

# Appendix D



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# **STAGE 1 PRELIMINARY CONTAMINATION ASSESSMENT**

Proposed Residential Subdivision and Seniors Housing

**49 Elouera Terrace, Bray Park NSW 2484  
(Lot 22, DP1170438 and Lot 18, DP627632)**

May 2019

**Environmental Engineering Solutions**

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## Executive Summary

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ENV Solutions (ENV) has undertaken a Stage 1 Preliminary Contamination Assessment for a proposed residential subdivision and site compatibility certificate for seniors housing at 49 Elouera Terrace, Bray Park, NSW.

The assessment included the following components:

- A review of the site conditions and surrounding environment;
- Preparation of a summary of the site history;
- Identification of past and present potentially contaminating activities and potential contaminant types;
- A preliminary assessment of potential site contamination based on the desktop studies;
- Collection of soil samples from across the subject site;
- Assessment of the soil analytical results against relevant screening and investigation levels; and
- Assessment of the environmental (chemical) suitability of the site for the proposed use (residential land use).

A desk-top site history assessment and a site inspection have been conducted as part of the assessment. The desk-top site history assessment encompassed the site and adjacent areas. Information used to assist in the site history was collated from the following sources:

- Anecdotal information provided by Mr. Paul John O'Connor;
- NSW LPI – available Town and Parish Maps for the Caniaba area;
- NSW OEH's *Protection of Environment Operations Act 1997* (POEO Act) Public Register;
- OEH's Contaminated Land – Record of Notices; and,
- NSW DPI: cattle dip site locator.

Based on the desk-top site history assessment, it appears as though the majority of the subject site has potentially been cleared of vegetation since at least 1916. Anecdotal information provided by Mr. Paul John O'Connor indicates that the site has historically been used for cattle grazing and sugar cane production.

On this basis, the primary Areas or Activities of Environmental Concern (AEC) have been subsequently identified as:

- Site areas where possible previous broad-scale agricultural activities may have occurred. The associated chemicals of potential concern (COPC) were considered to

be organo-chlorine pesticides (OCPs) and heavy metals associated with potential insecticide, pesticide and/or fertiliser use.

- Areas surrounding structures where the use of lead-based paints may have occurred.

The NSW EPA *Sampling Design Guidelines* (1995) recommend a minimum of 72 sampling points for a site (proposed development) area of up to 5.7 ha. However, it is reasonable to expect that any contamination would be widespread on agricultural land such as this; therefore, a reasonable reduced sampling density was adopted. On this basis, 42 individual samples (40 grid based; 2 targeted) were collected from within the proposed subdivision and development envelope as part of the sampling program. Sampling was conducted on 9 April 2019.

A sampling grid was set up across the envelope area such that the samples were spaced evenly apart. Samples were collected directly by hand from shallow soils within the top 100 mm of the soil profile. Where organic matter such as leaves and twigs were present, these were removed and the underlying soils sampled. The sampling locations are presented on Figure 2, **Attachment 1**).

Each of the samples were placed immediately into an esky with ice and transported to the laboratory for analysis with accompanying chain of custody (COC) documentation. The samples were sent to Environmental Analysis Laboratories (EAL) in Lismore, which is accredited by the National Association of Testing Authorities (NATA) for the required analysis (refer to Section 6.4). Here, forty (40) individual samples were composited into ten samples for analysis of OCPs and a metals suite. Two (2) targeted soils samples were collected from visibly stained soils and analysed for hydrocarbons and heavy metals.

The analytical results for the individual and composited soil samples were compared with relevant human health-based and ecological investigation levels from the National Environment Protection (Assessment of Site Contamination) Measure 1999 (the 'NEPM') (as amended 2013). The human-health based screening and assessment levels used were those for a low density residential land use (HIL-A, HSL-residential, Management Limits), reflecting the proposed residential development.

A review of the results indicates that the concentrations of all analytes tested met the adopted human health-based investigation levels with the exception of chromium, lead and Total Recoverable Hydrocarbons (TRH); C16-C34 and C34-C40.

It is noted that chromium concentrations in several of the composite samples were greater than the NEPM HIL-A (allowing for compositing, by dividing the criterion by four). However, the site's location amongst volcanic rocks of basaltic origin is considered to be the cause of the elevated concentrations of these metals, as they are known constituent metals of basalt. The reported concentrations of each of these metals are also within or close to the published background ranges (where available), as provided in Schedule B(1) of the NEPM.

Following review of the initial composite results, it was evident that lead exceeded the adopted assessment criteria in composite samples 'C1' and 'C4'. Each of the sub-samples

comprising these composite samples were then individually analysed for lead. The results indicated that concentrations of lead in sample 'BH8' marginally exceeded the adopted assessment criterion. A 95% upper confidence limit (UCL) of the arithmetic average of lead concentrations was calculated using the statistical software ProUCL 5.1.002. The results from the 95% Student's-t UCL test indicate the mean lead concentration at 95% confidence is less than the adopted assessment criterion (**Attachment 4**).

With respect to the reported TRH exceedances, if the areas represented by 'BH7A' and 'BH16A' (i.e. visibly stained soils) are developed as a garden area or other unsealed area where human contact may occur, surface soil at these locations should be scraped and the material transported off-site to a suitably licensed landfill facility. Given the composition of the hydrocarbons reported in the samples ('heavier' chain fractions), it is considered likely that the soil impacts associated with the staining are limited to relatively shallow soils. From an aesthetic perspective (staining and odour), these soils may be unsuitable for the proposed development even if they are not within such areas. If the soils are removed, a remediation action plan (RAP) which details the methodology for the works and provides a description of validation sampling of the remaining soils in this area would be required, prior to the excavation works occurring.

Additionally, following the removal of existing structures at the property, further sampling should be undertaken to ensure soils beneath each structure are suitable for the proposed development.

On the basis of the results, and noting the exceptions described above, the subject land is considered suitable from an environmental perspective for the proposed residential and seniors housing development.

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## 1. Introduction and Scope of Works

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ENV Solutions Pty Ltd (ENV) was engaged by Marjan Management Pty Ltd to undertake a Stage 1 Preliminary Contamination Assessment of a portion of property located at 49 Elouera Terrace, Bray Park, NSW. The site is described as Lot 22 DP1170438 and Lot 18 DP627632. The relative location of the site is shown on Figures 1 and 2, **Attachment 1**.

ENV understands that the property as a whole has an area of approximately 36.5 ha and has been used historically for sugar cane production and cattle grazing. A residential subdivision is proposed for the property, including a senior's housing development. For the purposes of this assessment, the envelope of land associated with the proposed development has been assumed to be 5.7 ha.

Clause 7(1) of State Environment Planning Policy No 55 – Remediation of Land (SEPP 55) states that:

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

This assessment has been prepared to address these SEPP 55 requirements and has been prepared in accordance with the *Managing Land Contamination Planning Guidelines* (Department of Urban Affairs [DUAP] and Environment Protection Authority [EPA] 1998) and the *Guidelines for Consultants Reporting on Contaminated Sites* (EPA, 2011).

The assessment included the following components:

- A review of the site conditions and surrounding environment;
- Preparation of a summary of the site history;
- Identification of past and present potentially contaminating activities and potential

contaminant types;

- A preliminary assessment of potential site contamination, based on the desktop studies;
- A site inspection;
- Collection of soil samples from across the property;
- Assessment of the soil analytical results against relevant screening and investigation levels; and
- Assessment of the environmental suitability of the site for the proposed use (low density residential land use).

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## 2. Site Identification Details

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The site is identified as Lot 22 DP1170438 and Lot 18 DP627632, and is located approximately 2 kilometres (km) to the south-west of the Murwillumbah Central Business District (CBD).

Table 1 provides identification details for the site, relevant to the assessment.

**Table 1: Site Identification Details**

<b>Site Address</b>	49 Elouera Terrace, Bray Park, NSW.
<b>Site Area</b>	Overall property – approximately 36.5 ha. Development envelope considered for contamination assessment – approximately 5.7 ha.
<b>Real Property Description</b>	Lot 22 DP1170438 and Lot 18 DP627632
<b>Local Government Area</b>	Tweed Shire Council.
<b>Zoning</b>	RU1 – Primary Production and R2 – Low Density Residential (Tweed Shire Council’s Local Environmental Plan (LEP), 2014).
<b>Site Features</b>	The property can be generally characterised as sloping in parts, with a flat, elevated portion in the site’s western and central areas in which the existing dwelling and several farm/mechanical sheds are positioned. A small stormwater drain is positioned on the north-western border, which initially flows west and then north across the site. The majority of the site is grassed, with several stands of trees spread out across the property.
<b>Elevation</b>	The subject property slopes from its western portion to the north, south and east, with the highest point being approximately 23.64 m Australian Height Datum (AHD) (Usher & Company, 2018).
<b>Existing Land Use</b>	Agricultural use (sugar cane production and cattle grazing).
<b>Surrounding Environment</b>	Large rural agricultural blocks of land, with exception to the residential lots to the west and north-west. Tweed River borders the southern side of the property.

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### 3. Site Condition and Surrounding Environment

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A desk-top study was undertaken to establish the physical characteristics of the site and surrounding environment. The desk-top based information was supplemented by observations from the site inspection and sampling undertaken on 9 April 2019.

#### 3.1. Site Features

At the time of the investigation, the area proposed for development was predominantly cleared of vegetation and covered with grass. Isolated medium to large stands of trees were located across the property area. There were several farm and mechanical shed surrounding the main dwelling and farm house located off the property driveway. Oil drums and chemical (herbicide) containers were observed in areas adjacent to the shed. A small stormwater drain is positioned on the north-western border, which initially flows west and then north across the site. The site slopes from the west in all directions. Cattle were observed to be grazing across the site.

Selected site inspection photos are provided in **Attachment 2**.

#### 3.2. Surrounding Environment

The site is bordered immediately to the west and north-west by neighbouring residential properties. The southern boundary is bordered by the Tweed River, and then rural land likely used for broad-scale agricultural activities and/or cattle grazing surround the site in all other directions. The Murwillumbah CBD is approximately 2 km to the north-east.

#### 3.3. Topography

The elevation of the area on which the development is proposed ranges from approximately 23.64 m AHD (west) to 5.23 m AHD (north, east and south) (Usher & Company, 2018).

#### 3.4. Soils

Information regarding regional soils was collected using the NSW eSPADE mapping (<https://www.environment.nsw.gov.au/eSpade2Webapp>). The closest soil sample information was obtained from a location approximately 2.4 km to the west of the site, at the location named "Tyalgum Road – 1.1 km from Kyogle Rd Int.". The available soil information from this location is summarised as follows:

- Dark brown, light-medium clay with a pH of 6.0, moderately moist, moderately plastic, moderately sticky, disruptive test result was moderately weak force, shearing test result was plastic, to a depth of 1.5 m.

Observations of the on-site soils within the proposed development area, made during the site inspection and sampling on 9 April 2019, indicated soils comprising of dark brown to grey clay with abundant vegetative matter (leaves and roots) and some gravels, which is relatively consistent with the eSPADE notes.

### 3.5. Flooding

There is a potential flooding risk associated with the maximum probable flood level in the areas of the proposed development. However, the proposed development area is not situated within Tweed Shire Council's flood planning area. The extent of the Tweed Shire Council LEP (2014) flood planning area, associated with Tweed River to the south, is shown on Figure 3, **Attachment 1**.

### 3.6. Acid Sulfate Soils

The area of the proposed development is mapped as 'Class 5' acid sulfate soil (ASS) risk, with reference to the Tweed Shire Council LEP (2014). The ASS risk of soils in the vicinity of the site is illustrated on Figure 4, **Attachment 1**.

### 3.7. Groundwater Resources

A search of existing licensed groundwater bores was undertaken on 29 April 2019 using the WaterNSW Groundwater Explorer database (updated in the previous 12 months). The search indicated that there was one licensed groundwater bore situated within 500 m of the subject property. The bore is installed to a depth of 3.4 m, for irrigation water supply purposes. The bore is located on adjacent property to the west. A plan illustrating the relative location of the bore is presented as Figure 5, **Attachment 1**.

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## 4. Site History

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### 4.1. Overview

A desk-top site history assessment was undertaken to evaluate the chronological history of site occupation and possible sources and locations of contamination. Information used to assist in the desk-top site history assessment was collected and collated from the following sources:

- Anecdotal information provided by Paul John O'Connor (3<sup>rd</sup> generation property owner);
- NSW Land and Property Information (LPI) – available Town and Parish Maps for the Murwillumbah area;
- NSW Office of Environment and Heritage's (OEHS) *Protection of Environment Operations Act 1997* (POEO Act) Public Register;
- OEHS's Contaminated Land – Record of Notices; and,

- NSW Department of Primary Industries (DPI): cattle dip site locator.

The findings of the desk-top site history assessment are summarised in the following sub-sections.

## **4.2. Anecdotal Information**

Anecdotal information relating to past site uses was provided during the site investigation by Mr. Paul John O'Connor on 9 April 2019. This information suggests that the subject property has been owned by the O'Connor family since 1892 and has formerly been used for agricultural activities (cattle grazing and sugar cane production). During this time organochlorine pesticides, Dieldrin and a product identified as 'BHC dust' has been used in areas across the property on existing power poles and to manage cane grubs. In 1984, areas around the pre-existing dairy shed and the adjacent power pole were excavated, due to Dieldrin contamination, during the construction of the current farm shed (west of dwelling). It is understood that this material was transported off site during construction. Dieldrin contamination was also found along the north-western boundary, which was thought to be attributed to contaminated grass clippings being placed over the fence from neighbouring properties.

## **4.3. Town and Parish Maps**

The available historical Parish Maps for the Murwillumbah area and surrounds were reviewed to evaluate past land uses and ownership relevant for the assessment. The maps were accessed using the Land and Property Information (LPI) Historical Land Records Viewer (HLRV).

Three Parish Maps dating from 1916, 1923 and 1938 were available on the HLRV. The maps show that the subject property was encompassed within a larger allotment, which included the two separate land parcels located east of the site. The property was owned by T. Buckland and J. Milson.

An excerpt of each of the 1916 and 1938 maps are presented as Figures 6, **Attachment 1**.

## **4.4. POEO Act Public Register Search**

The NSW EPA POEO Act Public Register contains information about environment protection licences, licence applications, notices issued under the POEO Act and pollution studies and reduction programs.

The EPA's POEO Act Public Register was searched for the areas of Bray Park and Murwillumbah on 1 May 2019. Six licences were located, associated with Holcim's concrete plant (3.2 km north-east), Sunstate's concrete plant (3.5 km north-east), Tweed Shire Council's landfill (4.8 km east), Tweed Shire Council's wastewater treatment plant (2.3 km



north), Tweed Shire Council's Bray Park water treatment plant (4 km north-east) and Uki Quarry (4 km north-east). These facilities are all located a significant distance from the subject property, and are considered to present a negligible risk to soil and groundwater quality at the subject property.

#### **4.5. Contaminated Land – Record of Notices Search**

The OEH's Contaminated Land – Record of Notices was searched (accessed 1 May 2019) for the Bray Park and Murwillumbah region. One notice was found – for the Murwillumbah Puma Service Station (approximately 3.8 km north-east) – concerning groundwater contamination at the site and the migration of contaminated groundwater beyond the sites boundaries. Given the distance of this site from the subject property, any contaminants which may be the subject of these notices are expected to pose a negligible risk to the quality of the subject site soils and groundwater.

#### **4.6. Cattle Dip Site Locator**

The NSW DPI's cattle dip site locator was accessed on 1 May 2019. A search of the Murwillumbah area indicated that twenty-seven cattle dips were present – the closest dip site 'OCONNORS', is located approximately 800 metres east of the site. The status of the dip site is 'lapsed' meaning it is currently not in use, however when it was operating prior to 2000, the following chemicals were used; arsenic, DDT, dioxathion, ethion, ethion chlordimeform and amitraz. All other dip sites were located more than 2.7 km from the subject site. Given the distance of the dip sites from the subject property, they are considered to pose a negligible risk to soils and groundwater at the subject property.

#### **4.7. Areas of Environmental Concern and Potential Contaminants**

Based on the desk-top site history assessment, it appears as though the majority of the subject site has been cleared for agricultural and/or cattle grazing purposes since at least 1916. Anecdotal information provided by Mr. Paul John O'Connor indicates that the site has historically been used for cattle grazing and sugar cane production where pesticides (Dieldrin) have been applied to land.

On this basis, the primary Areas or Activities of Environmental Concern (AEC) have been subsequently identified as:

- Site areas where previous broad-scale agricultural activities have occurred. The chemicals of potential concern (COPC) associated with these activities may include organo-chlorine pesticides (OCPs) and heavy metals associated with potential insecticide, pesticide and/or fertiliser use.
- Areas surrounding structures where the use of lead-based paints may have occurred.

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## 5. Site Inspection

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An Environmental Engineer from ENV, Ollie Fick, undertook a site inspection with associated soil sampling on 9 April 2019. The inspection and sampling were limited to the proposed subdivision and seniors housing development envelope, with an area of approximately 5.7 ha. The relative location of the dwelling envelope is presented on Figure 2, **Attachment 1**.

The purpose of the inspection was to obtain further information about AECs identified during the desk-top site history assessment and to identify any additional AECs on the site. Photographs taken during the site inspection and sampling program are provided in **Attachment 2**.

During the inspection, one additional AEC was noted where two small areas appeared to have mechanical oil staining. Two additional targeted samples were subsequently collected for laboratory analyses from the surficial soils in these areas. The vegetation within the proposed subdivision and seniors housing development envelope appeared to be healthy and not distressed by potential contamination in the soils.

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## 6. Sampling and Analysis Plan

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Section 2.1 of the *Sampling Design Guidelines* (EPA, 1995) states that a preliminary sampling and analysis program may be required where investigations indicate possible sources of contamination. Given the results of the site history assessment, soil sampling and analysis were undertaken at the site.

### 6.1. Sampling Objective

In accordance with the NSW EPA *Sampling Design Guidelines* (EPA, 1995), the rationale behind sampling is to gather information concerning the location, nature, level and extent of contamination at the site. The objective of the field sampling program was therefore to collect this information in order to evaluate the current environmental quality of the site soils in the context of the proposed residential subdivision and seniors housing development.

### 6.2. Sampling Investigation

The NSW EPA *Sampling Design Guidelines* (1995) recommend a minimum of 72 sampling points for a site (proposed development envelope) area of up to 5.2 ha. However, it is reasonable to expect any contamination would be widespread on agricultural land such as this. A reduced sampling density was adopted on this basis.

Forty (40) individual samples and 2 targeted samples were collected from within the proposed development envelope as part of the sampling program. Sampling was conducted on 9 April 2019.

A sampling grid was set up across the development area such that the samples were spaced evenly apart. Samples were collected using a shovel and a gloved hand from shallow soils

within the top 150 mm of the soil profile. Where organic matter such as leaves and twigs were present, these were removed and the underlying soils sampled. The sampling locations are presented on Figure 2, **Attachment 1**).

Each of the samples were placed immediately into an esky with ice and transported to the laboratory for analysis with accompanying chain of custody (COC) documentation. The samples were sent to Environmental Analysis Laboratories (EAL) in Lismore, which is accredited by the National Association of Testing Authorities (NATA) for the required analysis (refer to Section 6.4). Here, the individual samples were composited into ten (10) samples – refer to Table 2, for analysis of OCPs and a metals suite and the two targeted samples were analysed for hydrocarbons and heavy metals.

**Table 2: Sample Details**

Individual Sample No.	Depth (mm)	Composite Sample No.
BH1, BH2, BH3, BH12	0 - 150	C1
BH4, BH5, BH6, BH36	0 - 150	C2
BH33, BH34, BH37, BH38	0 - 150	C3
BH7, BH8, BH9, BH11	0 - 150	C4
BH29, BH31, BH35, BH39	0 - 150	C5
BH26, BH27, BH27, BH32	0 - 150	C6
BH10, BH13, BH14, BH15	0 - 150	C7
BH16, BH17, BH18, BH40	0 - 150	C8
BH19, BH20, BH21, BH25	0 - 150	C9
BH22, BH23, BH24, BH30	0 - 150	C10

### 6.3. Field Quality Assurance/Quality Control (QA/QC)

The samples were collected using a fresh pair of disposable nitrile gloves for each discrete sample. The samples were collected using a shovel to loosen soil in the subsurface. Between locations, the shovel was washed with detergent and potable water to minimise the potential for cross-contamination between locations. Each sample was sealed in glass sample jars (supplied by the laboratory) with no headspace and chilled using ice in an esky prior to, and during dispatch to the laboratory.

### 6.4. Laboratory Analysis

Table 3 summarises the laboratory analysis conducted on the samples collected.

**Table 3: Summary of Laboratory Analysis**

Analytes Tested	Potential Contamination Source	Sample No.
Organo-chlorine pesticides (OCPs)	Agricultural insecticides and pesticides	C1 – C10
Metals	Agricultural chemicals, insecticides and pesticides, fertilisers	C1 – C10, BH7A, BH16A
Hydrocarbons	Machinery oils and fuels	BH7A, BH16A

### ***Insecticides/Pesticides***

Insecticides and pesticides are used during agricultural and horticultural activities to kill organisms that are potentially harmful to the crop being grown. Some pesticides are also applied beneath and adjacent to buildings to control termites.

Some insecticides and pesticides contain heavy metals and OCPs. They may cause both acute and chronic health effects in those who are exposed. Insecticide and pesticide exposure can cause a variety of adverse health effects, ranging from irritation of the skin and eyes to more severe effects such as those on the nervous system, mimicking hormones causing reproductive problems, or causing cancer.

### ***Metals***

Metals occur naturally in the environment with large variations in concentration. Anthropogenic sources of metals include fertilisers, pesticides/herbicides and combustion products of fossil fuels.

### ***Hydrocarbons***

Hydrocarbons deriving from the use of mechanical lubricants, oils and fuels which may have been historically dumped or spilled. They may cause both acute and chronic health effects in those who are exposed.

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## 7. Laboratory Analysis Results and Discussion

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A summary table showing the laboratory results is provided in **Attachment 3**.

The analytical results for the ten composite soil samples and two individual targeted soil samples analysed were compared with relevant investigation levels from the NEPM. The human-health based screening and assessment levels used were those for a low-density residential land use (HIL-A, HSL-residential, Management Limits), since these are the most conservative levels and meet the proposed residential land use of the subject site. Generic EILs were also referenced.

A review of the results indicates that the concentrations of all analytes tested met the adopted human health-based investigation levels with the exception of chromium, lead and Total Recoverable Hydrocarbons (TRH); C16-C34 and C34-C40.

It is noted that chromium concentrations in several of the composite samples were greater than the NEPM HIL-A (allowing for compositing, by dividing the criteria by four). However, the site's location amongst volcanic rocks of basaltic origin is considered to be the cause of the elevated concentrations of these metals, as they are known constituent metals of basalt. The reported concentrations of each of these metals are also within or close to the published background ranges (where available), as provided in Schedule B(1) of the NEPM.

Following review of the initial composite results, it was evident that lead exceeded the adopted assessment criterion in composite samples 'C1' and 'C4'. Each of the sub-samples that comprised the composite samples were then individually analysed for lead. The results indicated that concentrations of lead in sample 'BH8' marginally exceeded the adopted assessment criteria. A 95% upper confidence limit (UCL) of the arithmetic average of lead concentrations was calculated using the statistical software ProUCL 5.1.002. The results from the 95% Student's-t UCL test indicate the mean lead concentration at 95% confidence is less than the adopted assessment criterion (**Attachment 4**).

Concentrations of TRH were reported to be greater than the adopted assessment criteria in samples 'BH7A' and 'BH16A' for TRH C16-C34, and 'BH16A' for TRH 34-C40, collected from surficial soils within areas of inferred oil staining on the ground surface in two locations. The reported concentrations exceeded the NEPM Management Limits for residential land use. However, given the composition of the hydrocarbons reported in these samples ('heavier' chain fractions), it is considered likely that the soil impacts associated with the staining are limited to relatively shallow soils.

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## 8. Conclusions and Recommendations

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ENV Solutions has undertaken a Stage 1 Preliminary Contamination Assessment for a proposed residential subdivision and site compatibility certificate for seniors housing at 49 Elouera Terrace, Bray Park, NSW.

Based on a site inspection and sampling investigation undertaken at the site on 9 April 2019, together with a desk-top site history assessment, it appears as though the subject site has been predominantly cleared of vegetation since at least 1916. Anecdotal information provided by Mr. Paul John O'Connor suggests that the land has been used historically for cattle grazing and sugar cane production. Areas surrounding structures where the use of lead-based paints may have occurred were also noted.

From the above information, preliminary sampling and analysis was undertaken across the subject property, consistent with relevant NSW EPA Guidelines. A total of forty (40) individual grid-based samples and two (2) targeted samples were collected from within the proposed development envelope (area of up to 5.7 ha), which is a density reduced from the recommended sampling density provided in the NSW EPA *Sampling Design Guidelines* (1995). As it is reasonable to expect that any contamination would be widespread (diffuse) on agricultural land such as this, a reduced sampling density was adopted. The samples were stored on ice in an esky and transported to a NATA accredited laboratory for analysis.

The analytical results for the individual soil samples were compared with relevant human health and ecological investigation levels from the NEPM (as amended 2013). The criteria adopted were those for a low density residential land use (HIL-A, HSL-residential, Management Limits), reflecting the proposed residential development.

A review of the results indicates that the concentrations of all analytes tested met the adopted investigation levels with the exception of chromium, lead and TRH fractions C16-C34 and C34-C40.

The chromium exceedances are considered to be associated with volcanic rocks of basaltic origin known to exist in the area, and not with anthropogenic sources.

Lead exceedances in two of the composite samples (C1 and C4) were investigated further by analysing the individual sub-samples that comprised these composite samples. The calculated 95% UCLs of mean lead concentrations in the individual samples analysed were less than the adopted assessment criterion.

On the basis of the TRH results, if the areas represented by 'BH7A' and 'BH16A' (i.e. visibly stained soils) are developed as a garden area or other unsealed area where human contact may occur, surface soil at this location should be scraped and the material transported off-site to a suitably licensed landfill facility. From an aesthetic perspective (staining and odour), the soils may be unsuitable for the proposed development even if they are not within such areas. If the soils are removed, a remediation action plan (RAP) which details the

methodology for the works and provides a description of validation sampling of the remaining soils in this area would be required, prior to the excavation works occurring.

Additionally, following the removal of existing structures at the property, further sampling should be undertaken to ensure soils beneath each structure are suitable for the proposed development.

On the basis of the results, and noting the exceptions described above, the subject land is considered suitable from an environmental perspective for the proposed residential development.

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## **9. General Notes**

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### **General**

Geotechnical and environmental reports present the results of investigations carried out for a specific project and usually for a specific phase of the project (e.g. preliminary design). The report is based on specific criteria, such as the nature of the project, underground utilities or scope of service limitations imposed by the Client. The report may not be relevant for other phases of the project (e.g. construction), after some time or where project details and clients change.

### **Interpretation of Results**

The discussion and recommendations in the accompanying report are based on extrapolation/interpolation from data obtained at discrete locations and other external sources and guidelines. The actual interface between the materials may be far more gradual or abrupt than indicated. Also, actual conditions in areas not sampled may differ from those predicted.

The report is based on significant background details that only the authors can be aware of, and therefore implementation of the recommendations by others may lead to misinterpretation and complications. Therefore, this company should be consulted to explain the reports implications to other involved parties.

Reporting relies on interpretation of often limited factual information based on judgment and opinion which has a level of uncertainty and ambiguity attached to it and is far less exact than other design disciplines. This should be considered by users of the report when assessing the implications of the recommendations.

### **Change in Conditions**

Subsurface conditions can change with time and can vary between test locations. Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations can also affect subsurface conditions.



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## 10. References

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1. *Bureau of Meteorology (2019) Australian Groundwater Explorer database.*
2. *Department of Urban Affairs and Planning and the Environment Protection Authority (1998). Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land.*
3. *DIPMAC (1995) Guidelines to Assist Local Government in Assessing Development within 200 metres of Cattle Tick Dip Sites.*
4. *Environment Protection Authority (1995) Sampling Design Guidelines.*
5. *Environment Protection Authority (2000) Guidelines for Consultants Reporting on Contaminated Sites.*
6. *Tweed Shire Council: Local Environmental Plan (LEP; 2014).*

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## 11. Glossary

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Below is a list of commonly used abbreviations in the report:

AEC – Areas of Environmental Concern

ENV – ENV Solutions Pty Ltd

COC – Chain of Custody

DPI – Department of Primary Industries

EILs – Ecological Investigation Levels (for soil)

EPA – NSW Environment Protection Authority (within the Office of Environment and Heritage (OEH))

HILs – Health Investigation Levels (for soil)

HSL – Health Screening Levels (for soil)

NEPM – National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)

mBGL – Metres Below Ground Level

OEH – Office of Environment & Heritage

QA/QC – Quality Assurance and Quality Control

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## 12. Attachments

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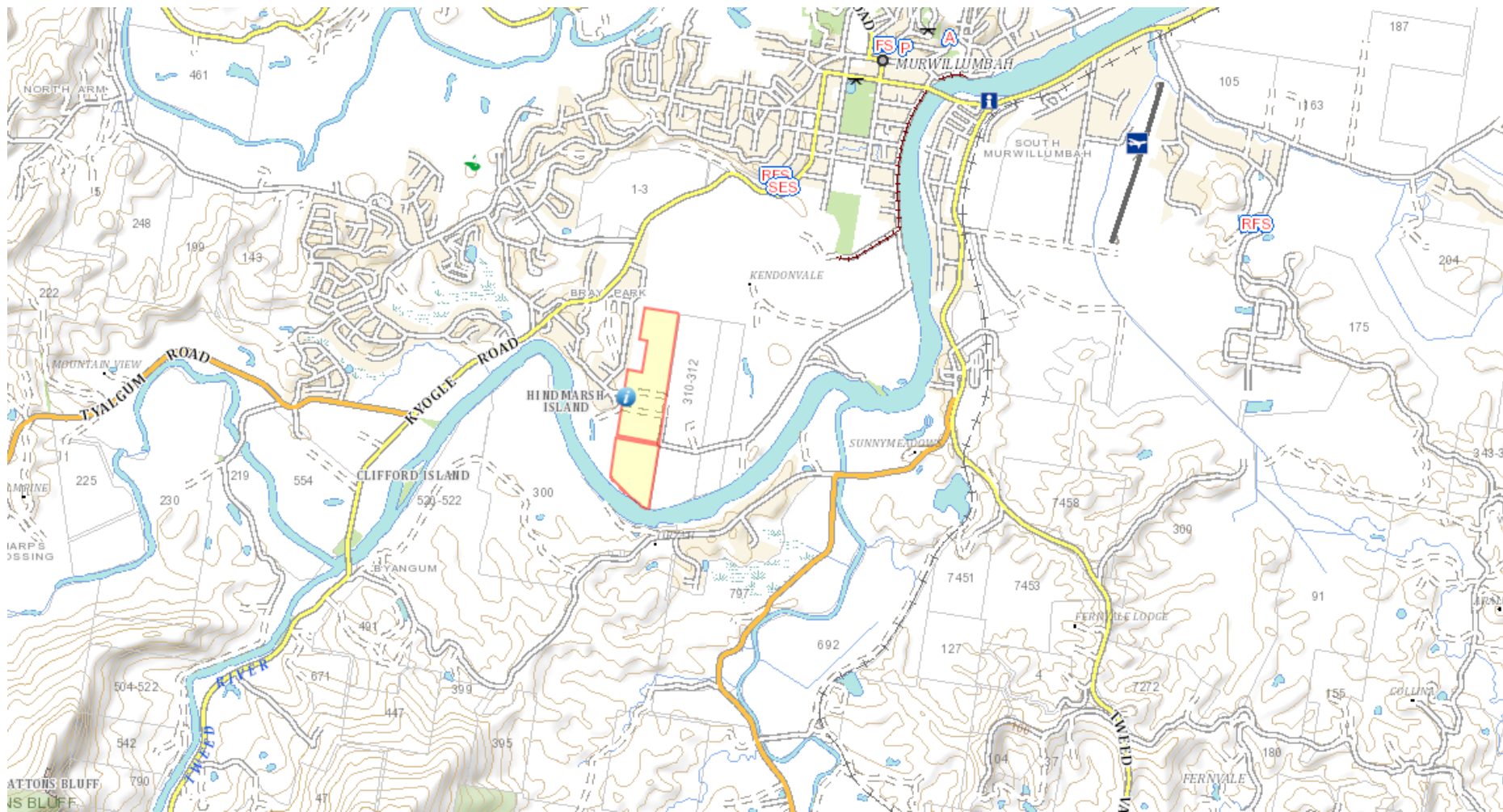
Attachment 1	Figures
Attachment 2	Photographs
Attachment 3	Analytical Results Table
Attachment 4	ProUCL Statistical Analyses

---

## ATTACHMENT 1

---

### Figures 1, 2, 3, 4, 5, 6 and Client Drawings



Site Location (Approximate)



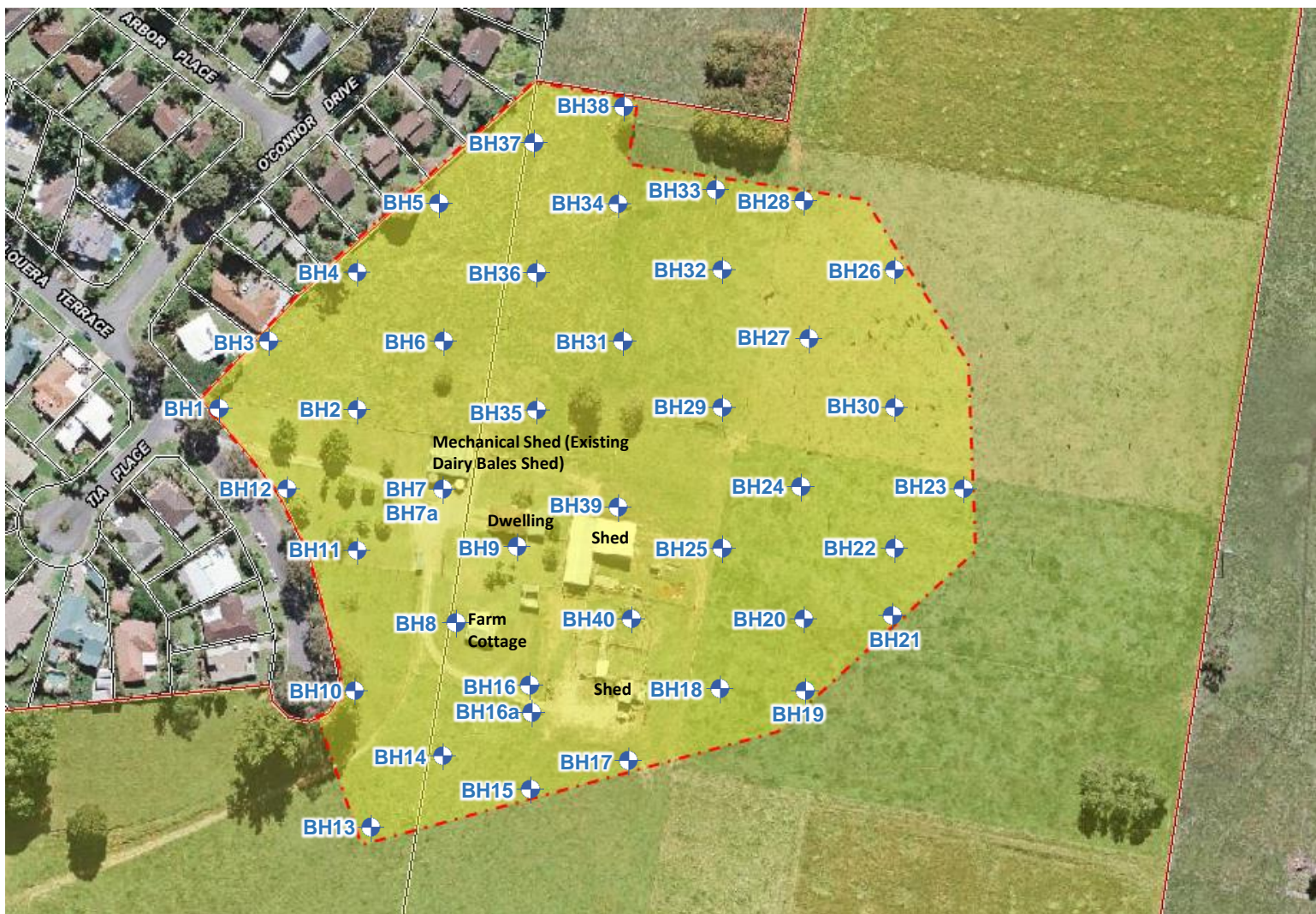
0 200 400 m



**Figure 1 - Site Location**  
49 Elouera Terrace, Bray Park NSW

Marjan Management Pty Ltd  
Contamination Assessment  
Job No: 19121





Investigation area (approximate)



Contamination Soil Sample Locations




0 30 60 m



**Figure 2 – Sample Locations**  
49 Elouera Terrace, Bray Park NSW

Marjan Management Pty Ltd  
Contamination Assessment  
Job No: 19121

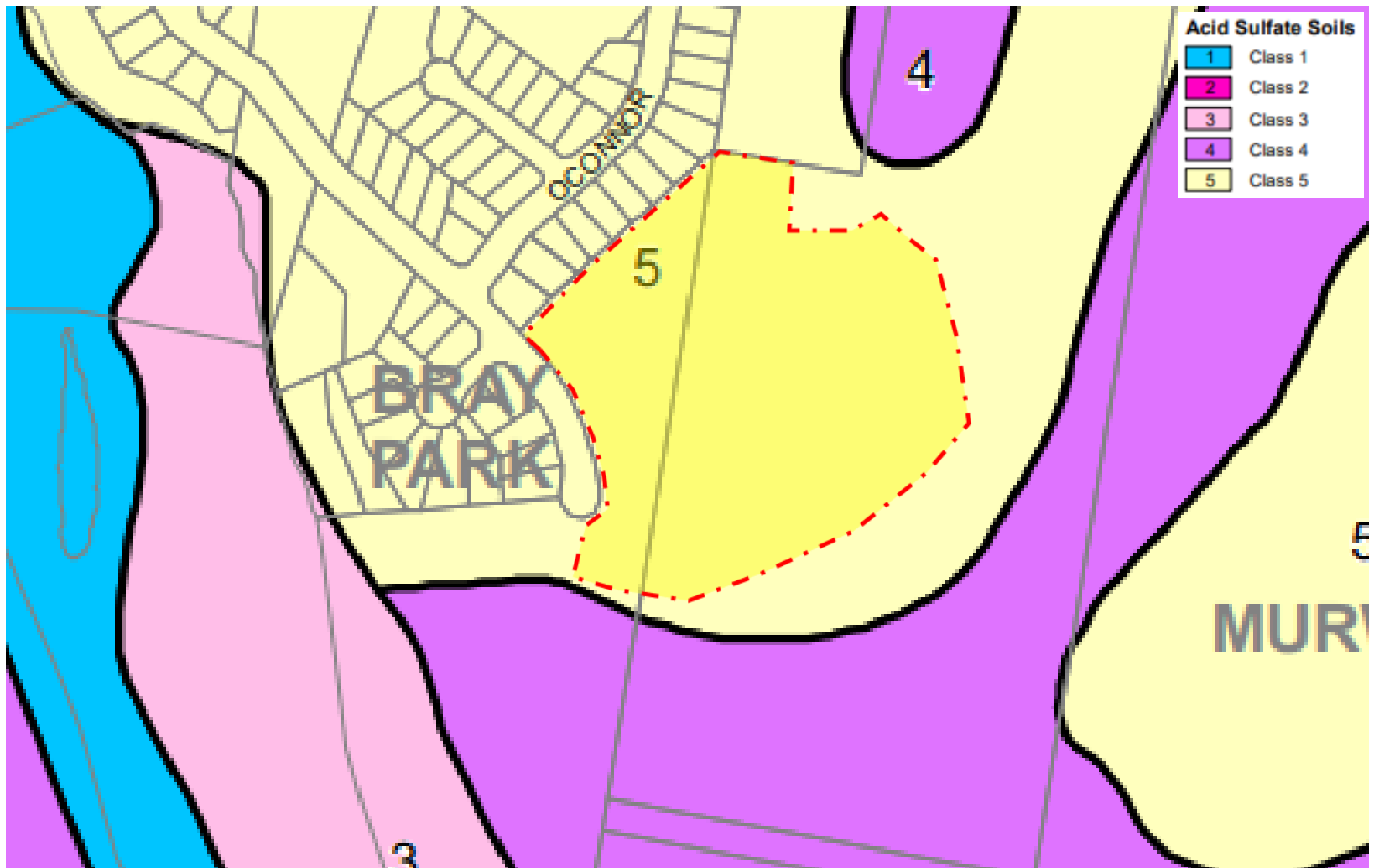


 Site area (approximate)



**Figure 3 – Flood Planning Area**  
49 Elouera Terrace, Bray Park NSW

Marjan Management Pty Ltd  
Contamination Assessment  
Job No: 19121

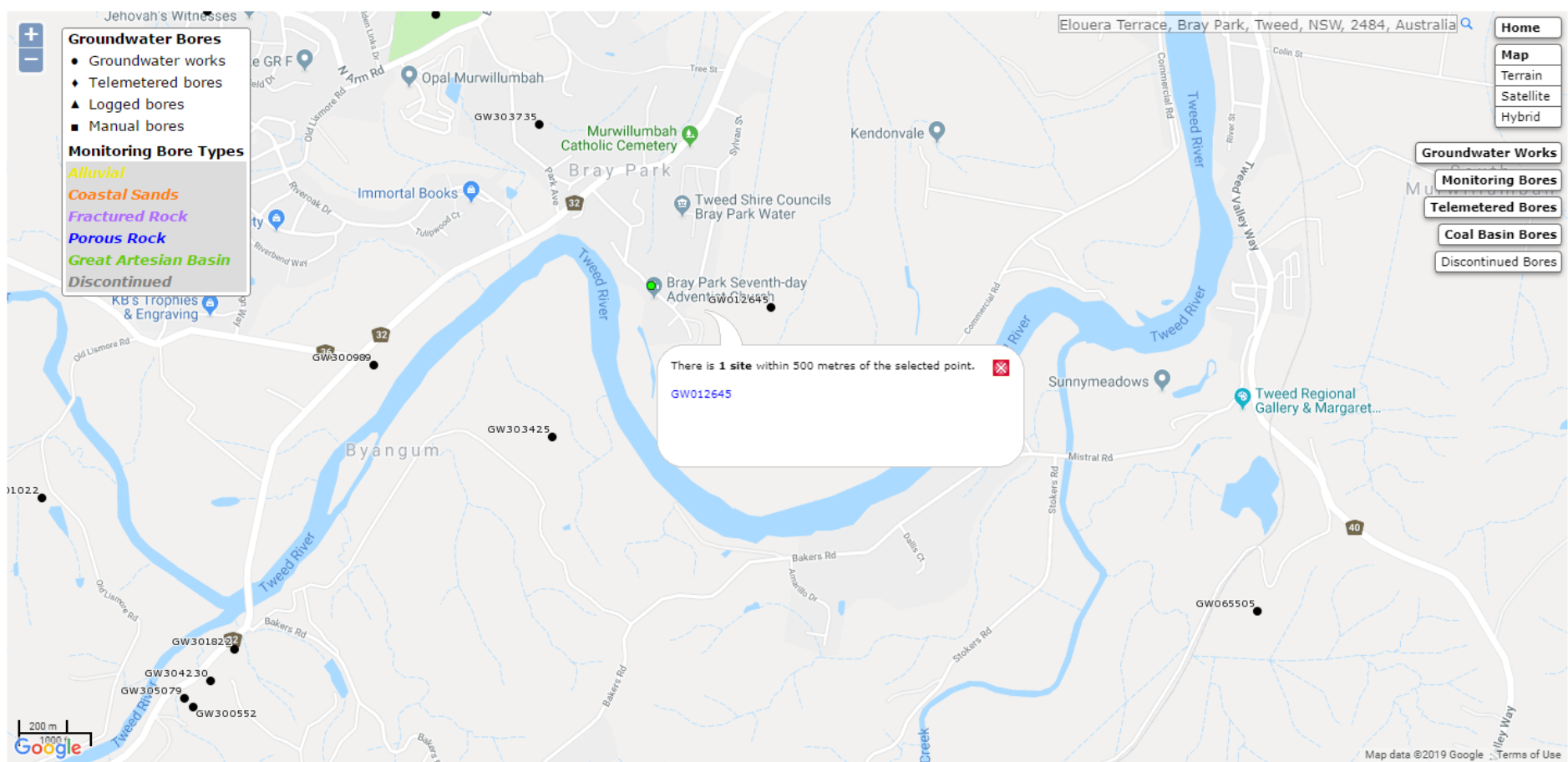


Site area (approximate)



**Figure 4 – Acid Sulfate Soils Map: Tweed Shire Council LEP (2014)**  
49 Elouera Terrace, Bray Park NSW





Site area (approximate)

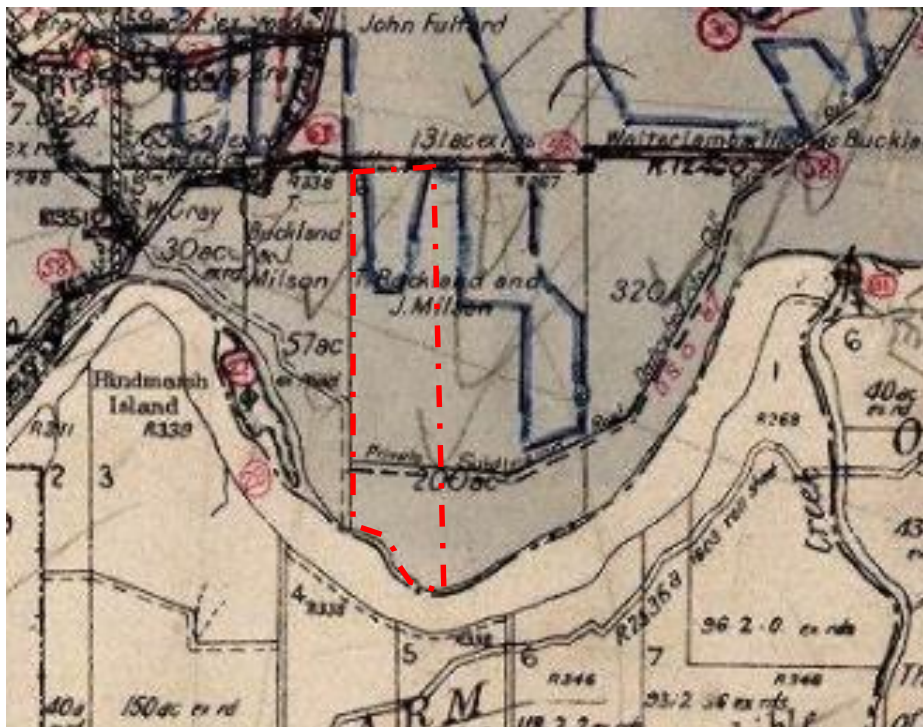


Registered Groundwater Bore Location

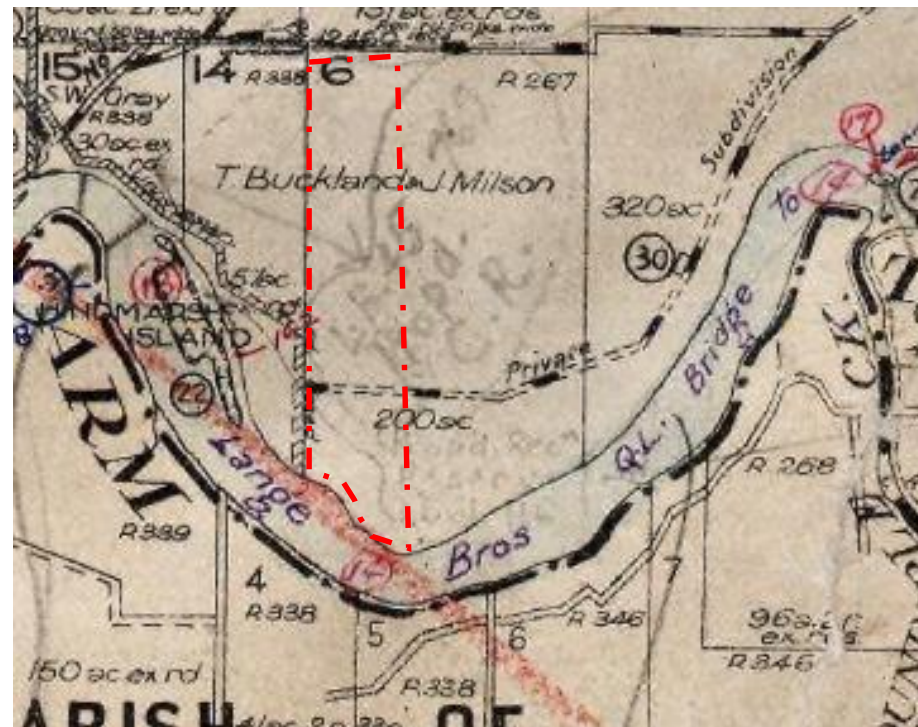


**Figure 5 – Registered Groundwater Bore Locations**  
49 Elouera Terrace, Bray Park NSW

Marjan Management Pty Ltd  
Contamination Assessment  
Job No: 19121



1916



1938



Site area (approximate)



**Figure 6 – Town and Parish Maps**  
49 Elouera Terrace, Bray Park NSW

Marjan Management Pty Ltd  
Contamination Assessment  
Job No: 19121



# Elouera Terrace, Bray Park

Concept Layout Plan





**Photographs**



Photograph 1: Looking south-east at the area of the dwelling, mechanical shed and farm cottage. The driveway, grass ground cover of the area and nearby stands of trees are visible.



Photograph 2: Looking east toward the adjacent land parcel where the northern portion of development will be situated. The drain that enters the site is visible in the foreground before it flows north.





Photograph 3: Typical surface sample, showing 'BH8' collected from the perimeter of the farm cottage.



Photograph 4: Looking north at the cattle yard, the mechanical oil staining and location of sample 'BH16A' visible in the foreground.





Photograph 5: Image of the chemical drums (herbicide) observed during the site inspection and location of sample 'BH39'.



Photograph 6: Image of the mechanical oil staining next to the mechanical shed and the location of sample 'BH7A'.

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## ATTACHMENT 3

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### Analytical Results Table

## RESULTS OF SOIL ANALYSIS

42 soil samples supplied by Env Solutions Pty Ltd on 11th April, 2019 - Lab Job No. 10664

Soil samples supplied were composited by EAL into 10 composite samples for analysis

Analysis requested by Ollie Fick. Your Job: 19121

PO Box 248 BALLINA NSW 2478

ANALYTE	METHOD REFERENCE	Composite Sample 1 C1 (BH1, BH2, BH3, BH12)	Composite Sample 2 C2 (BH4, BH5, BH6, BH36)	Composite Sample 3 C3 (BH33, BH34, BH37, BH38)	Composite Sample 4 C4 (BH7, BH8, BH9, BH11)	Composite Sample 5 C5 (BH29, BH31, BH35, BH39)	Composite Sample 6 C6 (BH26, BH27, BH28, BH32)	Composite Sample 7 C7 (BH10, BH13, BH14, BH15)	Composite Sample 8 C8 BH16, BH17, BH18, BH40)	Composite Sample 9 C9 (BH19, BH20, BH21, BH25)	Composite Sample 10 C10 (BH22, BH23, BH24, BH30)	Sample 41 BH7A	Sample 42 BH16A	RESIDENTIAL A Guideline Limit		COMMERCIAL / INDUSTRIAL D Guideline Limit		Background
	Job No.	10664/C1	10664/C2	10664/C3	10664/C4	10664/C5	10664/C6	10664/C7	10664/C8	10664/C9	10664/C10	10664/41	10664/42	See note 1a	See note 1a	See note 1d	See note 1d	See note 2
TEXTURE (SAND, CLAY, SILT)	** inhouse	Silt	Silt	Silt	Silt	Silt	Silt	Silt	Silt	Silt	Silt	--	--	--	--	--	--	--
MOISTURE %	** C	19	26	27	20	22	26	23	23	29	30	13	6	--	--	--	--	--
SILVER (mg/kg DW)	a	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	na	na	na	na	na
ARSENIC (mg/kg DW)	a	13	17	9	15	9	5	9	10	4	5	14	9	25	100	750	3,000	0.2-30
LEAD (mg/kg DW)	a	103	14	11	97	13	10	12	20	11	10	15	14	75	300	375	1,500	<2,000
CADMIUM (mg/kg DW)	a	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	20	225	900	0.04-2.0
CHROMIUM (mg/kg DW)	a	36	15	18	29	42	40	21	19	49	50	36	16	<23	<100	<900	<6,000	0.5-110
COPPER (mg/kg DW)	a	9	11	8	12	9	12	12	12	11	11	14	13	1,500	6,000	60,000	240,000	1-190
MANGANESE (mg/kg DW)	a	352	509	658	398	352	383	624	255	486	517	149	229	950	3,800	15,000	60,000	4 - 12,600
NICKEL (mg/kg DW)	a	4	3	4	7	8	10	8	5	10	10	8	4	100	400	1,500	6,000	2-400
SELENIUM (mg/kg DW)	a	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	50	200	2,500	10,000	na
ZINC (mg/kg DW)	a	61	59	37	108	50	45	43	41	43	43	132	170	1,850	7,400	100,000	400,000	2-180
MERCURY (mg/kg DW)	a	<0.05	0.09	0.26	0.15	0.09	0.14	0.10	<0.05	0.11	0.14	0.06	<0.05	10	40	183	730	0.001-0.1
IRON (% DW)	a	2.03	2.22	2.42	3.24	4.29	4.08	2.48	2.04	4.85	4.90	3.85	1.56	na	na	na	na	na
ALUMINIUM (% DW)	a	1.03	1.58	2.00	1.99	3.21	3.59	1.72	1.23	3.65	3.83	2.55	1.02	na	na	na	na	na
BERYLLIUM (mg/kg DW)	a	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	60	125	500	na
BORON (mg/kg DW)	a	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	1	2	1,125	4,500	75,000	300,000	na
COBALT (mg/kg DW)	a	3	2	3	4	4	4	7	3	5	5	2	3	25	100	1,000	4,000	na
PESTICIDE ANALYSIS SCREEN																		
DOT-HOE+DOD (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	60	240	900	3,600	<0.1
Aldrin + Dieldrin (mg/kg)	c	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	--	--	2	6	11	45	<0.1
Chlordane (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	12	50	133	530	<0.1
Endosulfan (mg/kg)	c	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	--	--	68	270	500	2,000	<0.1
Endrin (mg/kg)	c	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	--	--	3	10	25	100	<0.1
Heptachlor (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	2	6	13	50	<0.1
HCB (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	3	10	20	80	<0.1
Methoxychlor (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	75	300	625	2,500	<0.1
Other Organochlorine Pesticides (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	--	--	--	<0.1
HYDROCARBON ANALYSIS RESULTS																		
BTEX																		
Benzene (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	<0.1	<0.1	--	--	--	--	--
Toluene (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	<0.1	<0.1	--	--	--	--	--
Ethylbenzene (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	<0.1	<0.1	--	--	--	--	--
m+p-Xylene (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	<0.2	<0.2	--	--	--	--	--
o-Xylene (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	<0.1	0.4	--	--	--	--	--
Total Xylenes (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	<0.3	0.5	--	--	--	--	--
Total BTEX (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	<0.6	<0.6	--	--	--	--	--
Naphthalene (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	<0.1	0.2	--	--	--	--	--
Total Recoverable Hydrocarbons																		
TRH C10-C14 (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	<20	440	--	--	--	--	--
TRH C15-C28 (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	2,000	20,000	--	--	--	--	--
TRH C29-C36 (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	3,800	25,000	--	--	--	--	--
TRH C37-C40 (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	1,900	11,000	--	--	--	--	--
TRH <C10-C16 (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	<25	560	--	--	--	--	--
TRH <C10-C16 - Naphthalene (F2) (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	<25	560	--	--	--	--	--
TRH <C16-C34 (F3) (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	4,400	35,000	--	--	--	--	--
TRH <C34-C40 (F4) (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	3,400	21,000	--	--	--	--	--
TRH C10-C36 Total (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	5,800	45,000	--	--	--	--	--
TRH C10-C40 Total (P bands) (mg/kg)	c	--	--	--	--	--	--	--	--	--	--	7,700	56,000	--	--	--	--	--

## METHODS REFERENCE

a. <sup>13</sup>C-Nitric/CHCl<sub>3</sub> digest - APHA 3125 ICPMSb. <sup>13</sup>C-Nitric/CHCl<sub>3</sub> digest - APHA 3120 ICPMS

c. Analysis sub-contracted - SIS report no. SE 191675

\*\* denotes these test procedure or calculation are as yet not NATA accredited but quality control data is available

## NOTES

1a. HIL A Residential with garden/accessible soil (home grown produce &lt;10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.

1b. HIL B Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.

1c. HIL C Public open space such as parks, playgrounds, playing fields (e.g. oval), secondary schools and footpaths. This does not include undeveloped public open space.

1d. HIL D Commercial/Industrial, includes premises such as shops, offices, factories and industrial sites.

(REFERENCE: Health Investigation on Guidelines from NEPM (National Environmental Protection, Assessment of Site Contamination, Measure), 2013; Schedule B1).

2. Environmental Soil Quality Guidelines, Page 40, ANZECC, 1992.

3a. Table 1 Maximum values of specific contaminant concentrations for classification without TCLP (NSW EPA 2014, Waste Classification Guidelines Part 1: Classifying Waste)

3b. Table 2 Maximum values for leachable concentrations and specific contaminant concentrations when used together (NSW EPA 2014, Waste Classification Guidelines Part 1: Classifying Waste)

4. Analysis conducted between sample arrival date and reporting date.

5. \*\* NATA accreditation does not cover the performance of this service.

6. -- Denotes not requested.

7. This report is not to be reproduced except in full.

8. All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (refer scu.edu.au/eal or on request).

## Additional NOTES

DW = Dry Weight. na = no guidelines available

Organochlorine pesticide (OC) screen:

(HCB, alpha-BHC, Heptachlor, delta-BHC, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, Lindane, trans-Nonachlor, Endrin Ketone, Isodrin, Mirex

Alpha Endosulfan, p,p'-DDE, Dieldrin, Endrin, p,p'-DDD, Beta Endosulfan, p,p'-DDT, Endrin Aldehyde, Endosulfan Sulphate, Methoxychlor)



RESULTS OF SOIL ANALYSIS

10 of 42 soil samples supplied by Env Solutions Pty Ltd on 11th April, 2019 - Lab Job No. i0664  
Analysis requested by Ollie Fick. Your Job: 19121  
PO Box 248 BALLINA NSW 2478

ANALYTE	METHOD	Sample 1	Sample 2	Sample 3	Sample 4	Sample 13	Sample 14	Sample 15	Sample 16	RESIDENTIAL A Guideline Limit		COMMERCIAL/ INDUSTRIAL D Guideline Limit		Background
	REFERENCE	BH1	BH3	BH12	BH2	BH11	BH7	BH8	BH9	Composite - Column A	Individual - Column A	Composite - Column D	Individual - Column D	Range
	Job No.	i0664/1	i0664/2	i0664/3	i0664/4	i0664/13	i0664/14	i0664/15	i0664/16	See note 1a	See note 1a	See note 1d	See note 1d	See note 2
LEAD (mg/kg DW)	a	7	8	8	13	15	12	331	58	75	300	375	1,500	<2-200

METHODS REFERENCE

- a. <sup>13</sup>Nitric/HCl digest - APHA 3125 ICPMS  
b. <sup>13</sup>Nitric/HCl digest - APHA 3120 ICPOES  
c. Analysis sub-contracted - SGS report no. SE 191675  
\*\* denotes these test procedure or calculation are as yet not NATA accredited but quality control data is available

NOTES

- 1a. HIL A ≡ Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.  
1b. HIL B ≡ Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.  
1c. HIL C ≡ Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space.  
1d. HIL D ≡ Commercial/industrial, includes premises such as shops, offices, factories and industrial sites.  
(REFERENCE: Health Investigation Guidelines from NEPM (National Environmental Protection, Assessment of Site Contamination, Measure), 2013; Schedule B1).  
2. Environmental Soil Quality Guidelines, Page 40, ANZECC, 1992.  
3a. Table 1 Maximum values of specific contaminant concentrations for classification without TCLP (NSW EPA 2014, Waste Classification Guidelines Part 1: Classifying Waste)  
3b. Table 2 Maximum values for leachable concentrations and specific contaminant concentrations when used together (NSW EPA 2014, Waste Classification Guidelines Part 1: Classifying Waste)  
4. Analysis conducted between sample arrival date and reporting date.  
5. \*\* NATA accreditation does not cover the performance of this service.  
6. ... Denotes not requested.  
7. This report is not to be reproduced except in full.  
8. All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (refer scu.edu.au/eal or on request).

Additional NOTES

DW = Dry Weight. na = no guidelines available



## TABULATED TRH RESULTS

			TRH						
			C6-C10	C6-C10 (F1 minus BTEX)	C10-C16	C10-C16 (F2 minus Naphthalene)	C16-C34	C34-C40	C10-C40 (Sum of total)
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			25	25	50	50	100	100	50
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Fine Soil			800		1,000		3,500	10,000	
Field ID	Date	Depth							
BH7A	09-04-19	0.15	-	-	<25	<25	4400	3400	7700
BH16A	09-04-19	0.15	-	-	560	560	35000	21000	56000

**Environmental Standards**

NEPM, NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Fine Soil

(-) not reported



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 P: +61 2 6620 3678  
 E: eal@scu.edu.au  
 www.scu.edu.au/eal  
 ABN: 41 995 651 524

## Sample Receipt Notification (SRN)

Project: **EAL/10664**  
 Customer: Env Solutions Pty Ltd  
 Contact: Ollie Fick  
 Client Job ID: 19121  
 No. of Samples: 42 x Soil; 10 x Composites.  
 Date Received: 11 APR 2019  
 Comments: 1/5/19 added Pb to selected samples Urgent 3 day TAT due Monday

Billers: 6th May  
 Env Solutions Pty Ltd - Accounts Payable

Page 1 of 7

		Test Request				
Sample Text ID	Client Sample ID	SS-PACK-004	SS-PACK-008	SS-PACK-017	SS-PREP-004	SS-SING-150
		Basic Metals Scan - Total Acid Extractable				
		Contaminated Site Assessment 3				
		Petroleum Compounds Assessment 1a				
		Sample Compositing				
		Lead - Total				
I0664/(C)001	Samples(1,2,3,4)	0	1	0	0	0
I0664/(C)002	Samples(5,6,7,8)	0	1	0	0	0
I0664/(C)003	Samples(9,10,11,12)	0	1	0	0	0

## Sample Receipt Notification (SRN)

for EAL/I0664

Page 2 of 7

		SS-PACK-004	SS-PACK-008	SS-PACK-017	SS-PREP-004	SS-SING-150
		Basic Metals Scan - Total Acid Extractable	Contaminated Site Assessment 3	Petroleum Compounds Assessment 1a	Sample Compositing	Lead - Total
I0664/(C)004	Samples(13,14,15,16)	0	1	0	0	0
I0664/(C)005	Samples(17,18,19,20)	0	1	0	0	0
I0664/(C)006	Samples(21,22,23,24)	0	1	0	0	0
I0664/(C)007	Samples(25,26,27,28)	0	1	0	0	0
I0664/(C)008	Samples(29,30,31,32)	0	1	0	0	0
I0664/(C)009	Samples(33,34,35,36)	0	1	0	0	0
I0664/(C)010	Samples(37,38,39,40)	0	1	0	0	0
I0664/001	BH1	0	0	0	1	1
I0664/002	BH3	0	0	0	1	1
I0664/003	BH12	0	0	0	1	1

## Sample Receipt Notification (SRN)

for EAL/I0664

Page 3 of 7

		SS-PACK-004	SS-PACK-008	SS-PACK-017	SS-PREP-004	SS-SING-150
		Basic Metals Scan - Total Acid Extractable	Contaminated Site Assessment 3	Petroleum Compounds Assessment 1a	Sample Compositing	Lead - Total
I0664/004	BH2	0	0	0	1	1
I0664/005	BH4	0	0	0	1	0
I0664/006	BH5	0	0	0	1	0
I0664/007	BH6	0	0	0	1	0
I0664/008	BH36	0	0	0	1	0
I0664/009	BH37	0	0	0	1	0
I0664/010	BH38	0	0	0	1	0
I0664/011	BH34	0	0	0	1	0
I0664/012	BH33	0	0	0	1	0
I0664/013	BH11	0	0	0	1	1

## Sample Receipt Notification (SRN)

for EAL/I0664

Page 4 of 7

		SS-PACK-004	SS-PACK-008	SS-PACK-017	SS-PREP-004	SS-SING-150
		Basic Metals Scan - Total Acid Extractable	Contaminated Site Assessment 3	Petroleum Compounds Assessment 1a	Sample Compositing	Lead - Total
I0664/014	BH7	0	0	0	1	1
I0664/015	BH8	0	0	0	1	1
I0664/016	BH9	0	0	0	1	1
I0664/017	BH35	0	0	0	1	0
I0664/018	BH31	0	0	0	1	0
I0664/019	BH39	0	0	0	1	0
I0664/020	BH29	0	0	0	1	0
I0664/021	BH32	0	0	0	1	0
I0664/022	BH28	0	0	0	1	0
I0664/023	BH27	0	0	0	1	0

## Sample Receipt Notification (SRN)

for EAL/I0664

Page 5 of 7

		SS-PACK-004	SS-PACK-008	SS-PACK-017	SS-PREP-004	SS-SING-150
		Basic Metals Scan - Total Acid Extractable	Contaminated Site Assessment 3	Petroleum Compounds Assessment 1a	Sample Compositing	Lead - Total
I0664/024	BH26	0	0	0	1	0
I0664/025	BH10	0	0	0	1	0
I0664/026	BH13	0	0	0	1	0
I0664/027	BH14	0	0	0	1	0
I0664/028	BH15	0	0	0	1	0
I0664/029	BH16	0	0	0	1	0
I0664/030	BH17	0	0	0	1	0
I0664/031	BH40	0	0	0	1	0
I0664/032	BH18	0	0	0	1	0
I0664/033	BH25	0	0	0	1	0

## Sample Receipt Notification (SRN) for EAL/I0664

Page 6 of 7

		SS-PACK-004	SS-PACK-008	SS-PACK-017	SS-PREP-004	SS-SING-150
		Basic Metals Scan - Total Acid Extractable	Contaminated Site Assessment 3	Petroleum Compounds Assessment 1a	Sample Compositing	Lead - Total
I0664/034	BH20	0	0	0	1	0
I0664/035	BH19	0	0	0	1	0
I0664/036	BH21	0	0	0	1	0
I0664/037	BH24	0	0	0	1	0
I0664/038	BH22	0	0	0	1	0
I0664/039	BH30	0	0	0	1	0
I0664/040	BH23	0	0	0	1	0
I0664/041	BH7A	1	0	1	0	0
I0664/042	BH16A	1	0	1	0	0
<b>Total</b>		<b>2</b>	<b>10</b>	<b>2</b>	<b>40</b>	<b>8</b>



## Sample Receipt Notification (SRN) for EAL/I0664

Page 7 of 7

### Test Descriptions

Test List Item	Item Description
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<b>SS-PREP-004</b>	<b>Sample Compositing</b> EAL can composite samples and store the individual samples for at least 2 months to allow for individual testing if required. Charge per individual sample used in the composite.
--------------------	--

<b>SS-PACK-004</b>	<b>Basic Metals Scan - Total Acid Extractable</b> Dry and Grind Metals (Al, As, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, Zn)
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<b>SS-PACK-008</b>	<b>Contaminated Site Assessment 3</b> Dry and Grind Basic Texture Metals (Cu, Pb, Cd, Zn, As, Se, Fe, Mn, Ag, Cr, Ni, Al, Hg, B, Co, Be) Pesticides (OCs) SUBCONTRACTED
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<b>SS-PACK-017</b>	<b>Petroleum Compounds Assessment 1a</b> TPH(C10-C36) and BTEX (equivalent to TPHC6- C9) SUBCONTRACTED
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<b>SS-SING-150</b>	<b>Lead - Total</b> Includes sample preparation / acid digest and analysis by ICPMS.
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PO Box 157 (Military Road)  
LISMORE NSW 2480  
T: 02 6620 3678 E: eal@scu.edu.au W: www.scu.edu.au

#### Submitting Client Details

Quote Id:  
Job Ref: 19121  
Company: ENV Solutions Pty Ltd  
Contact: James Foster OLLIE FICK  
Phone: 0423 124 923  
Mobile: 0421519354  
Email: james@envsolutions.com.au  
Postal address:

#### Billing Client Details

☐ Tick if same as submitting details  
ABN: 58 600 788 814  
Company: ENV Solutions Pty Ltd  
Contact: James Foster  
Phone:  
Mobile: 0421519354  
Email: james@envsolutions.com.au  
Postal address: PO Box 248 Ballina NSW 2478

#### Payment Method:

- ☐ Purchase Order  
☐ Cheque  
☐ Credit/Debit Card (EAL staff will phone for details)  
☐ Invoice (prior approval)

Relinquished: O. FICK

Received:

Date: 9.4.19

Date: 11.4.19

Preservation:

Condition on receipt:

none - freezer bricks ice - acidified - filtered - other  
ambient - cool - frozen - other

#### Comments:

#### Likelihood and nature of Hazardous material:

Comments:							Total number of samples	Sample Analysis Request					
								Price list code (e.g. SW-PACK-06)					
Likelihood and nature of Hazardous material:								Composite	SS-PACK-008				
Lab ID	Sample ID	Sample Depth	Sampling Date	Sampler	Your Client	Crop ID	Sample Type (e.g. water, leaf, soil)						
1	BH 1		9-4-19				SOIL	✓					
2	BH 3		↑				↑	✓					
3	BH 12		↓				↓	✓					
4	BH 2		9-4-19				SOIL	✓					

# CHAIN OF CUSTODY

Comments:

Marketing Survey – where did you find us?

☐ Word of mouth ☐ Magazine ☐ Google search ☐ Other

## Sample Analysis Request

Price List Code (e.g. SW-PACK-06)

Lab Sample No.	Sample ID	Sample Depth	Sampling Date	Your Client	Crop ID	Sample Type (e.g. water, leaf, soil)	Composite	SS-PACK-008											
	C1		9-4-19			SOIL		✓											
5	BH 4		↑			↑	✓												
6	BH 5						✓												
7	BH 6						✓												
8	BH 36						✓												
	C2							✓											
9	BH 37						✓												
10	BH 38						✓												
12	BH 34						✓												
12	BH 33						✓												
	C3							✓											
13	BH 11						✓												
14	BH 7						✓												
15	BH 8						✓												
16	BH 9						✓												
	C4							✓											
17	BH 35						✓												
18	BH 31						✓												
19	BH 39		✓			↓	✓												
20	BH 29		9-4-19			SOIL	✓												

# CHAIN OF CUSTODY

Comments:

Marketing Survey - where did you find us?

☐ Word of mouth ☐ Magazine ☐ Google search ☐ Other

## Sample Analysis Request

Price List Code (e.g. SW-PACK-06)

Lab Sample No.	Sample ID	Sample Depth	Sampling Date	Your Client	Crop ID	Sample Type (e.g. water, leaf, soil)	Composite	SS-PACK-008												
	C5		9.4.19			SOIL		✓												
21	BH 32		↑			↑	✓													
22	BH 28						✓													
23	BH 27						✓													
24	BH 26						✓													
	C6							✓												
25	BH 10						✓													
26	BH 13						✓													
27	BH 14						✓													
28	BH 15							✓												
	C7						✓													
29	BH 16						✓													
30	BH 17						✓													
31	BH 40						✓													
32	BH 18							✓												
	C8						✓													
33	BH 25						✓													
34	BH 20						✓													
35	BH 19		↓			↓	✓													
36	BH 21		9.4.19			SOIL	✓													

### CHAIN OF CUSTODY

**Comments:**

**Marketing Survey – where did you find us?**

**Marketing Survey - where did you find us?**  
☐ Word of mouth ☐ Magazine ☐ Google search ☐ Other

### Sample Analysis Request

Price List Code (e.g. SW-PACK-06)

[illegible]

**ProUCL Statistical Analyses**

	A	B	C	D	E	F	G	H	I	J	K	L
1	Normal UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.108-May-19 9:38:09 AM								
5	From File			ENV022-SS-i0664-R01_b.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8												
9												
10	C1											
11												
12	General Statistics											
13	Total Number of Observations				8		Number of Distinct Observations				7	
14							Number of Missing Observations				1	
15	Minimum				7		Mean				56.5	
16	Maximum				331		Median				12.5	
17	SD				112.2		SD of logged Data				1.326	
18	Coefficient of Variation				1.986		Skewness				2.71	
19												
20	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
21	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
22	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
23	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
24												
25	Normal GOF Test											
26	Shapiro Wilk Test Statistic				0.516		Shapiro Wilk GOF Test					
27	5% Shapiro Wilk Critical Value				0.818		Data Not Normal at 5% Significance Level					
28	Lilliefors Test Statistic				0.394		Lilliefors GOF Test					
29	5% Lilliefors Critical Value				0.283		Data Not Normal at 5% Significance Level					
30	Data Not Normal at 5% Significance Level											
31												
32	Assuming Normal Distribution											
33	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
34	95% Student's-t UCL 131.6						95% Adjusted-CLT UCL (Chen-1995)				162.4	
35							95% Modified-t UCL (Johnson-1978)				138	
36												
37	Suggested UCL to Use											
38	Data do not follow a Discernible Distribution, May want to try Nonparametric UCLs											
39												
40	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
41	Recommendations are based upon data size, data distribution, and skewness.											
42	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
43	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
44												

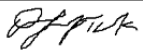

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### 13.Document Control

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Filename:	19121_Contam Assessment_20190521
Job No.:	19121
Author:	Ollie Fick
Client:	Marjan Management Pty Ltd
File/Pathname:	C:\Users\Dropbox (ENV Solutions)\ENV Solutions Team Folder\01 Jobs\19121 - Elouera Tce, Bray Park SEPP55

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Revision No:	Date:	Name	Signed
0	09/05/2019	Ollie Fick	
1	21/05/2019	Ollie Fick	

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