polychlorinated Biphenyls	Metals M8	BTEX	Moisture Set	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271							X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217						X									
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
External Laboratory															
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID										
1	KLF01	Aug 18, 2018		Soil	M18-Au26338	X		X	X	X	X	X	X	X	X
2	KLF02	Aug 18, 2018		Soil	M18-Au26339	X						X		X	
3	KLF03	Aug 18, 2018		Soil	M18-Au26340	X						X		X	
4	KLF04A	Aug 18, 2018		Soil	M18-Au26341	X						X		X	
5	KLF04B	Aug 18, 2018		Soil	M18-Au26342	X						X		X	
6	KLF05	Aug 18, 2018		Soil	M18-Au26343	X						X		X	
7	KLF06	Aug 18, 2018		Soil	M18-Au26344	X		X	X	X	X	X	X	X	X
8	KLF07A	Aug 18, 2018		Soil	M18-Au26345	X						X		X	
9	KLF07B	Aug 18, 2018		Soil	M18-Au26346	X						X		X	

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Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorus Pesticides	Polychlorinated Biphenyls	Metals M8	BTEX	Moisture Set	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271							X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217						X									
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
10	KLF08	Aug 18, 2018		Soil	M18-Au26347	X						X		X	
11	KLF09A	Aug 18, 2018		Soil	M18-Au26348	X		X	X	X	X	X	X	X	X
12	KLF09B	Aug 18, 2018		Soil	M18-Au26349	X		X	X	X	X	X	X	X	X
13	KLF10	Aug 18, 2018		Soil	M18-Au26350	X						X		X	
14	KLF11	Aug 18, 2018		Soil	M18-Au26351	X						X		X	
15	KLF12A	Aug 18, 2018		Soil	M18-Au26352	X						X		X	
16	KLF13	Aug 18, 2018		Soil	M18-Au26353	X						X		X	
17	KLF14A	Aug 18, 2018		Soil	M18-Au26354	X		X	X	X	X	X	X	X	X
18	KLF14B	Aug 18, 2018		Soil	M18-Au26355	X		X	X	X	X	X	X	X	X
19	QC1	Aug 18, 2018		Soil	M18-Au26356	X						X		X	
20	KLF12B	Aug 18, 2018		Soil	M18-Au26357		X								
Test Counts						19	1	6	6	6	6	19	6	19	6

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPa, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	104			70-130	Pass	
TRH C10-C14	%	91			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	95			70-130	Pass	
Toluene	%	98			70-130	Pass	
Ethylbenzene	%	103			70-130	Pass	
m&p-Xylenes	%	114			70-130	Pass	
Xylenes - Total	%	112			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	95			70-130	Pass	
TRH C6-C10	%	100			70-130	Pass	
TRH >C10-C16	%	93			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							
Aroclor-1260	%	97			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	105			80-120	Pass	
Cadmium	%	101			80-120	Pass	
Chromium	%	118			80-120	Pass	
Copper	%	114			80-120	Pass	
Lead	%	104			80-120	Pass	
Mercury	%	91			75-125	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nickel			%	111			80-120	Pass	
Zinc			%	110			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M18-Au26343	CP	%	95			75-125	Pass	
Cadmium	M18-Au26343	CP	%	97			75-125	Pass	
Chromium	M18-Au26343	CP	%	112			75-125	Pass	
Copper	M18-Au26343	CP	%	112			75-125	Pass	
Lead	M18-Au26343	CP	%	99			75-125	Pass	
Mercury	M18-Au26343	CP	%	102			70-130	Pass	
Nickel	M18-Au26343	CP	%	104			75-125	Pass	
Zinc	M18-Au26343	CP	%	124			75-125	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M18-Au26344	CP	%	85			70-130	Pass	
Acenaphthylene	M18-Au26344	CP	%	80			70-130	Pass	
Anthracene	M18-Au26344	CP	%	81			70-130	Pass	
Benz(a)anthracene	M18-Au26344	CP	%	75			70-130	Pass	
Benzo(a)pyrene	M18-Au26344	CP	%	80			70-130	Pass	
Benzo(b&j)fluoranthene	M18-Au26344	CP	%	71			70-130	Pass	
Benzo(g,h,i)perylene	M18-Au26344	CP	%	83			70-130	Pass	
Benzo(k)fluoranthene	M18-Au26344	CP	%	84			70-130	Pass	
Chrysene	M18-Au26344	CP	%	89			70-130	Pass	
Dibenz(a,h)anthracene	M18-Au26344	CP	%	72			70-130	Pass	
Fluoranthene	M18-Au26344	CP	%	80			70-130	Pass	
Fluorene	M18-Au26344	CP	%	89			70-130	Pass	
Indeno(1,2,3-cd)pyrene	M18-Au26344	CP	%	79			70-130	Pass	
Naphthalene	M18-Au26344	CP	%	87			70-130	Pass	
Phenanthrene	M18-Au26344	CP	%	84			70-130	Pass	
Pyrene	M18-Au26344	CP	%	83			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	M18-Au26348	CP	%	76			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M18-Au26348	CP	%	83			70-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1260	M18-Au26348	CP	%	99			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M18-Au26353	CP	%	102			75-125	Pass	
Cadmium	M18-Au26353	CP	%	96			75-125	Pass	
Chromium	M18-Au26353	CP	%	113			75-125	Pass	
Copper	M18-Au26353	CP	%	110			75-125	Pass	
Lead	M18-Au26353	CP	%	99			75-125	Pass	
Mercury	M18-Au26353	CP	%	101			70-130	Pass	
Nickel	M18-Au26353	CP	%	107			75-125	Pass	
Zinc	M18-Au26353	CP	%	107			75-125	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M18-Au26354	CP	%	76			70-130	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
BTEX				Result 1					
Benzene	M18-Au26354	CP	%	78			70-130	Pass	
Toluene	M18-Au26354	CP	%	83			70-130	Pass	
Ethylbenzene	M18-Au26354	CP	%	85			70-130	Pass	
m&p-Xylenes	M18-Au26354	CP	%	94			70-130	Pass	
o-Xylene	M18-Au26354	CP	%	91			70-130	Pass	
Xylenes - Total	M18-Au26354	CP	%	93			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M18-Au26354	CP	%	76			70-130	Pass	
TRH C6-C10	M18-Au26354	CP	%	74			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M18-Au26107	NCP	mg/kg	5.6	2.5	74	30%	Fail	Q15
Acenaphthylene	M18-Au26107	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M18-Au26107	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M18-Au26107	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	M18-Au26107	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	M18-Au26107	NCP	mg/kg	0.6	< 0.5	130	30%	Fail	Q15
Benzo(g,h,i)perylene	M18-Au26107	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M18-Au26107	NCP	mg/kg	0.6	< 0.5	130	30%	Fail	Q15
Chrysene	M18-Au26107	NCP	mg/kg	0.6	< 0.5	130	30%	Fail	Q15
Dibenz(a,h)anthracene	M18-Au26107	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M18-Au26107	NCP	mg/kg	1.3	< 0.5	110	30%	Fail	Q15
Fluorene	M18-Au26107	NCP	mg/kg	2.2	1.1	71	30%	Fail	Q15
Indeno(1,2,3-cd)pyrene	M18-Au26107	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M18-Au26107	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M18-Au26107	NCP	mg/kg	1.4	0.8	57	30%	Fail	Q15
Pyrene	M18-Au26107	NCP	mg/kg	0.9	< 0.5	120	30%	Fail	Q15
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	M18-Au26107	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

Duplicate								
Organophosphorus Pesticides				Result 1	Result 2	RPD		
Mevinphos	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Monocrotophos	M18-Au26107	NCP	mg/kg	< 2	< 2	<1	30%	Pass
Naled	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Omethoate	M18-Au26107	NCP	mg/kg	< 2	< 2	<1	30%	Pass
Phorate	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Pirimiphos-methyl	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Pyrazophos	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Ronnel	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Terbufos	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Tetrachlorvinphos	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Tokuthion	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Trichloronate	M18-Au26107	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	M18-Au26072	NCP	%	2.4	2.3	6.0	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	M18-Au26342	CP	mg/kg	3.2	2.8	13	30%	Pass
Cadmium	M18-Au26342	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass
Chromium	M18-Au26342	CP	mg/kg	5.7	< 5	14	30%	Pass
Copper	M18-Au26342	CP	mg/kg	10	8.7	14	30%	Pass
Lead	M18-Au26342	CP	mg/kg	< 5	< 5	<1	30%	Pass
Mercury	M18-Au26342	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Nickel	M18-Au26342	CP	mg/kg	< 5	< 5	<1	30%	Pass
Zinc	M18-Au26342	CP	mg/kg	35	37	6.0	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	M18-Au26343	CP	mg/kg	7.2	7.2	1.0	30%	Pass
Cadmium	M18-Au26343	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass
Chromium	M18-Au26343	CP	mg/kg	7.8	8.0	3.0	30%	Pass
Copper	M18-Au26343	CP	mg/kg	15	15	2.0	30%	Pass
Lead	M18-Au26343	CP	mg/kg	21	21	1.0	30%	Pass
Mercury	M18-Au26343	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Nickel	M18-Au26343	CP	mg/kg	5.4	5.6	3.0	30%	Pass
Zinc	M18-Au26343	CP	mg/kg	77	78	2.0	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C10-C14	M18-Au26344	CP	mg/kg	< 20	< 20	<1	30%	Pass
TRH C15-C28	M18-Au26344	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH C29-C36	M18-Au26344	CP	mg/kg	< 50	< 50	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
TRH >C10-C16	M18-Au26344	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH >C16-C34	M18-Au26344	CP	mg/kg	< 100	< 100	<1	30%	Pass
TRH >C34-C40	M18-Au26344	CP	mg/kg	< 100	< 100	<1	30%	Pass
Duplicate								
Organochlorine Pesticides				Result 1	Result 2	RPD		
Chlordanes - Total	M18-Au26344	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
4,4'-DDD	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
4,4'-DDE	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
4,4'-DDT	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
a-BHC	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Aldrin	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
b-BHC	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass

Duplicate								
Organochlorine Pesticides				Result 1	Result 2	RPD		
d-BHC	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Dieldrin	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endosulfan I	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endosulfan II	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endosulfan sulphate	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endrin	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endrin aldehyde	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endrin ketone	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
g-BHC (Lindane)	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Heptachlor	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Heptachlor epoxide	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Hexachlorobenzene	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Methoxychlor	M18-Au26344	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Toxaphene	M18-Au26344	CP	mg/kg	< 1	< 1	<1	30%	Pass
Duplicate								
Polychlorinated Biphenyls				Result 1	Result 2	RPD		
Aroclor-1016	M18-Au26344	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1221	M18-Au26344	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1232	M18-Au26344	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1242	M18-Au26344	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1248	M18-Au26344	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1254	M18-Au26344	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1260	M18-Au26344	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Total PCB*	M18-Au26344	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C6-C9	M18-Au26349	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
BTEX				Result 1	Result 2	RPD		
Benzene	M18-Au26349	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	M18-Au26349	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	M18-Au26349	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	M18-Au26349	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	M18-Au26349	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total	M18-Au26349	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	M18-Au26349	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	M18-Au26349	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	M18-Au26352	CP	mg/kg	3.4	2.6	25	30%	Pass
Cadmium	M18-Au26352	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass
Chromium	M18-Au26352	CP	mg/kg	33	33	1.0	30%	Pass
Copper	M18-Au26352	CP	mg/kg	15	15	3.0	30%	Pass
Lead	M18-Au26352	CP	mg/kg	5.9	5.4	9.0	30%	Pass
Mercury	M18-Au26352	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Nickel	M18-Au26352	CP	mg/kg	24	25	2.0	30%	Pass
Zinc	M18-Au26352	CP	mg/kg	44	44	1.0	30%	Pass

Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	M18-Au26353	CP	mg/kg	< 2	< 2	<1	30%	Pass
Cadmium	M18-Au26353	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass
Chromium	M18-Au26353	CP	mg/kg	12	13	2.0	30%	Pass
Copper	M18-Au26353	CP	mg/kg	8.4	8.5	2.0	30%	Pass
Lead	M18-Au26353	CP	mg/kg	6.4	6.5	1.0	30%	Pass
Mercury	M18-Au26353	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Nickel	M18-Au26353	CP	mg/kg	7.7	7.8	1.0	30%	Pass
Zinc	M18-Au26353	CP	mg/kg	29	29	1.0	30%	Pass

Comments

New version with repeat lead result.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Andrew Black	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Nibha Vaidya	Senior Analyst-Asbestos (NSW)



Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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CERTIFICATE OF ANALYSIS

Work Order : **EM1813332**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : **MR BRENDAN GRANT**
Address : **LEVEL 1, 95 COVENTRY STREET**
SOUTH MELBOURNE VIC, AUSTRALIA 3205
Telephone : **02 4949 5200**
Project : **20191404**
Order number :
C-O-C number :
Sampler : **DK**
Site : **Warnervale Primary School PSI**
Quote number : **EN/222**
No. of samples received : **1**
No. of samples analysed : **1**

Page : 1 of 3
Laboratory : Environmental Division Melbourne
Contact : Shirley LeCornu
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61-3-8549 9630
Date Samples Received : 22-Aug-2018 10:00
Date Analysis Commenced : 22-Aug-2018
Issue Date : 28-Aug-2018 09:20



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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Emily Daos	Team Leader - Asbestos	Melbourne Asbestos, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC



General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **EA200: As only one sample container was submitted for multiple tests, at the client's request, sub sampling was conducted prior to Asbestos analysis. As this has the potential to understate detection, results should be scrutinised accordingly.**
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QC2	----	----	----	----
Client sampling date / time				18-Aug-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM1813332-001	-----	-----	-----	-----
Result				----	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	13.6	----	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	----	----	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	No	----	----	----	----
Asbestos Type	1332-21-4	-	--	-	----	----	----	----
Sample weight (dry)	----	0.01	g	47.7	----	----	----	----
APPROVED IDENTIFIER:	----	-	--	E.DAOS	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	6	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	12	----	----	----	----
Copper	7440-50-8	5	mg/kg	9	----	----	----	----
Lead	7439-92-1	5	mg/kg	15	----	----	----	----
Nickel	7440-02-0	2	mg/kg	4	----	----	----	----
Zinc	7440-66-6	5	mg/kg	188	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: SOIL		
Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	QC2 - 18-Aug-2018 00:00	Brown sandy soil with rock and organic matter.

QUALITY CONTROL REPORT

Work Order	: EM1813332	Page	: 1 of 3
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: MR BRENDAN GRANT	Contact	: Shirley LeCornu
Address	: LEVEL 1, 95 COVENTRY STREET SOUTH MELBOURNE VIC, AUSTRALIA 3205	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: 02 4949 5200	Telephone	: +61-3-8549 9630
Project	: 20191404	Date Samples Received	: 22-Aug-2018
Order number	:	Date Analysis Commenced	: 22-Aug-2018
C-O-C number	: ----	Issue Date	: 28-Aug-2018
Sampler	: DK		
Site	: Warnervale Primary School PSI		
Quote number	: EN/222		
No. of samples received	: 1		
No. of samples analysed	: 1		



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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Emily Daos	Team Leader - Asbestos	Melbourne Asbestos, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC



General Comments

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

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

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

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

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 (Dried @ 105-110°C) (QC Lot: 1891415)									
EM1813273-001	Anonymous	EA055: Moisture Content	----	0.1	%	21.5	22.4	4.26	0% - 20%
EM1813273-011	Anonymous	EA055: Moisture Content	----	0.1	%	18.8	19.6	4.39	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 1889787)									
EM1813114-106	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	43	36	18.2	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	18	17	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	6	6	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	10	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	16	14	15.1	No Limit
EM1813128-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	12	12	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	9	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	6	5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	9	9	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	19	19	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1889786)									
EM1813114-106	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1813128-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit



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

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005T: Total Metals by ICP-AES (QCLot: 1889787)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	94.8	79	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	93.0	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	94.9	83	109
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	95.1	78	108
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	89.8	78	106
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	100	82	111
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	100	82	111
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1889786)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	92.4	77	104

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1889787)							
EM1813114-109	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	83.7	78	124
		EG005T: Cadmium	7440-43-9	50 mg/kg	87.8	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	105	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	94.9	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	91.2	76	124
		EG005T: Nickel	7440-02-0	50 mg/kg	93.7	78	120
		EG005T: Zinc	7440-66-6	50 mg/kg	89.0	74	128
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1889786)							
EM1813114-109	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	82.7	76	116

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1813332	Page	: 1 of 4
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: MR BRENDAN GRANT	Telephone	: +61-3-8549 9630
Project	: 20191404	Date Samples Received	: 22-Aug-2018
Site	: Warnervale Primary School PSI	Issue Date	: 28-Aug-2018
Sampler	: DK	No. of samples received	: 1
Order number	:	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) QC2	18-Aug-2018	----	----	----	22-Aug-2018	01-Sep-2018	✓
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag - Subsampled by ALS (EA200) QC2	18-Aug-2018	----	----	----	22-Aug-2018	14-Feb-2019	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) QC2	18-Aug-2018	23-Aug-2018	14-Feb-2019	✓	24-Aug-2018	14-Feb-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) QC2	18-Aug-2018	23-Aug-2018	15-Sep-2018	✓	27-Aug-2018	15-Sep-2018	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Mercury by FIMS	EG035T	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)

[illegible]

ATTACHMENT E QA/QC ANALYSIS

Table 2
Soil Analytical Data - Metals
Warnervale Primary School



Analyte			Metals							
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
LOR			2.0	0.4	5.0	5.0	5.0	0.1	5.0	5.0
Units			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HIL A - Residential (NEPM 2013)			100	20	--	6,000	300	40	400	7,400
EIL - Urban Residential/Public Open Space (NEPM 2013)			100	--	190	60	1,100	--	30	70
Sample Name	Sample Date	Start Depth (m)								
KLF01	18-Aug-18	0.05	3.0	< 0.4	33	65	17	< 0.1	45	69
KLF02	18-Aug-18	0.05	3.6	< 0.4	7.0	8.2	19	< 0.1	< 5.0	100
KLF03	18-Aug-18	0.05	7.6	< 0.4	8.9	12	25	< 0.1	< 5.0	66
KLF04A	18-Aug-18	0.05	2.3	< 0.4	< 5.0	9.4	< 5.0	< 0.1	< 5.0	33
KLF04B	18-Aug-18	0.05	3.2	< 0.4	5.7	10	< 5.0	< 0.1	< 5.0	35
KLF05	18-Aug-18	0.05	7.2	< 0.4	7.8	15	21	< 0.1	5.4	77
KLF06	18-Aug-18	0.05	3.0	< 0.4	12	7.5	9.6	< 0.1	7.7	64
KLF07A	18-Aug-18	0.05	8.3	< 0.4	15	13	14	< 0.1	7.4	210
KLF07B	18-Aug-18	0.05	2.1	< 0.4	9.7	5.3	7.7	< 0.1	< 5.0	32
KLF08	18-Aug-18	0.05	4.1	< 0.4	10	< 5.0	12	< 0.1	< 5.0	210
KLF09A	18-Aug-18	0.05	3.2	< 0.4	13	11	15	< 0.1	9.3	270
KLF09B	18-Aug-18	0.05	5.2	< 0.4	15	< 5.0	19	< 0.1	6.4	60
KLF10	18-Aug-18	0.05	2.4	< 0.4	25	38	6.2	< 0.1	68	68
KLF11	18-Aug-18	0.05	5.1	< 0.4	9.8	10	24	< 0.1	5.8	190
KLF12A	18-Aug-18	0.05	3.4	< 0.4	33	15	5.9	< 0.1	24	44
KLF13	18-Aug-18	0.05	< 2.0	< 0.4	12	8.4	6.4	< 0.1	7.7	29
KLF14A	18-Aug-18	0.05	42	< 0.4	25	27	6.8	< 0.1	< 5.0	55
KLF14B	18-Aug-18	0.05	6.3	< 0.4	5.5	< 5.0	< 5.0	< 0.1	< 5.0	13

Notes:

< - Less than laboratory limit of reporting

mg/kg - Milligrams per kilogram

Bold indicates a detection above the laboratory limit of reporting

Highlighting indicates an exceedance of the corresponding criteria (highlighting corresponds to the guideline with the highest criteria value where analytical result exceeds more than one guideline)

Criteria:

National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013).

Table 5
Soil Analytical Data - Pesticides
Warnervale Primary School



Analyte			4,4'-DDE	4,4'-DDD	4,4'-DDT	alpha-BHC	beta-BHC	gamma-BHC	delta-BHC	Aldrin	Heptachlor epoxide	Chlordane	alpha-Endosulfan	beta-Endosulfan
LOR			0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.05
Units			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HIL A - Residential (NEPM 2013)			--	--	--	--	--	--	--	--	--	50	--	--
EIL - Urban Residential/Public Open Space (NEPM 2013)			--	--	180	--	--	--	--	--	--	--	--	--
Sample Name	Sample Date	Start Depth (m)												
KLF01	18-Aug-18	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05
KLF06	18-Aug-18	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05
KLF09A	18-Aug-18	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05
KLF09B	18-Aug-18	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05
KLF14A	18-Aug-18	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05
KLF14B	18-Aug-18	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05

Notes:

< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/kg - Milligrams per kilogram
DDT - Dichlorodiphenyltrichloroethane
DDE - Dichlorodiphenyldichloroethylene
DDD - Dichlorodiphenyldichloroethane

Criteria:

National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013).

Table 5
Soil Analytical Data - Pesticides
Warnervale Primary School



Organochlorine Pesticides														
Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	Dieldrin	Heptachlor	Hexachlorobenzene	Methoxychlor	Toxaphene	Sum of Aldrin + Dieldrin	Sum of DDD + DDE + DDT	Sum of other Organochlorine pesticides	Total Organochlorine Pesticides	Azinphos methyl	Bolstar
0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	1.0	0.05	0.05	0.1	0.1	0.2	0.2
mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
--	10	--	--	--	6.0	10	300	20	6.0	240	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 1.0	< 0.05	< 0.05	< 0.1	< 0.1	< 0.2	< 0.2
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 1.0	< 0.05	< 0.05	< 0.1	< 0.1	< 0.2	< 0.2
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 1.0	< 0.05	< 0.05	< 0.1	< 0.1	< 0.2	< 0.2
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 1.0	< 0.05	< 0.05	< 0.1	< 0.1	< 0.2	< 0.2
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 1.0	< 0.05	< 0.05	< 0.1	< 0.1	< 0.2	< 0.2
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 1.0	< 0.05	< 0.05	< 0.1	< 0.1	< 0.2	< 0.2

Table 5
Soil Analytical Data - Pesticides
Warnervale Primary School



Organophosphorus Pesticides															
Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-S	Demeton-O	Disulfoton	Diazinon	Dichlorvos	Dimethoate	EPN	Ethion	Ethoprop	Fenitrothion	Fensulfothion	Fenthion
0.2	0.2	0.2	2.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
--	160	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
< 0.2	< 0.2	< 0.2	< 2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
< 0.2	< 0.2	< 0.2	< 2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
< 0.2	< 0.2	< 0.2	< 2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
< 0.2	< 0.2	< 0.2	< 2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
< 0.2	< 0.2	< 0.2	< 2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
< 0.2	< 0.2	< 0.2	< 2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

Table 5
Soil Analytical Data - Pesticides
Warnervale Primary School



Malathion	Merphos	Mevinphos	Monocrotophos	Omethoate	Parathion	Parathion-methyl	Phorate	Pirimiphos-methyl	Ronnel	Terbufos	Tetrachlorvinphos	Trichloronate	Naled	Pyrazophos	Tokuthion
0.2	0.2	0.2	2.0	2.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
< 0.2	< 0.2	< 0.2	< 2.0	< 2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
< 0.2	< 0.2	< 0.2	< 2.0	< 2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
< 0.2	< 0.2	< 0.2	< 2.0	< 2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
< 0.2	< 0.2	< 0.2	< 2.0	< 2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
< 0.2	< 0.2	< 0.2	< 2.0	< 2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
< 0.2	< 0.2	< 0.2	< 2.0	< 2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

Table 3
Soil Analytical Data - PAHs
Warnervale Primary School



Analyte			Polycyclic Aromatic Hydrocarbons																				
LOR			Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Chrysene	Benzo[a]anthracene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene	Total PAH	Benzo[a]pyrene TEQ (Zero)	Benzo[a]pyrene TEQ (LOR)	Benzo[a]pyrene TEQ (Half LOR)	
Units			0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	0.5 mg/kg	
HIL A - Residential (NEPM 2013)			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	300	3.0	3.0
ESL - Urban Residential/Public Open Space, Coarse (NEPM 2013)			--	--	--	--	--	--	--	--	--	--	--	--	0.7	--	--	--	--	--	--	--	--
EIL - Urban Residential/Public Open Space (NEPM 2013)			170	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HSL A - Direct Contact (CRC CARE 2011)			1,400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HSL (Vapour Intrusion) A & B - SAND (NEPM 2013)		0 m - <1 m	3.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
HSL - Intrusive Maintenance Worker (Shallow Trench) SAND (CRC CARE 2011)		0 m - <2 m	NL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Sample Name	Sample Date	Start Depth (m)	< 0.5	< 0.5	< 0.5	< 0.5	2.8	0.7	6.0	6.8	3.6	2.8	3.7	3.6	5.6	3.8	0.9	4.8	45	8.0	8.0	8.0	
KLF01	18-Aug-18	0.05	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	0.6	
KLF06	18-Aug-18	0.05	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	0.6	
KLF09A	18-Aug-18	0.05	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	0.6	
KLF09B	18-Aug-18	0.05	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	0.6	
KLF14A	18-Aug-18	0.05	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	0.6	
KLF14B	18-Aug-18	0.05	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	0.6	

Notes:
 < - Less than laboratory limit of reporting
 LOR - Laboratory limit of reporting
 NL - Not limiting
 mg/kg - Milligrams per kilogram
Bold indicates a detection above the laboratory limit of reporting
 Highlighting indicates an exceedance of the corresponding criteria (highlighting corresponds to the guideline with the highest criteria value where analytical result exceeds more than one guideline)

Criteria:
 National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013).
 CRC CARE Technical Report No. 10 - Health Screening Level (HSL) for Petroleum Hydrocarbons in Soil and Groundwater, Part 2: Application Document (2011).

Table 4
Soil Analytical Data - PCBs
Warnervale Primary School



Analyte	Polychlorinated Biphenyls							
	Aroclor-1260	Aroclor-1254	Aroclor-1221	Aroclor-1232	Aroclor-1248	Aroclor-1016	Aroclor-1242	Total PCBs
LOR	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HIL A - Residential (NEPM 2013)	--	--	--	--	--	--	--	1.0
Sample Name	Sample Date	Start Depth (m)						
KLF01	18-Aug-18	0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
KLF06	18-Aug-18	0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
KLF09A	18-Aug-18	0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
KLF09B	18-Aug-18	0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
KLF14A	18-Aug-18	0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
KLF14B	18-Aug-18	0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Notes:

< - Less than laboratory limit of reporting

LOR - Laboratory limit of reporting

mg/kg - Milligrams per kilogram

PCB - Polychlorinated Biphenyl

Criteria:

National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013).

Table 6
Quality Control Sample Analysis - Metals
Warnervale Primary School



Analyte			Metals							
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Units			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Sample Name	Sample Date	Sample Type								
KLF07A_18082018	18-Aug-18	Primary	8.3	< 0.4	15	13	14	< 0.1	7.4	210
QC1_18082018	18-Aug-18	Duplicate	8.3	< 0.4	12	11	18	< 0.1	< 5.0	200
Relative Percentage Difference			0%	NC	22%	17%	25%	NC	99%	5%
KLF07A_18082018	18-Aug-18	Primary	8.3	< 0.4	15	13	14	< 0.1	7.4	210
QC2_18082018	18-Aug-18	Triplicate	6.0	< 1.0	12	9.0	15	< 0.1	4.0	188
Relative Percentage Difference			32%	NC	22%	36%	7%	NC	60%	11%

Notes:

< - Less than laboratory limit of reporting

NC - Not calculated

mg/kg - Milligrams per kilogram

Half the laboratory limit of reporting used when calculating RPD

RPD - Relative Percentage Difference

Table 1
Soil Analytical Data - BTEXN, TRH
Warnervale Primary School



Analyte			BTEXN							Total Petroleum Hydrocarbons					Total Recoverable Hydrocarbons							
			Benzene	Toluene	Ethylbenzene	meta- & para- Xylene	ortho-Xylene	Total Xylenes	Naphthalene	C ₆ - C ₉	C ₁₀ - C ₁₄	C ₁₅ - C ₂₈	C ₂₉ - C ₃₆	C ₁₀ - C ₃₆ sum	C ₆ - C ₁₀	C ₆ - C ₁₅ minus BTEX (F1)	>C ₁₀ - C ₁₆	>C ₁₀ - C ₁₆ minus Naphthalene (F2)	>C ₁₆ - C ₃₄	>C ₃₄ - C ₄₀	>C ₁₀ - C ₄₀ (sum)	
LOR	0.1	0.1	0.1	0.2	0.1	0.3	0.5	20	20	50	50	50	20	20	50	50	100	100	100			
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg			
ESL - Urban Residential/Public Open Space, Coarse (NEPM 2013)	50	85	70	--	--	105	--	--	--	--	--	--	--	--	180	120	--	300	2,800	--		
EIL - Urban Residential/Public Open Space (NEPM 2013)	--	--	--	--	--	--	170	--	--	--	--	--	--	--	--	--	--	--	--	--		
HSL A - Direct Contact (CRC CARE 2011)	100	14,000	4,500	--	--	12,000	1,400	--	--	--	--	--	4,400	NL	3,300	NL	4,500	6,300	--			
HSL (Vapour Intrusion) A & B - SAND (NEPM 2013)	0 m - <1 m		0.5	160	55	--	--	40	3.0	--	--	--	--	--	45	--	110	--	--	--		
	HSL - Intrusive Maintenance Worker 0 m - <2 m		77	NL	NL	--	--	NL	NL	--	--	--	--	NL	--	NL	--	NL	NL	--		
Sample Name	Sample Date	Start Depth (m)		< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.3	< 0.5	< 20	< 20	190	230	420	< 20	< 20	< 50	< 50	350	320	670
KL F01	18-Aug-18	0.05		< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.3	< 0.5	< 20	< 20	< 50	< 50	< 50	< 20	< 20	< 50	< 50	< 100	< 100	< 100
KL F06	18-Aug-18	0.05		< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.3	< 0.5	< 20	< 20	< 50	< 50	< 50	< 20	< 20	< 50	< 50	< 100	< 100	< 100
KL F09A	18-Aug-18	0.05		< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.3	< 0.5	< 20	< 20	71	51	122	< 20	< 20	< 50	< 50	< 100	< 100	< 100
KL F09B	18-Aug-18	0.05		< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.3	< 0.5	< 20	< 20	< 50	< 50	< 50	< 20	< 20	< 50	< 50	< 100	< 100	< 100
KL F14A	18-Aug-18	0.05		< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.3	< 0.5	< 20	< 20	< 50	< 50	< 50	< 20	< 20	< 50	< 50	< 100	< 100	< 100
KL F14B	18-Aug-18	0.05		< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.3	< 0.5	< 20	< 20	< 50	< 50	< 50	< 20	< 20	< 50	< 50	< 100	< 100	< 100

Notes:
 < - Less than laboratory limit of reporting
 NL - Not limiting
 mg/kg - Milligrams per kilogram
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene
Bold indicates a detection above the laboratory limit of reporting
 Highlighting indicates an exceedance of the corresponding criteria (highlighting corresponds to the guideline with the highest criteria value where analytical result exceeds more than one guideline)

Criteria:
 National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013).
 CRC CARE Technical Report No. 10 - Health Screening Level (HSL) for Petroleum Hydrocarbons in Soil and Groundwater, Part 2: Application Document (2011).

Waste Classification

Analyte													
			Benzo[a]pyrene	C ₆ - C ₉	C ₁₀ - C ₃₆ sum	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
LOR			0.5	20	50	2.0	0.4	5.0	5.0	5.0	0.1	5.0	5.0
Units			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
CT1 - General Solid Waste			0.8	650	10,000	100	20	100	--	100	4.0	40	--
CT2 - Restricted Solid Waste			3.2	2,600	40,000	400	80	400	--	400	16	160	--
Sample Name	Sample Date	Start Depth (m)											
KLF01	18-Aug-18	0.05	5.6	< 20	420	3.0	< 0.4	33	65	17	< 0.1	45	69
KLF02	18-Aug-18	0.05	--	--	--	3.6	< 0.4	7.0	8.2	19	< 0.1	< 5.0	100
KLF03	18-Aug-18	0.05	--	--	--	7.6	< 0.4	8.9	12	25	< 0.1	< 5.0	66
KLF04A	18-Aug-18	0.05	--	--	--	2.3	< 0.4	< 5.0	9.4	< 5.0	< 0.1	< 5.0	33
KLF04B	18-Aug-18	0.05	--	--	--	3.2	< 0.4	5.7	10	< 5.0	< 0.1	< 5.0	35
KLF05	18-Aug-18	0.05	--	--	--	7.2	< 0.4	7.8	15	21	< 0.1	5.4	77
KLF06	18-Aug-18	0.05	< 0.5	< 20	< 50	3.0	< 0.4	12	7.5	9.6	< 0.1	7.7	64
KLF07A	18-Aug-18	0.05	--	--	--	8.3	< 0.4	15	13	14	< 0.1	7.4	210
KLF07B	18-Aug-18	0.05	--	--	--	2.1	< 0.4	9.7	5.3	7.7	< 0.1	< 5.0	32
KLF08	18-Aug-18	0.05	--	--	--	4.1	< 0.4	10	< 5.0	12	< 0.1	< 5.0	210
KLF09A	18-Aug-18	0.05	< 0.5	< 20	122	3.2	< 0.4	13	11	15	< 0.1	9.3	270
KLF09B	18-Aug-18	0.05	< 0.5	< 20	< 50	5.2	< 0.4	15	< 5.0	19	< 0.1	6.4	60
KLF10	18-Aug-18	0.05	--	--	--	2.4	< 0.4	25	38	6.2	< 0.1	68	68
KLF11	18-Aug-18	0.05	--	--	--	5.1	< 0.4	9.8	10	24	< 0.1	5.8	190
KLF12A	18-Aug-18	0.05	--	--	--	3.4	< 0.4	33	15	5.9	< 0.1	24	44
KLF13	18-Aug-18	0.05	--	--	--	< 2.0	< 0.4	12	8.4	6.4	< 0.1	7.7	29
KLF14A	18-Aug-18	0.05	< 0.5	< 20	< 50	42	< 0.4	25	27	6.8	< 0.1	< 5.0	55
KLF14B	18-Aug-18	0.05	< 0.5	< 20	< 50	6.3	< 0.4	5.5	< 5.0	< 5.0	< 0.1	< 5.0	13

Notes:
-- Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
µg/L - Micrograms per litre
mg/kg - Milligrams per kilogram
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
Highlighting indicates an exceedance of the corresponding criteria
highlighting corresponds to the guideline with the highest criteria value where analytical result exceeds more than one guideline

Criteria:
Contaminant threshold values (CT1 & CT2) for classifying waste by chemical assessment without the leaching (TCLP) test, Waste Classification Guidelines NSW (EPA 2014)