Northern Rivers Contaminated Land Program - Contamination Report Summary Table

NORTHERN RIVERS
Contaminated Land Program

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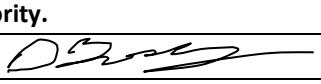
Report title: Preliminary Contaminated Land Assessment Revision A	
Produced by: Greg Alderson & Associates	**ABN:** 58 594 160 789
Provided to Lismore City Council **Council on:** May 2022	
I Dylan Brooks **of** Greg Alderson & Associates **state that I have undertaken this assessment in accordance with the guidelines made and approved by the NSW Environment Protection Authority.**	
Name: Dylan Brooks	**Signature:** 
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This project has been funded by the New South Wales Government through the EPA's Contaminated Land Management Program

PRELIMINARY CONTAMINATED LAND ASSESSMENT

To Support the LEP Amendment for varying the Minimum Lot Size of Lot 1 DP 832781 1443 Bangalow Road, Clunes

For:	John Clement
Report no:	21484_sepp55 Rev A.docx
Date:	April 27, 2022

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Document Information

Project name:

LEP amendment to vary minimum Lot size

Reference:

21484_sepp55 Rev A.docx

Revision Summary:

A – Incorporate soil sampling into the preliminary report

EXECUTIVE SUMMARY

Greg Alderson and Associates have been commissioned by John Clement to undertake a preliminary contaminated land assessment at Lot 1 DP 832781, 1443 Bangalow Road, Clunes. As required under Section 7 of SEPP 55, this assessment was conducted to determine if the nominated investigation area was contaminated from past or present land uses. This assessment is to accompany the planning proposal to allow for an amendment to the Local Environment Plan (LEP) to vary the minimum lot size to allow for a dwelling entitlement at the subject property.

As requested by Lismore City Council, soil testing was undertaken around the existing industrial shed and general-purpose shed (being the investigation area for this assessment) to determine if it is contaminated.

Staff of this office inspected the site on the 23/02/2022 as part of the assessment of any potential contamination.

A desktop assessment and site investigation was undertaken as part of the preliminary assessment. It was determined that the earliest identified land use of the site was as a dairy farm, with a besser block constructed dairy bales, which were then added to create the shed to accommodate the motor vehicle repair workshop and also contained a dwelling to the west of the shed. The dwelling was removed in the 1970s and the northern shed was used as a motor vehicle repair workshop.

There is potential contamination in the northern section of the site, as a result from lead based paint from the former dwelling, and hydrocarbons and heavy metals from the motor vehicle repair workshop. It was identified that there is a low risk of contamination elsewhere on the property.

To determine if any contamination was present on the site, a preliminary soil contamination assessment (Tier 1) was undertaken in accordance with NEPM 1999 (2013), EPA (2020) and NSW EPA (1995) within the investigation area. Given that the probable sources of contamination were identified, a judgemental sampling pattern was adopted.

Based on the known history of the investigation area, a broad range of contaminants were included in the analysis suit. These included heavy metals (including arsenic, lead and copper), organochlorines (including DDT, aldrin/Dieldrin and endosulfan), organophosphates, and hydrocarbons including BTEX, TRH's & PAH's. The sampling results were compared with relevant published screening levels based on a residential sensitivity.

Results of all tested contaminants were below the relevant screening levels.

Based on the known history of the site, inspection of the site and sampling regime, it is concluded that further soil contamination assessment is not required in the proposed investigation area. NSW EPA (1995) and NEPM 1999 (2013) state that if the

contaminant concentration of the site is below a threshold limit, the investigation area can be considered as uncontaminated, and this is considered to be the case in this investigation area.

This assessment has been undertaken in accordance with NEPM 1999 (2013). If rubbish or other indicators of contamination are found on the site that has not been addressed under this assessment, this office is to be notified.

CONTENTS

1. INTRODUCTION

Greg Alderson and Associates have been commissioned by John Clement to undertake a preliminary contaminated land assessment at Lot 1 DP 832781, 1443 Bangalow Road, Clunes. This report is to accompany the planning proposal to allow for an amendment to the Local Environment Plan (LEP) to vary the minimum lot size to allow for a dwelling entitlement at the site. As required under Section 7 of SEPP 55, this assessment was conducted to determine if the investigation area was contaminated from past or present land uses. The site was assessed for contamination in accordance with the requirements of the National Environmental Protection Measure 1999 (2013) (NEPM).

The existing industrial shed, proposed building envelope and its curtilage was classed as the investigation area for this assessment and is shown in **Exhibit No. 2**.

2. OBJECTIVES

The objectives of this preliminary contaminated land assessment are outlined as:

- Determine the presence and extent of contamination occurring within the subject site,
- Provide recommendations to the consent authority for addressing any contamination occurring on the subject site.

3. SCOPE OF WORK

This investigation is Tier 1 - preliminary site investigation, which is required to determine if contamination of the investigation areas soil has occurred from past land usage in accordance with NEPM 1999 (2013), DUAP and EPA (1998). The investigation includes obtaining a history of land usage on the site and a preliminary soil-sampling regime. The results of the soil sample analysis are compared with the Health Investigation Levels (HIL's) outlined in NEPM 1999 (2013) and have been adjusted for composite soil sampling. If the sample results are above the relevant HIL a detailed investigation will be required in accordance with NEPM 1999 (2013) & NSW EPA (2000) which would include the ecological investigation levels and Groundwater investigation levels.

The relevant guidelines used for the investigation are as follows:

- NSW EPA (1995) Contaminated Sites – Sampling Design Guidelines;
- National Environmental Protection Measure 1999 (2013);
- Northern Rivers Regional Councils *Regional Policy for the Management of Contaminated Land* (2006);
- NSW EPA (2020) *Consultants reporting on contaminated land guidelines.*

Soil sampling methodology used in this investigation included:

- Soil analysis tests were undertaken to determine the presence of heavy metals, organochlorines and organophosphorous;
- All soil sampling was undertaken by Dylan Brooks (BEnvSc) of this office, using judgemental point sampling of the investigation area's topsoil;
- All samples were collected using a hand auger, placed in a plastic bag and delivered to Richmond Water Laboratories (RWL) who subcontracted the soil analysis to Envirolab for analysis of heavy metals, BTEX, PAH's, TRH's, OrganoChlorines (OCs) and OrganoPhosphorus (OPs);
- All results from RWL were sent to this office for the completion of this report;
- Heavy metal, OP & OC results were compared with NEPM 1999 (2013) HIL's according to 'residential A' sensitivity;
- PAH, BTEX & TRH concentrations were compared to HSL – A within Friebel, E & Nadebaum, P (2011), for vapour intrusion and direct contact screening levels;
- The site was assessed in accordance with the Tier 1 requirements of NEPM 1999 (2013);
- The report is written in accordance with NSW EPA (2020) *Consultants reporting on contaminated land guidelines.*

4. SITE IDENTIFICATION

The site is formally identified as Lot 1 DP 832781, 1443 Bangalow Road, Clunes. The site is located to the south of Bangalow Road and is accessed by a single driveway which leads to the shed along the northern boundary of the property. An informal access is provided to the southern shed, which is located on a lower terraced area to the south.

The site is currently zoned RU1 primary production. The site is also within the drinking water catchment for Wilsons River.

The subject site is presented in Figure 1.

Figure 1: Site location (Lismaps, 2021).

5. HISTORY OF SITE

The site has most recently been used as a motor repair station, being a panel beater within the shed closest to the northern boundary. The approval history is summarised below:

- BA No 1978/565, 27 Nov. 1978 – approved a Dwelling on Lot 3 DP 591492.
- DA No 1980/9, 5 March 1980 – approved subject to 3 conditions the use of an existing building (disused dairy- for a Motor Vehicle Repair Panel Beating Repair Shop on Lot 3 DP 591492. (Part of Main Northern Building On Site).

- BA No 1980/408, 3 July 1980 – approved the shed on Lot 3 DP 591492. (Main Northern Building On Site).
- BA No 1987/98, 9 March 1987 – approved a swimming pool with the dwelling on Lot 3 DP 591492.
- DA No 1989/449, 5 Dec 1989 – approved subject to 12 conditions the extension of the workshop building on Lot 3 DP 591492. (Main Northern Building On Site). This consent required a Type "A" intersection on Bangalow Road which was constructed by the applicant, and later removed by the RMS as part of Lismore Road upgrades 7 years ago.
- BA No 1989/560, 3 April 1990 – approved the extension to the workshop building on Lot 3 DP 591492. (Main Northern Building On Site).
- DA No 1992/1, 18 Feb. 1992 – approved subject to 3 conditions a subdivision of Lot 3 DP 591492 to create two lots. This placed the Main Northern Building On Site, being the Motor Vehicle Repair Panel Beating Repair Shop, onto its own title. Now known as Lot 1 DP 832781 No 1443 Bangalow Road Clunes, being a "Special Purpose Lot".
- DA 2014/14, 10 June 2014 – approved the smaller shed to the south of the Motor Vehicle Repair Panel Beating Repair Shop on Lot 1 DP 832781 No 1443 Bangalow Road Clunes.

Discussions with the current property owner were held regarding the land use history. Previously to the use of the site as a motor vehicle repair – panel beater, the property was part of a dairy farm. Part of the panel beater shed (northern shed) was the dairy bales which began in 1957 and the dairy building was of besser block construction, which can be still observed within the existing shed. There was a dwelling to the west of the dairy bales, however, during the 1970s this dwelling was removed from the property.

5.1. Previous Subdivision and Parish Maps

The property was previously part of Lot 3 DP 591492 which was created from the subdivision of Lot 3 DP 574796, also known as Portion 207. Parish maps present that Portion 207 extended to the east of the road reserve, which forms the eastern boundary to the neighbouring lot.

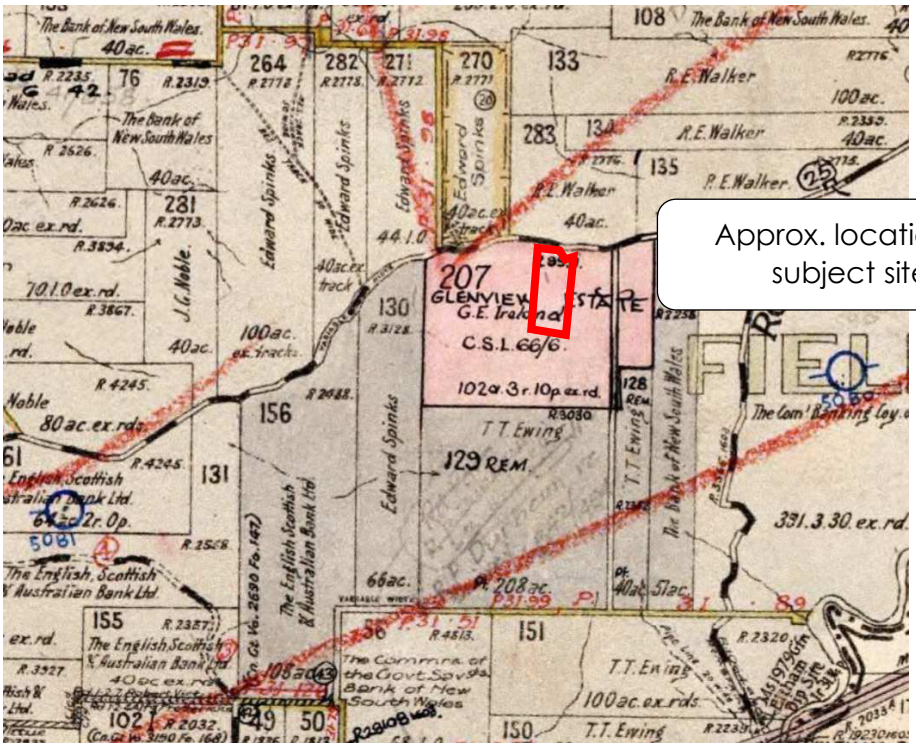


Figure 2: 1939 Parish Map (parish of Bexhill – LRS Historical Land Records Viewer, 2021)

Prior to the site being portion 207, the earliest available record presents that it was part of a larger holding being Portion 129 in 1900.

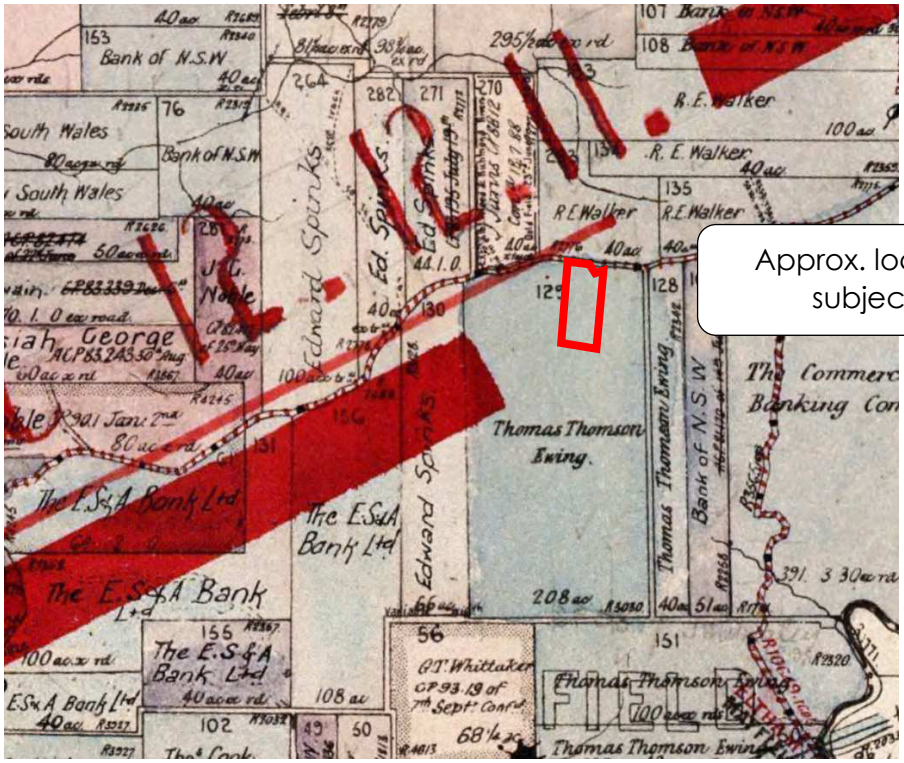


Figure 3: 1900 Parish Map (parish of Bexhill – LRS Historical Land Records Viewer, 2021)

5.2. Aerial Photography

Historic aerial photography available from Department of Customer Service (2020) was reviewed.

Figure 4: 1959 Aerial Photo (Department of Customer Service, 2020).

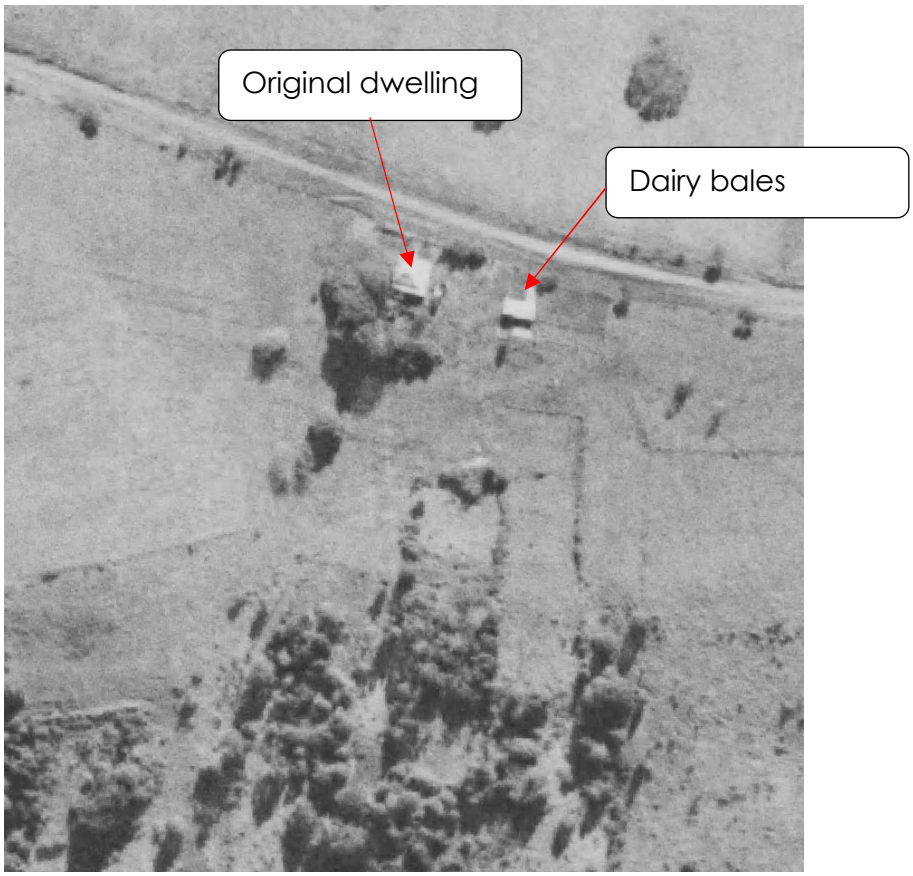


Figure 5: 1967 Aerial Photo (Department of Customer Service, 2020)

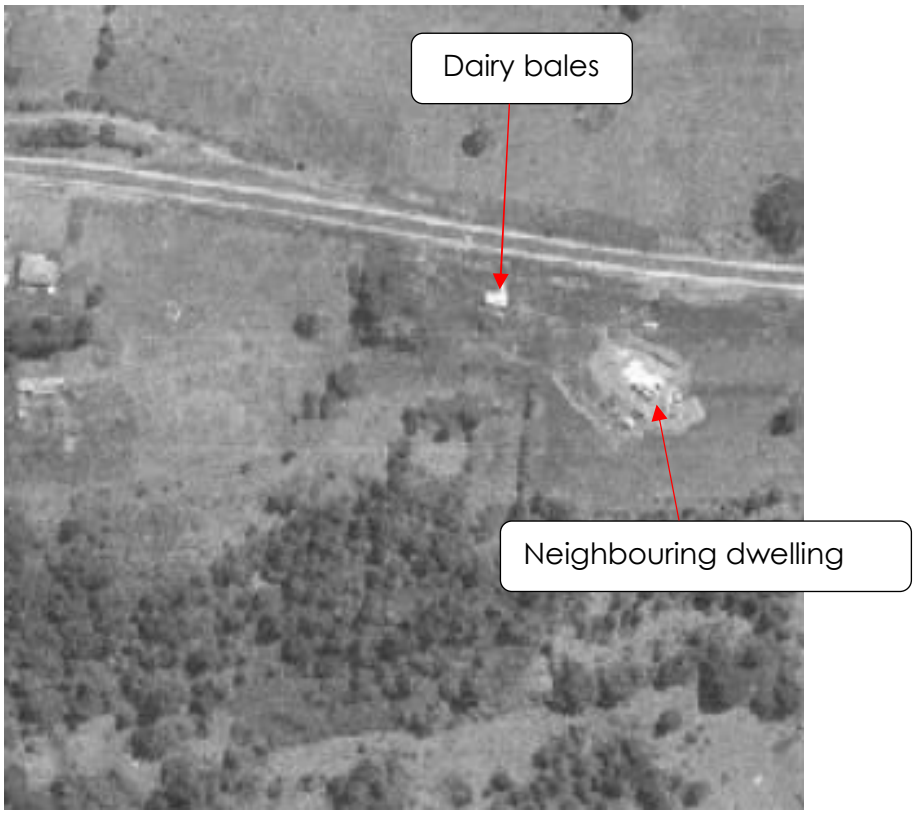


Figure 6: 1979 Aerial Photo (Department of Customer Service, 2020)

Figure 7: 1987 Aerial Photo (Department of Customer Service, 2020)

Figure 8: 1991 Aerial Photo (Department of Customer Service, 2020)

Figure 9: 2004 Satellite Photo (Google Earth, 2021)

Figure 10: 2014 Satellite Photo (Google Earth, 2021)

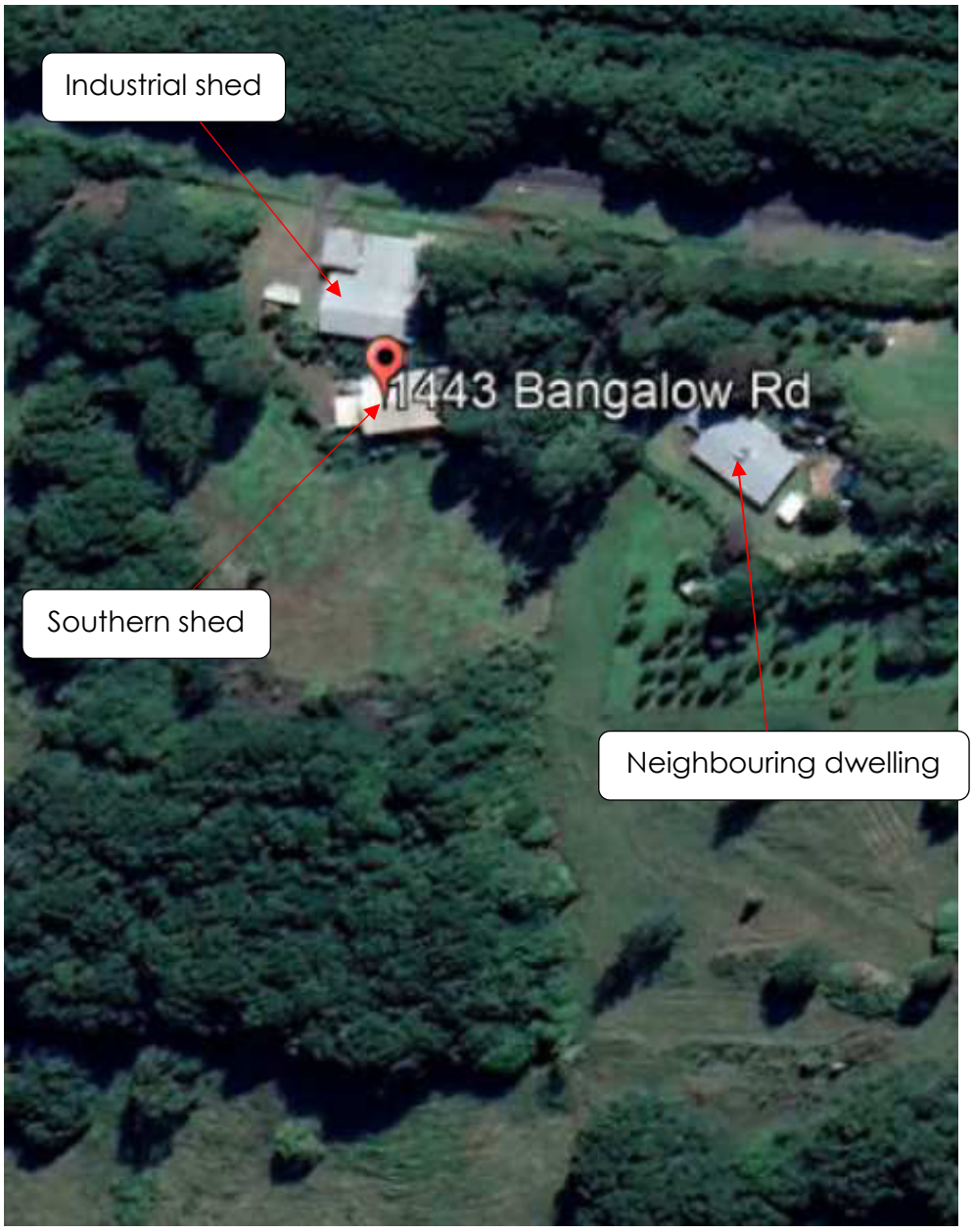


Figure 11: 2021 Satellite Photo (Google Earth, 2021)

Table 1: Description of Historic Aerial Photographs

Year	Description
1959	Site contains two buildings, presumed to be the dwelling to the west and dairy bales to the east Large trees to the west of buildings, remainder of the site is relatively clear with the occasional paddock tree
1967	Site contains two buildings, presumed to be the dwelling to the west and dairy bales to the east Large trees to the west of buildings, remainder of the site is relatively clear with the occasional paddock tree
1979	Site contains one building, the dwelling has been removed. Dairy bales to the east remain Large trees to the west of buildings, remainder of the site is relatively clear with the occasional paddock tree Neighbouring dwelling being constructed
1987	Site contains one building, the dwelling has been removed. Dairy bales to the east remain. Appears to be vehicles to the west of the building Large trees to the west of buildings. Some paddock trees removed, site is relatively clear of large vegetation Neighbouring site is well established
1991	Site contains one building, being the shed towards the northern boundary, which has been added to from 1987 – can see change in colour of roofing delineating extension Appears to be vehicles to the west of the building and potentially to the south Some minor regrowth of vegetation occurring Plantation starting to the north of Bangalow Road
2004	Site contains one building, being the shed towards the northern boundary Appears to be vehicles to the west of the building Major vegetation regrowth on site Macadamia plantation to the north of Bangalow Road
2014	Site contains one building, being the shed towards the northern boundary Appears to be vehicles to the west of the building Major vegetation regrowth – very dense to the south of the building Macadamia plantation to the north of Bangalow Road
2021	Site contains two buildings, being the shed towards the northern boundary and new shed to the south on a separate terrace. Vegetation has been cleared to the immediate south of the buildings. Dense vegetation for the remainder of the allotment. Vehicles have been removed from the site Macadamia plantation to the north of Bangalow Road

Google Street view provides a glimpse of the site from Bangalow Road in 2015 as shown in Figure 12.

Figure 12: Subject site from Bangalow Road Street view 2015 (Google Map, 2021)

6. SITE CONDITION AND SURROUNDING ENVIRONMENT

6.1. Site Investigation

The investigation area consisted of the area around the existing sheds and site. The northern shed being used for repairs and manufacturing of plastic canoes and not actively being used as a panel beater. At the time of the investigation the site was well maintained, with grass around the sheds, landscaping in terraced and larger trees to the west of the sheds.
It is apparent that the northern shed has been used for repairs/panel beaters due to the layout of the shed and the external appearance. There are no obvious areas of contamination around the shed, however, the historic arial photographs presented that vehicles were parked to the west of the shed.

Earth moving has occurred at the site, and it is expected that this would have been from cut and fill using soil from the site, however, it is possible that some soil may have been imported. Some gravel has been imported for the access roads.

Photograph 1: Western side of Motor Vehicle Workshop (Northern shed)

Photograph 2: South western side of Motor Vehicle Workshop (Northern shed)

Photograph 3: Southern side of Motor Vehicle Workshop, extraction fan outlet (Northern shed)

Photograph 4: Southern shed

Photograph 5: Area to the south, cleared and dense vegetation

6.2. General Site Condition

The site has a moderate gradient with a southerly aspect. There are no distinctive drainage channels on the subject site, with stormwater having general overland flow across the site. Stormwater is collected in water tanks with overflow on the ground. There is only a relatively small catchment above the subject site as Bangalow Road contains water table drains diverting stormwater generally around the site.

There are no open surface water bodies, such as dams, creeks or gullies within 100 m of the site. In general, there are no groundwater bores within 100 m of the investigation area. The site is within the drinking water catchment for the Wilsons River. It is unlikely that groundwater would be encountered within 10 m of the ground surface given the topography, elevation and soil type.

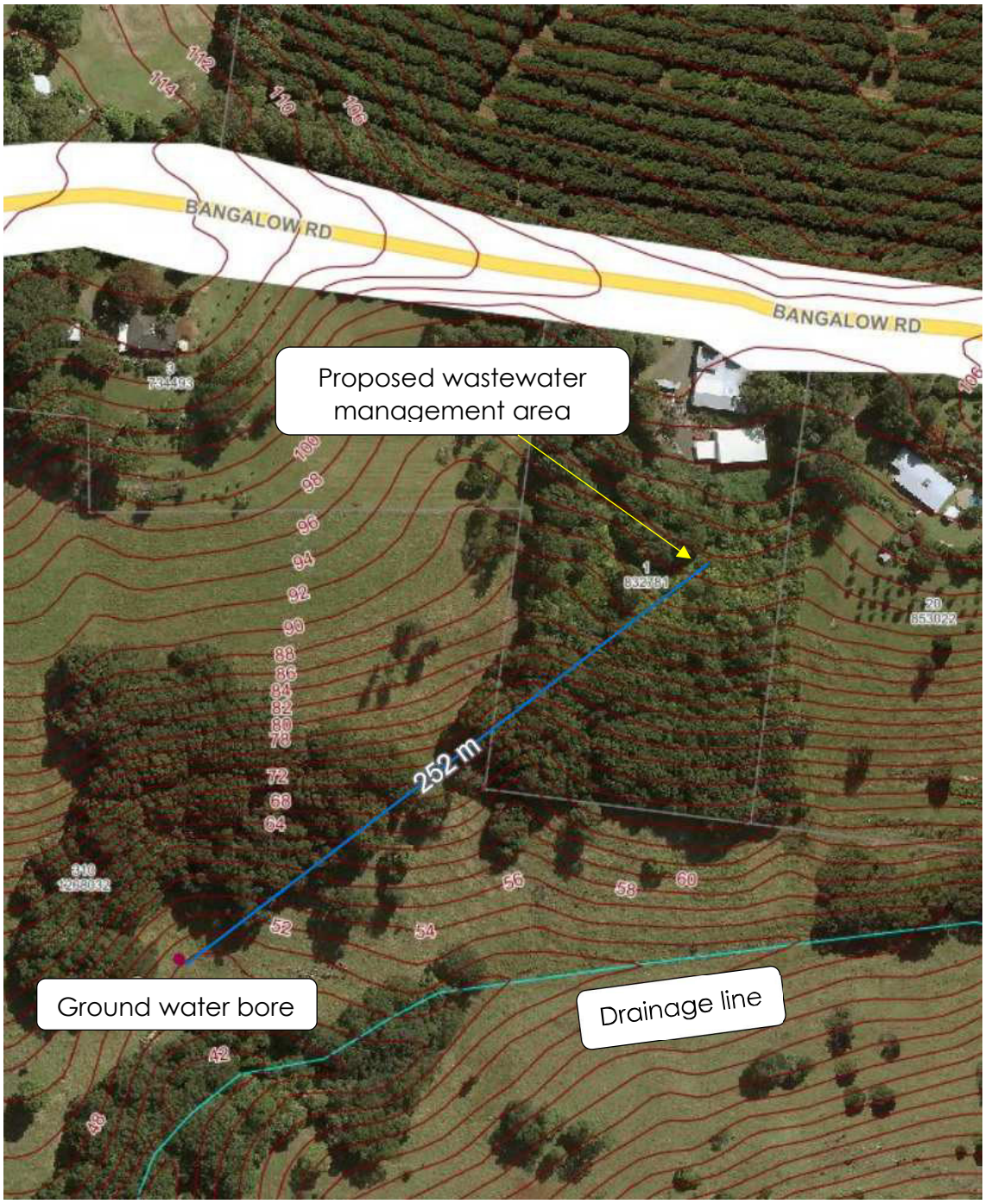


Figure 13: Groundwater Bore Location (LISMAPS 2021)

6.3. Signs of Contamination

The investigation area was inspected for signs of contamination. It was noted that there was some evidence of disturbance around the northern shed from the use of the site as a vehicle repair work shop with the area being level, concrete drains are located in the front of the northern shed as shown in Photograph 1, as well as extraction fan outlet and gas bottles. However, there were no obvious indications

that contamination is present and there are no indications of the previous dwelling at the site.

The area to the south of the southern shed consists of disturbed ground, which has resulted from clearing vegetation, as shown in Photograph 5.

There was no evidence of fuel storage at the site, although it is likely that this occurred. It is understood that there were no underground fuel storage. Gas bottles are observed in the south western corner of the northern shed.

6.4. Geology and soil

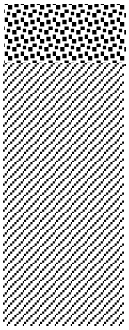
The soils of the site are dark reddish clay loams, being red krasnozem soils in accordance with the Great Soil Group classification. The site lies within the Rosebank Soil Landscape as located in the maps described in Morand (1994). The soil depth is estimated to be 2.0m in the proposed disposal area location.

The following is a summary of the soil landscape description by Morand (1994, p97).

Soil Landscape:	Rosebank Soil Landscape
Soils:	Moderately deep to deep (>100 cm), Krasnozems and brownish red well drained Krasnozems on slopes.
Geology:	Lamington volcanics: Lismore Basalts – Tertiary basalts, with bore and minor agglomerate
Limitations:	Very acid soils with high aluminium toxicity potential. Steep slopes and mass movement and localised rock outcrop.
Permeability:	moderate to high.

All of the limitations as outlined in Morand (1994) were not evident in the site assessment except for the localised rock outcrop. A representative borehole of the soil to the south of the southern shed is presented below in table 2.

Table 2: Borelog 1 soil profile description.

		SOIL DESCRIPTION					
Horizon	**Depth (mm)**	**Texture**	**Structure**	**Colour**	**Coarse Fragments**	**Soil pH**	**Dispersive Class**
	0 300 1000	Clay loam Light clay	Moderate Strong	Reddish brown throughout	Rock floaters on the surface and throughout the profile	6.0 (Morand, 1994)	Not tested although Morand (1994) states low dispersive class in this soil landscape

If chemicals were used on the site, due to the soil texture and structure, the contaminants would be remaining in the upper layers, typically 0-150 mm for arsenic and 0-75 mm for dieldrin. Given that the soil profile in the investigation area has been significantly disturbed, it is possible that contaminated soils are buried deeper below fill material.

As stated in Schedule B1 of NEPM 1999 (2013), HIL's are generic to all soil types and so will not require a textural classification for determining investigation Levels. It is understood soil texture is applicable for determining Environmental Investigation Levels (EIL's) and Environmental Screening Levels (ESL's), however EIL's and ESL's are not calculated for the subject site as there are no environmentally sensitive locations at risk in or adjacent to the investigation area. If contamination is found above the HILs, EILs will be assessed within a detailed investigation.

7. CONCEPTUAL SITE MODEL

A conceptual site model has been generated for the site showing potential paths of contamination if present (**Exhibit No. 3**). The following provides a summary of the CSM.

7.1. Potential Contamination Sources

The site has two former uses, being for a dairy and a dwelling and then for a motor vehicle repair work shop.

It appears that the most likely area of contamination of the site is within the upper area, immediately surrounding the northern shed, in the level area to the west of the shed, which was used for car parking but also contained the former dwelling which was moved from the site. The 1991 aerial photograph indicates that cars may have been parked in the area where the southern shed is now located. The southern shed does not appear to be a likely source of potential contamination. It is unlikely that the area to the south, in the open area or dense vegetation areas contain contamination due to no observations of former use in the past (ie no buildings, plantations etc), apart from most likely cattle grazing.

7.2. Potential Chemicals of Concern

There is potential that the former dwelling was painted with lead based paint The use of lead based paint as paints at one stage paints contained up to 60% lead, the amount was reduced to 1% in 1969 and to 0.1% in December 1997 (Australian Government, 2009).

The site was a former used as a panel beating workshop where oil, hydraulic fluid and solvents were used, being hydrocarbons and heavy metals.

7.3. Potential Receptors

The most likely potential receptors to the areas are:

- Construction workers during site redevelopment
- Future occupants at the site

7.4. Potential Exposure Pathways

The potential exposure pathways to the potential contamination are from contact with the soil, through either ingestion of dust/fibers and dermal contact. It is unlikely that groundwater or surface water would be contaminated from the former uses at the site. It is most likely that the contaminants would be bound to soil and would move with soil, ie erosion, dust, earth moving.

7.5. Data Gaps

Information suggests that the area around the northern shed is the most area at the site that has greatest potential of being contaminated, as confirmed through aerial photographs and discussions with the current owner of the site, who has owned the property since 1976. The use of the site prior to the 1950s is not known, however, it is most likely that there were no other industries at the site.

8. DATA QUALITY OBJECTIVES

Due to the known agricultural & industrial use & setting of the investigation area, soil sampling was undertaken for heavy metals, hydrocarbons and chemicals that were commonly used in fertilisers, pesticides, herbicides, dip formulas, old building materials, paints, solvents, hydraulic oils, thinners and engine oils. These include pesticides and herbicides that contained heavy metals such as arsenic pentoxide, lead arsenate, organochlorines (OC's) (DDT, Dieldrin/aldrin), organophosphates (OP's), heavy metals such as lead and zinc and hydrocarbon analytes such as Total Recoverable Hydrocarbons (TRH's), Toluene, Ethylbenzene, Xylenes (BTEX) & Polycyclic Aromatic Hydrocarbons (PAH's). A description of the data quality objectives for each of these analytes is given in the following sections.

8.1. Heavy metals

The results of the soil sample analysis are compared with the Health Investigation Levels (HILs) set out in Table 1A(1) of NEPM 1999 (2013) under Residential A. Due to the soil texture, depth to groundwater, and nature of potential contaminants of the site, it was considered that EIL's or ESL's were not required to be set at the site unless preliminary soil investigations detected contamination.

As heavy metals were collected using point sampling, the acceptable limit outlined in Table 1A(1) of NEPM 1999 (2013) are used and are outlined in Table 3.

Table 3: NEPM 1999 (2013) HIL heavy metal Acceptable Limits for Residential A.

Contaminant	NEPM HIL Acceptable Limit (mg/kg)
Arsenic	100
Lead	300
Cadmium	20
Copper	6000
Zinc	7400

Metals can be naturally occurring within a soil profile. Expected background levels are shown below (Table 4).

Table 4: Background Ranges for Potential Contaminants

Pollutant	Background Range (mg/kg)
Arsenic	<5
Lead	<20
Cadmium	<1
Copper	10-30
Zinc	50-200

8.2. Organochlorines & Organophosphates

Being semi volatile, OP's & OC's were collected as point samples as well. Table 1A(1) of NEPM 1999 (2013) provides a list of OC's (e.g. DDT, aldrin/dieldrin, chlordane) and OP's (Chlorpyrifos) with relevant HIL's. The acceptable limits of the various OP's & OC's outlined in Table 1A(1) of NEPM 1999 (2013) are used and are represented in Table 5.

Table 5: NEPM 1999 (2013) HIL OP & OC Acceptable Limits for Residential A.

Contaminant	NEPM HIL Acceptable Limit (mg/kg)
Organochlorines	
DDT+DDE+DDD	240
Aldrin and dieldrin	6
Chlordane	50
Endosulfan	270
Endrin	10
Heptachlor	6
HCB	10
Methoxychlor	300
Mirex	10
Toxaphene	20
Organophosphates	
Chlorpyrifos	160

8.3. Hydrocarbons

Samples for Total Recoverable Hydrocarbons (TRHs) BTEX are compared to screening levels for vapour intrusion and for direct soil contact. Both the soil health screening levels for vapour intrusion and for direct contact are found in Friebel & Nadebaum (2011). Table 3 from Friebel & Nadebaum (2011) provides screening levels for HSL – A (Low density residential) using a clay soil texture. These are presented in Table 6. It is noted that chemicals in the TPH>C16 fraction have physical properties which make this TPH fraction non-volative, and therefore are not of concern for vapour intrusion.

Table 6: Health screening levels for vapour intrusion (HSL – A) in mg/kg.

Contaminant	0m to < 1m	1m to <2m	2m to <4m	4m +
C6-C10	50	88	150	290
>C10-C16	280	NL*	NL	NL
Toluene	480	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	110	310	NL	NL
Benzene	0.7	1	2	3

*NL = not limiting based on sore saturation and porewater factors limiting vapour generation

Regarding direct contact, Table A4 of Friebel & Nadebaum (2011) provides screening levels. Table 7 presents the direct contact screening levels for HSL – A residential (low density).

Table 7: Health screening levels for direct contact (HSL – A) in mg/kg.

Contaminant	HSL - A
C6-C10	4400
>C10-C16	3300
>C16-C34	4500
>C34-C40	6300
Toluene	14,000
Ethylbenzene	5000
Xylenes	12,000
Benzene	100

TRH fractions generally correspond to the following sources:

C5 – 10: Car fuel (petrol)
C14 – 20: Diesel
C20 – C50: Lubricants

PAH concentrations are compared with the Health Investigation Levels (HILs) set out in Table 1A(1) of NEPM 1999 (2013) under Residential A, as outlined in in Table 8 below. Due to the soil texture, depth to groundwater, and nature of potential contaminants of the site, it was considered that EIL's or ESL's were not required to be set at the site unless preliminary soil investigations detected contamination.

Table 8: NEPM 1999 (2013) HIL heavy metal Acceptable Limits for Residential A.

Contaminant	NEPM HIL Acceptable Limit (mg/kg)
Total PAH's	300

9. SAMPLING & ANALYSIS QUALITY PLAN & SAMPLING METHODOLOGY

A judgemental sampling pattern was utilised for this assessment. It is judgemental in that sample collection was distributed around the existing industrial building (being the subject of this investigation) and around the existing general purpose (southern) shed. This sampling methodology is considered acceptable as the NSW EPA Sampling Guidelines (1995) state that this method is based on '*the investigators knowledge of the probable distribution of contaminants at the site, It is an efficient sampling method which makes use of the site history and field observations but has the disadvantage of being potentially biased'*. Further to this it states '*Judgemental or stratified sampling methods can be used if there is sufficient information about the probable distribution of the contamination*'.

Eight point samples were collected across the investigation area. This number of samples correlates to a 2500m^2 investigation area based on Table A with the NSW EPA Sampling Guidelines (1995). The actual investigation area was approximately 1700m^2 as depicted in the area shown in Figure 14 below. Seven samples would have met the sampling number requirements in Table A of the NSW EPA Sampling Guidelines (1995) however 8 samples were collected for a more thorough investigation.

Figure 14. Investigation area.

Eight point samples were also collected for OP's & OC's and hydrocarbons in the same locations as the heavy metal sample points.

Sampling was undertaken in the top 100mm of soil (due to if contaminants are present, they would be in the upper soil profile, bound to clay and organic particles). Sampling was focused around the openings in the sheds where industrial dust or spills could have entered the soil. Shed wall which did not have any access ways were generally not sampled. **Exhibit No.2** presents the soil sample locations, with dimensions given off buildings.

10. QUALITY ASSURANCE/QUALITY CONTROL

Samples collected by this office were collected using a hand auger, placed in plastic bags and sealed prior to placing in an esky. All samples were transported by staff of this office to the Richmond Water Laboratories (RWL) the same day of collection. The RWL packaged the samples and subcontracted organochlorine, organophosphate, BTEX, TRH & TPH analysis to Envirolab. Heavy metals were tested by DPI in Wollongbar do to flood damage to RWL's facilities. Laboratory QA/QC are attached to this report as Appendix A, with the chain of custody from this office.

11. RESULTS

A site plan is provided in **Exhibit No. 2**, presenting soil test locations. Table 10 presents a summary of the soil analysis results from the heavy metal composite soil samples collected by this office. Table 11 presents the results from the 8 point samples analysed for OP's & OC's. The full copies of the analysis results are also attached to this report in Appendix B.

Table 10: Summary of heavy metal composite soil sample analysis results (mg/kg).

Parameter	P1	P2	P3	P4	P5	P6	P7	P8
Organochlorines &organophosphates								
OC/OP	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heavy metals								
Arsenic	<4	<4	<4	<4	<4	<4	<4	<4
Cadmium	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Copper	34	41	58	9	25	27	18	26
Lead	110	72	210	6	8	22	10	30
Zinc	260	230	220	22	76	110	76	110
Hydrocarbons								
BTEX	ND	ND	ND	ND	ND	ND	ND	ND
PAH	Detected	Detected	Detected	ND	ND	ND	ND	Detected
TRH C10-14	76	61	93	<50	<50	<50	<50	<50
TRH C15-28	<100	<100	130	<100	110	<100	<100	220
TRH C29-36	<100	<100	<100	<100	120	<100	<100	280

11.1. Interpretation of Results

The results of the soil analysis are compared with the relevant screening levels outlined in Section 8 of this report. OP's or OC's were not detected in recordable concentrations within the soil samples, while all heavy metals were found lower than the adjusted HIL's. Trace amounts of TRH's were found around both the industrial (northern) shed (samples P1, P2, P3 & P5) and the general purpose (southern) shed (sample P8). Based on the sampling results there are no triggers to undertake further assessment.

All tested contaminants are below the relevant screening levels.

12. CONCLUSION

A preliminary contaminated soil investigation was undertaken in the proposed development area of Lot 1 DP 832781, 1443 Bangalow Road, Clunes. The purpose of this assessment was to determine if the location around the existing industrial shed and other shed is contaminated from past or present land uses. As part of the assessment under SEPP 55, to ensure that the investigation area has not been contaminated, judgemental soil testing was undertaken.

Based on the known history of the investigation area, a broad range of contaminants were included in the analysis suit. These included heavy metals (including arsenic, lead and copper), organochlorines (including DDT, aldrin/Dieldrin and endosulfan), organophosphates, and hydrocarbons including BTEX, TRH's & PAH's. The sampling results were compared with relevant published screening levels based on a residential sensitivity.

Results of all tested contaminants were below the relevant screening levels.

Based on the known history of the site, inspection of the site and sampling regime, it is concluded that further soil contamination assessment is not required in the proposed investigation area. NSW EPA (1995) and NEPM 1999 (2013) state that if the contaminant concentration of the site is below a threshold limit, the investigation area can be considered as uncontaminated, and this is considered to be the case in this investigation area.

This assessment has been undertaken in accordance with NEPM 1999 (2013). If rubbish or other indicators of contamination are found on the site that has not been addressed under this assessment, this office is to be notified.

13. REFERENCES

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

Friebel, E & Nadebaum, P (2011). *Health screening levels for petroleum hydrocarbons in soil and groundwater. Part 1: Technical development document,* CRC CARE Technical Report no. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.

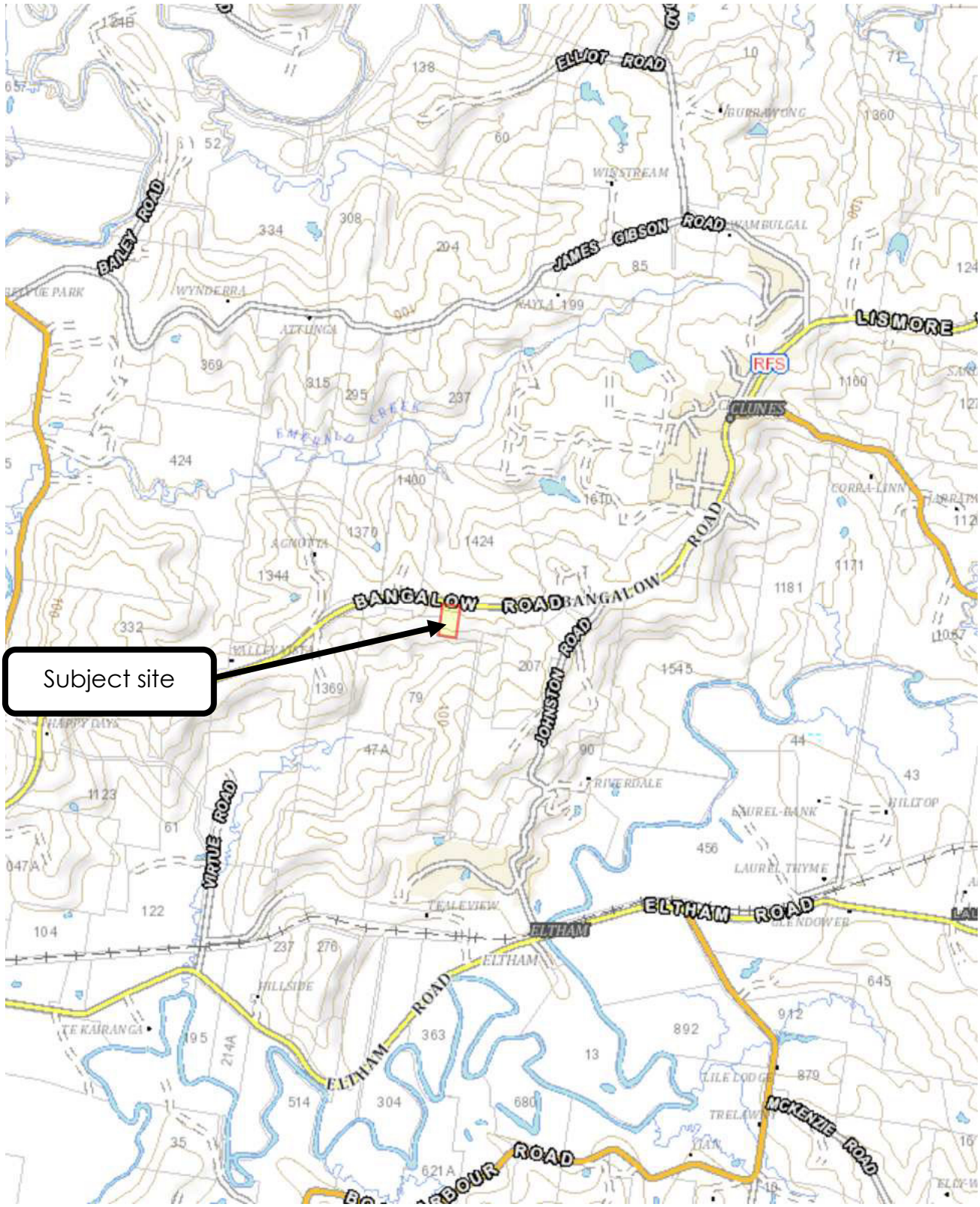
Morand, D.T. (1994). *Soil Landscapes of the Lismore-Ballina 1:100,000 Sheet* Report, Soil Conservation Service of NSW, Sydney.

National Environment Protection (Assessment of Site Contamination) Measure 1999 (2013).

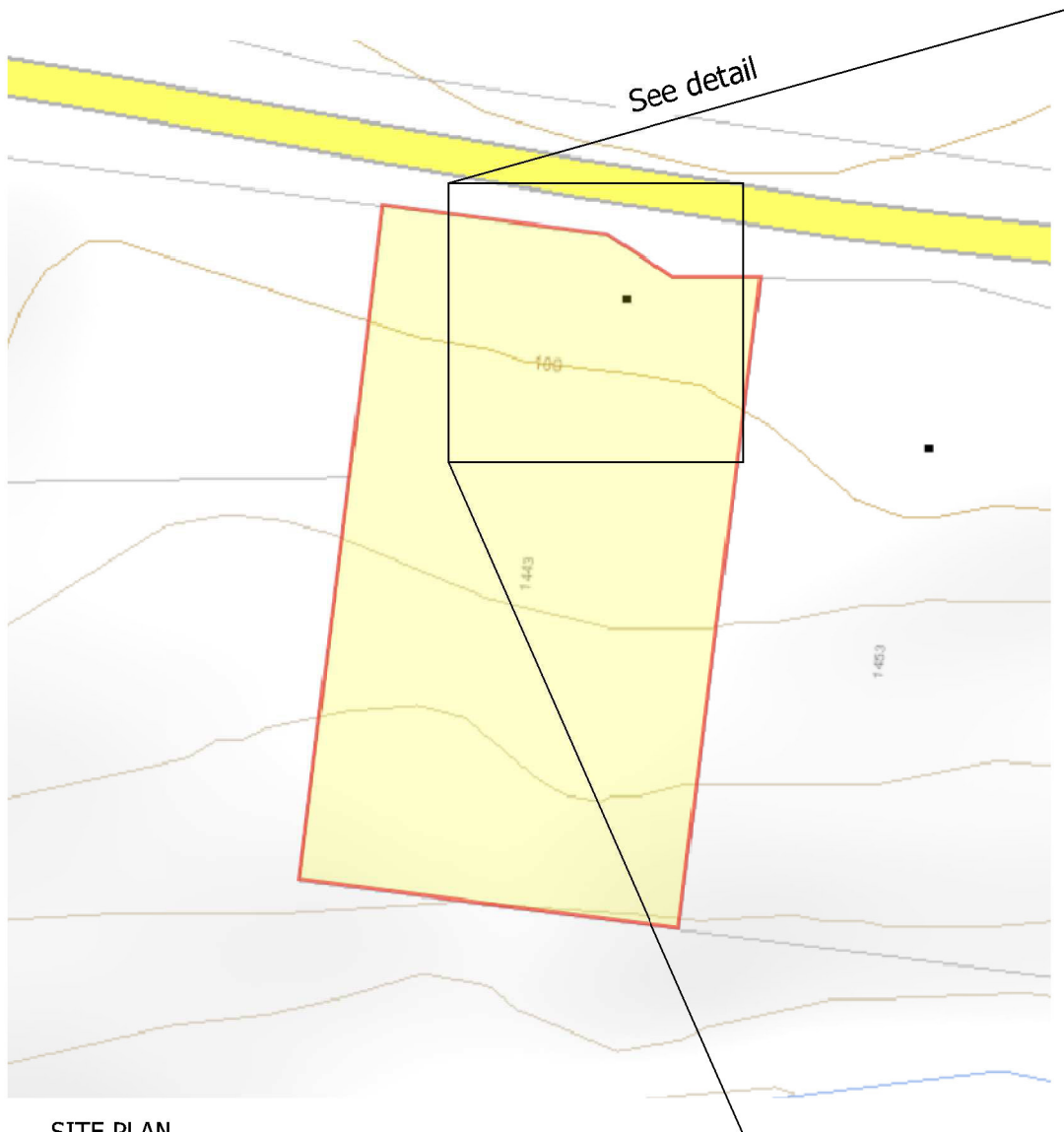
New South Wales Environmental Protection Agency (2020). *Consultants reporting on contaminated land*.

NSW DEC (2006). *Contaminated Sites – Guidelines for the NSW Site Auditor Scheme*. NSW EPA Sydney South.

NSW EPA (1995). *Contaminated Sites – Sampling Design Guidelines*. NSW EPA Chatswood.



Source: NSW LPI Spatial Information Exchange (2022) Date 27/04/22 Project No. 21484_sepp55 Rev A.docx Scale: NTS	**GREG ALDERSON AND ASSOCIATES** **ABN 58 594 160 789** 43 Main Street Clunes NSW 2480 Phone: (02) 6629 1552 Email: office@aldersonassociates.com.au	**Exhibit No. 1.** **SITE LOCATION** Lot 1 DP 832781, 1443 Bangalow Road, Clunes



SITE PLAN
Scale 1:2000

○ Sample locations

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GREG ALDERSON & ASSOCIATES
ABN 58 594 160 789
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Ph: 02 6629 1552 Fax: 02 6629 1566
E: office@aldersonassociates.com.au
Web: aldersonassociates.com.au

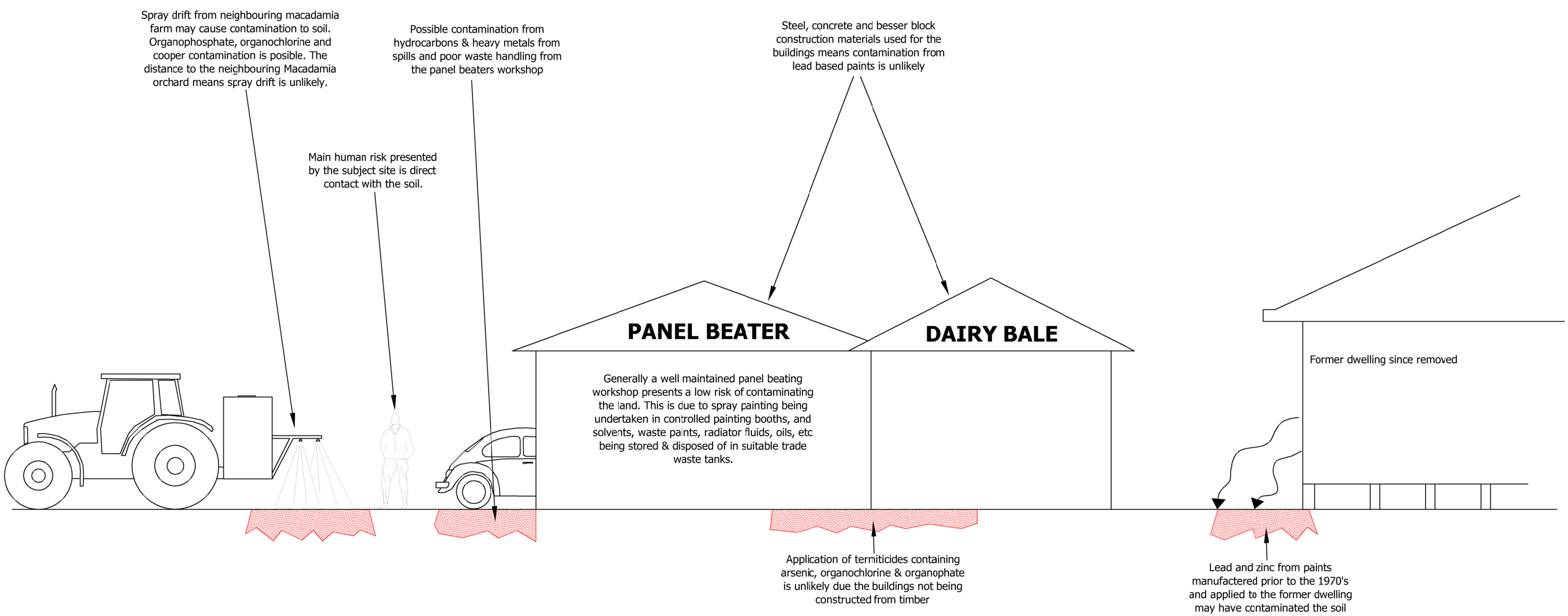
Client: John Clement

Site address: Lot 1 DP 832781, 1443 Bangalow Road, Clunes

SOIL SAMPLING LOCATIONS

Drawn: DB	Source: Base plan from Google Earth Pro (2022)	EXHIBIT NO: 2	Date: 26/04/22
Scale: 1:300	Original Size: A3	Project: AMENDMENT OF LEP TO VARY THE MINIMUM LOT SIZE	Revision: -
Job Number: 21484			

NOTE: NO CONTAMINATION DETECTED IN SOIL AT THE SITE, THIS PLAN PRESENTS HISTORIC POTENTIAL PATHWAYS OF CONTAMINATION ONLY



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Client: John Clement

Site address: Lot 1 DP 832781, 1443 Bangalow Road, Clunes

CONCEPTUAL SITE MODEL

Drawn: DB	Source: Greg Alderson & Associates, ASNZS 1547:2012	EXHIBIT NO: 3	Date: 26/04/22
Scale: NTS	Original Size: A4	Project: AMENDMENT OF LEP TO VARY THE MINIMUM LOT SIZE	Revision: -
Job Number: 21484			

14. SOIL LABORATORY ANALYSIS RESULTS

Richmond Water Laboratories
Environmental Analysis - Water Sampling - Data Management

Certificate Of Analysis

Client: Greg Alderson & Associates
Address: 43 Main St
Clunes NSW 2480
Contact: Stuart Edwards
Sampled by: Wendy Attrill
Subcontract Laboratory: Envirolab (NATA 2901)
Subcontract Reference: 291870

Final report

GAA Soil - 21484

Report no: 22/0393
Date received: 23/03/2022
Testing commenced: 23/03/2022
Date reported: 14/04/2022
No. of samples: 8
Revision no: 00

Analysis results apply to samples as received.

Sample No.: / Sample description: / Date sampled: / Time sampled:	Unit	LOR	22/0393-1 21484 - P1 23/03/2022	22/0393-2 21484 - P2 23/03/2022	22/0393-3 21484 - P3 23/03/2022	22/0393-4 21484 - P4 23/03/2022	22/0393-5 21484 - P5 23/03/2022	22/0393-6 21484 - P6 23/03/2022	22/0393-7 21484 - P7 23/03/2022	22/0393-8 21484 - P8 23/03/2022
OC/OP in soil*	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
OC/OP QC Recovery	%	1	88	85	83	100	103	104	105	88
Arsenic - soil*	mg/kg	4	<4	<4	4	<4	<4	<4	<4	<4
Cadmium - soil*	mg/kg	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Copper - soil*	mg/kg	1	34	41	58	9	25	27	18	26
Lead - soil*	mg/kg	1	110	72.0	210	6	8	22.0	10	30.0
Zinc - soil*	mg/kg	1	260	230	220	22	76	110	76	110
BTEX in Soil*	µg/L	1	[ND]	[ND]	[ND]	[ND]	[ND]	[ND]	[ND]	[ND]
PAHs in soil*	mg/kg	0.05	Detected	Detected	Detected	[ND]	[ND]	[ND]	[ND]	Detected
TRH C10-C14 in soil*	mg/kg	50	76	61	93	<50	<50	<50	<50	<50
TRH C15-C28 in soil*	mg/kg	100	<100	<100	130	<100	110	<100	<100	220
TRH C29-C36 in soil*	mg/kg	100	<100	<100	<100	<100	120	<100	<100	280

c/o DPI, 1243 Bruxner Highway. Wollongbar. NSW 2477 Telephone: 02 6623 3888

Certificate Of Analysis

Client: Greg Alderson & Associates **Report no:** 22/0393

End of results

General comments: This report must not be reproduced except in full. This report relates to items tested as specified herein.
Samples tested between date received and date reported. Accredited for compliance with ISO/IEC 17025 - Testing
NATA accreditation does not cover the performance of this service.Tests marked with * are subcontracted.
LOR denotes 'Limit of Reporting' < denotes less than; > denotes greater than; ND denotes 'not detected'
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards

Specific comments:

M Window
Laboratory Analyst
Approved Authoriser

c/o DPI, 1243 Bruxner Highway. Wollongbar. NSW 2477 Telephone: 02 6623 3888

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		291870-47	291870-48	291870-49	291870-50	291870-51
Your Reference	UNITS	393-1	393-2	393-3	393-4	393-5
Date Sampled		-	-	-	-	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022
Date analysed	-	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	97	105	98	109	108

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		291870-52	291870-53	291870-54
Your Reference	UNITS	393-6	393-7	393-8
Date Sampled		-	-	-
Type of sample		Soil	Soil	Soil
Date extracted	-	28/03/2022	28/03/2022	28/03/2022
Date analysed	-	28/03/2022	28/03/2022	28/03/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	108	86	102

svTRH (C10-C40) in Soil						
Our Reference		291870-47	291870-48	291870-49	291870-50	291870-51
Your Reference	UNITS	393-1	393-2	393-3	393-4	393-5
Date Sampled		-	-	-	-	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022
Date analysed	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
TRH C_{10} - C_{14}	mg/kg	76	61	93	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	130	<100	110
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	120
Total +ve TRH (C10-C36)	mg/kg	80	60	230	<50	230
TRH >C_{10} -C_{16}	mg/kg	57	<50	81	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	57	<50	81	<50	<50
TRH >C_{16} -C_{34}	mg/kg	110	120	200	<100	200
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	120
Total +ve TRH (>C10-C40)	mg/kg	170	120	280	<50	320
Surrogate o-Terphenyl	%	106	93	95	94	97

svTRH (C10-C40) in Soil				
Our Reference		291870-52	291870-53	291870-54
Your Reference	UNITS	393-6	393-7	393-8
Date Sampled		-	-	-
Type of sample		Soil	Soil	Soil
Date extracted	-	28/03/2022	28/03/2022	28/03/2022
Date analysed	-	29/03/2022	29/03/2022	29/03/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	220
TRH C_{29} - C_{36}	mg/kg	<100	<100	280
Total +ve TRH (C10-C36)	mg/kg	<50	<50	500
TRH >C_{10} -C_{16}	mg/kg	<50	<50	55
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	55
TRH >C_{16} -C_{34}	mg/kg	<100	<100	430
TRH >C_{34} -C_{40}	mg/kg	<100	<100	130
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	610
Surrogate o-Terphenyl	%	95	94	117

PAHs in Soil						
Our Reference		291870-47	291870-48	291870-49	291870-50	291870-51
Your Reference	UNITS	393-1	393-2	393-3	393-4	393-5
Date Sampled		-	-	-	-	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Date analysed	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.06	0.07	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	0.3	0.07	0.1	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	98	105	89	92	95

PAHs in Soil				
Our Reference		291870-52	291870-53	291870-54
Your Reference	UNITS	393-6	393-7	393-8
Date Sampled		-	-	-
Type of sample		Soil	Soil	Soil
Date extracted	-	29/03/2022	29/03/2022	29/03/2022
Date analysed	-	29/03/2022	29/03/2022	29/03/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	0.2
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	0.6
Pyrene	mg/kg	<0.1	<0.1	0.6
Benzo(a)anthracene	mg/kg	<0.1	<0.1	0.4
Chrysene	mg/kg	<0.1	<0.1	0.3
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	0.7
Benzo(a)pyrene	mg/kg	<0.05	<0.05	0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	0.3
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	0.3
Total +ve PAH's	mg/kg	<0.05	<0.05	4.0
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	0.6
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	0.7
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	0.7
Surrogate p-Terphenyl-d14	%	93	94	92

Organochlorine Pesticides in soil						
Our Reference		291870-1	291870-2	291870-3	291870-4	291870-47
Your Reference	UNITS	380-2	380-3	380-4	380-5	393-1
Date Sampled		22/03/2022	22/03/2022	22/03/2022	22/03/2022	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Date analysed	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	92	86	108	94	88

Organochlorine Pesticides in soil						
Our Reference		291870-48	291870-49	291870-50	291870-51	291870-52
Your Reference	UNITS	393-2	393-3	393-4	393-5	393-6
Date Sampled		-	-	-	-	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Date analysed	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	85	83	100	103	104

Organochlorine Pesticides in soil			
Our Reference		291870-53	291870-54
Your Reference	UNITS	393-7	393-8
Date Sampled		-	-
Type of sample		Soil	Soil
Date extracted	-	29/03/2022	29/03/2022
Date analysed	-	29/03/2022	29/03/2022
alpha-BHC	mg/kg	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1
Surrogate TCMX	%	105	88

Organophosphorus Pesticides in Soil						
Our Reference		291870-1	291870-2	291870-3	291870-4	291870-47
Your Reference	UNITS	380-2	380-3	380-4	380-5	393-1
Date Sampled		22/03/2022	22/03/2022	22/03/2022	22/03/2022	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Date analysed	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	92	86	108	94	88

Organophosphorus Pesticides in Soil						
Our Reference		291870-48	291870-49	291870-50	291870-51	291870-52
Your Reference	UNITS	393-2	393-3	393-4	393-5	393-6
Date Sampled		-	-	-	-	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Date analysed	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	85	83	100	103	104

Organophosphorus Pesticides in Soil			
Our Reference		291870-53	291870-54
Your Reference	UNITS	393-7	393-8
Date Sampled		-	-
Type of sample		Soil	Soil
Date extracted	-	29/03/2022	29/03/2022
Date analysed	-	29/03/2022	29/03/2022
Dichlorvos	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1
Surrogate TCMX	%	105	88

Acid Extractable metals in soil						
Our Reference		291870-35	291870-47	291870-48	291870-49	291870-50
Your Reference	UNITS	412-1	393-1	393-2	393-3	393-4
Date Sampled		21/03/2022	-	-	-	-
Type of sample		Biosolids	Soil	Soil	Soil	Soil
Date prepared	-	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022
Date analysed	-	31/03/2022	31/03/2022	31/03/2022	31/03/2022	31/03/2022
Arsenic	mg/kg	4	<4	<4	4	<4
Cadmium	mg/kg	0.7	<0.4	<0.4	<0.4	<0.4
Copper	mg/kg	250	34	41	58	9
Lead	mg/kg		110	72	210	6
Zinc	mg/kg	660	260	230	220	22
Uranium	mg/kg	5.0				
Aluminium	mg/kg	75,000				
Chromium	mg/kg	11				
Iron	mg/kg	7,800				
Manganese	mg/kg	490				
Nickel	mg/kg	10				

Acid Extractable metals in soil						
Our Reference		291870-51	291870-52	291870-53	291870-54	291870-55
Your Reference	UNITS	393-5	393-6	393-7	393-8	416-1
Date Sampled		-	-	-	-	-
Type of sample		Soil	Soil	Soil	Soil	Biosolids
Date prepared	-	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022
Date analysed	-	31/03/2022	31/03/2022	31/03/2022	31/03/2022	31/03/2022
Arsenic	mg/kg	<4	<4	<4	<4	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	0.8
Copper	mg/kg	25	27	18	26	310
Lead	mg/kg	8	22	10	30	
Zinc	mg/kg	76	110	76	110	820
Uranium	mg/kg					6.7
Aluminium	mg/kg					90,000
Chromium	mg/kg					12
Iron	mg/kg					6,900
Manganese	mg/kg					550
Nickel	mg/kg					12

Acid Extractable Cations in Soil			
Our Reference		291870-35	291870-55
Your Reference	UNITS	412-1	416-1
Date Sampled		21/03/2022	-
Type of sample		Biosolids	Biosolids
Date prepared	-	28/03/2022	28/03/2022
Date analysed	-	31/03/2022	31/03/2022
Calcium	mg/kg	10,000	12,000
Potassium	mg/kg	1,900	1,900
Magnesium	mg/kg	2,600	2,700
Sodium	mg/kg	2,100	2,500

Misc Inorg - Soil			
Our Reference		291870-35	291870-55
Your Reference	UNITS	412-1	416-1
Date Sampled		21/03/2022	-
Type of sample		Biosolids	Biosolids
Date prepared	-	30/03/2022	30/03/2022
Date analysed	-	30/03/2022	30/03/2022
pH 1:5 soil:water	pH Units	6.6	6.6
Electrical Conductivity 1:5 soil:water	µS/cm	150	170
Soluble Alkalinity as $CaCO_3$ *	mg/kg	2,600	3,300
Nitrate as N in soil	mg/kg	2	2
Chloride, Cl 1:5 soil:water	mg/kg	1,200	1,200
Total Fluoride	mg/kg	190	160

Moisture						
Our Reference		291870-1	291870-2	291870-3	291870-4	291870-35
Your Reference	UNITS	380-2	380-3	380-4	380-5	412-1
Date Sampled		22/03/2022	22/03/2022	22/03/2022	22/03/2022	21/03/2022
Type of sample		Soil	Soil	Soil	Soil	Biosolids
Date prepared	-	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022
Date analysed	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Moisture	%	33	32	32	31	94

Moisture						
Our Reference		291870-47	291870-48	291870-49	291870-50	291870-51
Your Reference	UNITS	393-1	393-2	393-3	393-4	393-5
Date Sampled		-	-	-	-	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022
Date analysed	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Moisture	%	37	18	11	20	8.2

Moisture					
Our Reference		291870-52	291870-53	291870-54	291870-55
Your Reference	UNITS	393-6	393-7	393-8	416-1
Date Sampled		-	-	-	-
Type of sample		Soil	Soil	Soil	Biosolids
Date prepared	-	28/03/2022	28/03/2022	28/03/2022	28/03/2022
Date analysed	-	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Moisture	%	4.5	24	10	96

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-026/53	Fluoride by caustic fusion and determined by ion selective electrode (ISE) analysis.
Inorg-055	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.
Metals-022	Determination of various metals by ICP-MS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-022	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.

Method ID	Methodology Summary
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	291870-48
Date extracted	-			28/03/2022	47	28/03/2022	28/03/2022		28/03/2022	28/03/2022
Date analysed	-			28/03/2022	47	28/03/2022	28/03/2022		28/03/2022	28/03/2022
TRH C_6 - C_9	mg/kg	25	Org-023	<25	47	<25	<25	0	103	97
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	47	<25	<25	0	103	97
Benzene	mg/kg	0.2	Org-023	<0.2	47	<0.2	<0.2	0	106	100
Toluene	mg/kg	0.5	Org-023	<0.5	47	<0.5	<0.5	0	102	97
Ethylbenzene	mg/kg	1	Org-023	<1	47	<1	<1	0	102	95
m+p-xylene	mg/kg	2	Org-023	<2	47	<2	<2	0	102	96
o-Xylene	mg/kg	1	Org-023	<1	47	<1	<1	0	104	98
Naphthalene	mg/kg	1	Org-023	<1	47	<1	<1	0		
Surrogate aaa-Trifluorotoluene	%		Org-023	94	47	97	96	1	96	100

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	291870-48
Date extracted	-			28/03/2022	47	28/03/2022	28/03/2022		28/03/2022	28/03/2022
Date analysed	-			29/03/2022	47	29/03/2022	29/03/2022		29/03/2022	29/03/2022
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	47	76	76	0	94	84
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	47	<100	100	0	93	96
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	47	<100	<100	0	121	95
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	47	57	64	12	94	84
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	47	110	160	37	93	96
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	47	<100	<100	0	121	95
Surrogate o-Terphenyl	%		Org-020	125	47	106	104	2	111	105

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	291870-48
Date extracted	-			29/03/2022	47	29/03/2022	29/03/2022		29/03/2022	29/03/2022
Date analysed	-			29/03/2022	47	29/03/2022	29/03/2022		29/03/2022	29/03/2022
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	86	88
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	79	87
Fluorene	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	74	90
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	108	106
Anthracene	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	47	0.1	0.2	67	94	91
Pyrene	mg/kg	0.1	Org-022/025	<0.1	47	0.1	0.2	67	89	98
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Chrysene	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	77	83
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	47	<0.2	<0.2	0		
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	47	0.06	0.1	50	78	97
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Surrogate p-Terphenyl-d14	%		Org-022/025	91	47	98	106	8	96	99

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	291870-48
Date extracted	-			29/03/2022	47	29/03/2022	29/03/2022		29/03/2022	29/03/2022
Date analysed	-			29/03/2022	47	29/03/2022	29/03/2022		29/03/2022	29/03/2022
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	74	74
HCB	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	75	78
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	77	83
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Aldrin	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	81	75
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	78	88
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	86	94
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	98	110
Endrin	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	76	92
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	62	82
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	68	94
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Surrogate TCMX	%		Org-022/025	92	47	88	98	11	74	80

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	291870-48
Date extracted	-			29/03/2022	47	29/03/2022	29/03/2022		29/03/2022	29/03/2022
Date analysed	-			29/03/2022	47	29/03/2022	29/03/2022		29/03/2022	29/03/2022
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	104	122
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Diazinon	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Ronnel	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	85	101
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	81	95
Malathion	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	105	82
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	96	118
Parathion	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	74	80
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	47	<0.1	<0.1	0		
Ethion	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0	82	107
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	47	<0.1	<0.1	0		
Surrogate TCMX	%		Org-022/025	92	47	88	98	11	74	80

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	291870-48
Date prepared	-			28/03/2022	47	28/03/2022	28/03/2022		28/03/2022	28/03/2022
Date analysed	-			31/03/2022	47	31/03/2022	31/03/2022		31/03/2022	31/03/2022
Arsenic	mg/kg	4	Metals-020	<4	47	<4	<4	0	88	##
Cadmium	mg/kg	0.4	Metals-020	<0.4	47	<0.4	<0.4	0	91	80
Copper	mg/kg	1	Metals-020	<1	47	34	36	6	87	70
Lead	mg/kg	1	Metals-020	<1	47	110	120	9	91	#
Zinc	mg/kg	1	Metals-020	<1	47	260	310	18	98	#
Uranium	mg/kg	0.1	Metals-022	<0.1					95	
Aluminium	mg/kg	10	Metals-020	<10					81	
Chromium	mg/kg	1	Metals-020	<1					94	
Iron	mg/kg	10	Metals-020	<10					87	
Manganese	mg/kg	1	Metals-020	<1					96	
Nickel	mg/kg	1	Metals-020	<1					91	

QUALITY CONTROL: Acid Extractable Cations in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			28/03/2022					28/03/2022	
Date analysed	-			31/03/2022					31/03/2022	
Calcium	mg/kg	10	Metals-020	<10					91	
Potassium	mg/kg	10	Metals-020	<10					85	
Magnesium	mg/kg	10	Metals-020	<10					89	
Sodium	mg/kg	10	Metals-020	<10					101	

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			30/03/2022					30/03/2022	
Date analysed	-			30/03/2022					30/03/2022	
pH 1:5 soil:water	pH Units		Inorg-001						99	
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1					97	
Soluble Alkalinity as $CaCO_3$ *	mg/kg	0.5	Inorg-006	<0.5					102	
Nitrate as N in soil	mg/kg	0.5	Inorg-055	<0.5					96	
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10					104	
Total Fluoride	mg/kg	50	Inorg-026/53	<50					70	

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

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Total metals: no unfiltered, preserved sample was received, therefore analysis was conducted from the unpreserved sample bottle.
Note: there is a possibility some elements may be underestimated.

8 metals in soil
- # Percent recovery is not possible to report due to the inhomogeneous nature of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.
- ## Low spike recovery was obtained for this sample. Sample matrix interference is suspected. However, an acceptable recovery was obtained for the LCS

15. CHAIN OF CUSTODY FORMS

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CHAIN OF CUSTODY FORM

Sheet 1 of 1

all subbed to Enviro

INVESTIGATOR:
GREG ALDERSON AND ASSOCIATES
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E-mail:
office@aldersonassociates.com.au
Contact:
Wendy Attrill

SITE: 21484

COURIER:
Greg Alderson & Associates

LABORATORIES: RICHMOND WATER LABORATORY

Contact:

Sample ID	Date of Collection	Container: Plastic Bag	Container: Plastic Bottle	Container: Glass Bottle	Sample Matrix: Soil	Sample Matrix: Soil Composite	Sample Matrix: Water	Sample Matrix: Other	Sample Preservation: Esky	Sample Preservation: Esky & Ice	Sample Preservation: Other	Laboratory Analysis Required
P1	23/3/22			✓	✓				✓			BTEX, PAH, TRH, OP's, OC's, heavy metals
P2	"			✓	✓				✓			"
P3	"			✓	✓				✓			"
P4	"			✓	✓				✓			"
P5	"			✓	✓				✓			"
P6	"			✓	✓				✓			"
P7	"			✓	✓				✓			"
P8	"			✓	✓				✓			"

Investigator: I attest that the proper field sampling procedures were used during the collection of these sample/s.
Signed:

Sampler Name (print): Dylan Brooks
Date: 23/3/22

Hazardous: Y ☐ N ☒
Comment:

Relinquished by:	Date: 23/3/22	Time: 12:19	Received by:	Date: 23.3.22	Time: 12.19
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

Summary of Experience and Qualifications.

Greg Alderson & Associates have been reporting on contaminated land since 1997. We have been one of the leading local consultants preparing and submitting contaminated land assessments during this time, and are highly experienced in Tiers 1-4 assessments as described in NEPM 1999 (2013).

Greg Alderson and Associates have the following qualifications relevant to reporting on contaminated land:

- Bachelor of Applied Science - Conservation Technology
- Bachelor of Environmental Science - Natural Resource Management
- Bachelor of Engineering - Civil
- Bachelor of Engineering - Environmental.

Further qualifications & training our staff have include:

- Contaminated land training courses hosted by Environmental Health Australia,
- Competencies in RTC2701A Follow OHS procedures, RTC3705A Transport, handle and store chemicals,
- White card.

Greg Alderson and Associates have a wide range of experience and worked on a number of varied projects, which include:

- Petrochemical rehabilitation;
- Analysis and Rehabilitation of dip sites;
- Assessment & remediation of former banana plantations;
- Review of remediation plan for gas works site;
- Assessment & remediation of contamination caused from lead-based paints in residential settings;
- Assessment of general agricultural sites.

Greg Alderson and Associates has the following Public Liability Insurance:

Agent: CGU Insurance Ltd
Policy Number: 15T8586099
Expiry Date: 23/2/2023

Greg Alderson and Associates has the following Professional Indemnity Insurance:

Agent: Solution Underwriting Agency Pty Ltd
Policy Number: 9009711PIN
Expiry Date: 4/03/2023

Greg Alderson Associates

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Acid Sulfate Soil
Water Quality Assessment