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# Detailed Site Investigation
# Proposed Rezoning

**Tweed Shire Council Reference PP12/0001**

*Location:*

420 – 434 Terranora Road
Lots 2-8 DP 28597
Terranora

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*Prepared for:*

GR & JG Stone

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*Report:*

HMC 2015.009 DSI

February 2015

February 2015

**RE: Lots 2-8 DP 28597 Nos.420-434 Terranora Road, Terranora**

HMC Environmental Consulting Pty Ltd is pleased to present our report for a Detailed Site Investigation for the abovementioned site.

We trust this report meets with your requirements. If you require further information please contact HMC Environmental Consulting directly on the numbers provided.

Yours sincerely

Mark Tunks
(B.App.Sc.Env.Hlth)

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## EXECUTIVE SUMMARY

A rezoning of agricultural land for residential purposes is proposed at Lots 2-8 DP Nos. 420-434 Terranora Road, Terranora. An information request issued by Tweed Shire Council on 12 November 2014 identified a rock retaining wall on the northern boundary of the site indicating that potential fill material had been placed on the site. Item C of the Council correspondence required an assessment of the potential fill material for contaminants of potential concern. HMC Environmental consulting (HMC) was engaged to assess the soil profile within the identified fill material for potential contaminants of concern and the suitability of the site for the proposed land use.

As the Preliminary Site Investigation (HMC20013.125CL) had previously assessed the surface soil and the site was estimated to be generally native soil with the exception of the northern part of the site, the current investigation focussed near the northern boundary. Eight primary sampling locations were provided along a transect oriented east-west parallel with the northern boundary as shown in Appendix 3.

In accordance with the *Memorandum of Understanding - Preparation of Additional Studies or Other Information* (MOU) dated November 2013, the sampling and quality plan was discussed with Brad Pearce of Tweed Shire Council Environmental Health.

A site inspection on 10 February 2015 recorded the presence of a rock retaining wall along the northern boundary. Borelogs indicated the fill depth ranged from nil to 1.1m along the transect. Most of the boreholes recorded fill depth less than 0.5m depth. It is likely the source of the fill was from the site or the immediate surrounding area to modify the ground surface to maximise agricultural land use in the area surrounding the gully on the site.

The concentrations of all organochlorine and organophosphorus pesticides and arsenic, cadmium and mercury were below the laboratory level of reporting and therefore below the Environmental Investigation Level (EIL) and residential criteria - Health Investigation Level –A (HIL-A).

No exceedances of the residential criteria (HIL-A) for the other targeted contaminants of concern (chromium, copper, nickel, lead and zinc) were recorded. Slight exceedances for the adjusted EIL for zinc was recorded in composite samples however the results for the discrete duplicate samples were below the nominated EIL.

In relation to potential site contamination associated with current and former land use and, based on the information provided within this report, a site inspection carried out on 10 February 2015, and the soil and analysis program, it is concluded that, in relation to potential site contamination associated with the identified fill material, Lots 2-8 DP 28597 Nos. 420-434 Terranora Road, Terranora are considered suitable for the proposed residential land use.

After consideration of these findings, it is concluded that further sampling and laboratory analysis is not required. A remediation action plan is not required.

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# 1 INTRODUCTION

Tweed Shire council has raised a number of concerns relating to the proposed rezoning of Lots 2-8 DP 28597 Nos.420-434 Terranora Road, Terranora (Site) and potential fill from unknown source on the site. A rock retaining wall is located along the northern site boundary and there are concerns relating to stability and as the fill source is unknown, potential contamination from agricultural or other activities.

HMC Environmental Consulting (HMC) was commissioned by GR & JG Stone (Proponents) to assess the identified fill material for potential site contamination. This report details HMCs activities during the investigation and provides recommendations regarding the suitability of the site for the proposed rezoning for residential purposes.

## *1.1 Background*

The site lies immediately to the north of Terranora Road, is currently zoned 1(b1) Agricultural Protection, and contains seven allotments each of which is without a dwelling entitlement. A request from the landowners was forwarded to Council seeking a change in zoning to allow low density residential development of the site, consistent with its current subdivision pattern. Subsequently the request was reported to the Council Meeting of 21 March 2013. It outlined a range of constraints affecting the site, which required further investigation prior to determining the proposal, and recommended referral for an initial Gateway Determination

## *1.2 Memorandum of Understanding*

Tweed Shire Council, as part of the planning proposal for the rezoning, has requested the proponent to undertake additional studies. A document, *Memorandum of Understanding - Preparation of Additional Studies or Other Information* (MOU) dated November 2013 has been prepared for the proposal.

The MOU specifies the extent of studies required for the preparation of the Planning Proposal and the arrangements which will be entered into between Council and the landowner (or delegate) to have these studies and reports completed. Under the MOU further investigation for potential site contamination has been included as reproduced below:

> *4.2.4 Contaminated Land*
> *The site is classified as State Significant Agricultural land and zoned 1(b1) Agricultural Protection. While the site has not been utilised for agricultural purposes for some time, the history of the site triggers the need for an investigation of potential land contamination from previous landuses. Table 1 of the Department of Urban Affairs and Planning "Managing Land Contamination" Guidelines 1998, identifies potential associated chemicals, including fertilizer, insecticides, fungicides, and herbicides.*
>
> *<u>Terms of Reference, Scope, Methodology</u>*
>
> > *Preliminary assessment of the subject site in accordance with the Contaminated Land Planning Guidelines and additional guidelines as are stipulated and consistent with the requirements of Clause (6) of SEPP 55 Remediation of Contaminated Land and the relevant provisions of the Contaminated Land Management Act, 1997.*
> >
> > *A Stage 1 Preliminary Site Investigation is to be undertaken in accordance with the provisions of the NSW DECCW (EPA) guideline document entitled "Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites 2000"*
> >
> > *Pending the conclusion of the Stage 1 Preliminary Site Investigation, a Stage 2 Detailed Site Investigation report satisfying the provisions of NSW DECCW (EPA) guideline document entitled "Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites 2000" may also be required.*
> >
> > *The stage 1 investigation will need to identify all past and present potentially contaminating activities that have occurred on the site.*
> >
> > *The stage 2 assessment, if required, will need to identify any onsite and offsite contamination impacts.*

*The preparation of a stage 3 Site Remedial Action Plan and Stage 4 Validation and Site Monitoring Report(s) if considered necessary based on the outcome of the stage 1 and stage 2 investigations.*

*Report outcomes*

*An assessment that determines the extent of contamination and potential impacts on the development potential of the site.*

*If the land is contaminated, it must be demonstrated that the land is suitable in its contaminated state, or will be suitable, after remediation, for the proposed land use, and*

*If the land requires remediation prior to developing the site, the report must acknowledge that the land will be remediated before the land is used for that purpose.*

*General comments*

*A suitably qualified contaminated land consultant will need to prepare a report in accordance with the requirements for a stage 1 and 2 contamination investigation for the site in accordance with the "Terms of Reference".*

*Based on the outcome of the stage 1 investigations, the consultant will need to determine if a Stage 2 Detailed Site Investigation or Stage 3 Site Remedial Action Plan (RAP) and stage 4 Validation and Site Monitoring Report(s) as described in the abovementioned guideline will be required in order for the site to be made suitable for any specified use or range of uses.*

*The consultant will need to utilise any other applicable and relevant NSW DECCW (EPA) contaminated sites guidelines as appropriate for their investigations and provide a statement at the conclusion of their investigations as to whether or not the site is suitable for any specified use or range of uses.*

*All contamination reports will need to be submitted to Council's Environmental Health Officer for assessment and approval.*

*The proponent is advised that Council may (based on the outcome of any contamination investigation) require that such investigation and associated reports are reviewed by a DECCW (EPA) Accredited Contaminated Sites Auditor and the Auditor to provide a Statement as to the adequacy of the contamination investigations that have been carried out or require that an Auditor is engaged by the applicant to provide a Site Audit Statement as defined under the provisions of the Contaminated land Management Act 1997 based on the assessment of contamination of the site and the suitability of the site for any specified use or range of uses.*

### *1.3 Preliminary Site investigation*

A *Preliminary Site Investigation* (HMC 2013.125) including site inspection, desktop assessment and preliminary soil investigation, concluded that:

*In relation to potential site contamination associated with current and former land use and, based on the information provided within this report, a site inspection carried out on 20 December 2013, and the soil and analysis program, it is concluded that the proposed rezoning of Lots 2-8 DP 28597 Nos. 420-434 Terranora Road, Terranora is considered suitable for the proposed land use.*

*After consideration of these findings, it is concluded that further sampling and laboratory analysis is not required. A remediation action plan is not required.*

As fill material has been identified on the site and excavation for the proposed sewer would extend up to 1.5m into the fill material, additional investigation is required to assess the presence of potential contaminants of concern in this material.

### *1.4 Objectives*

The primary objective of the PSI is to assess the suitability of the site for the proposed residential land use.

Specific objectives include:

- Assess the identified fill material on the northern part of the site for the presence of contaminants of potential concern
- Provide recommendations regarding suitability of site and need for further investigation and site cleanup.

### *1.5 Scope*

The scope of work undertaken during the investigation included the following:

- A detailed site Inspection to assess the presence of fill on the site.
- Preparation of a sampling and analysis plan based on the site inspection and location of identified fill.
- Collection of soil samples from 8 locations along an east-west transect parallel with the northern boundary (TR17-TR24).
- Laboratory analysis of both composite and discrete soil samples using a National Association of Testing Authorities (NATA) certified laboratory.

## 2 SITE IDENTIFICATION AND ENVIRONMENTAL SETTING

### *2.1 Site Location*

The site is located on the North Coast of New South Wales on agricultural land approximately 1.4km east of Terranora village. The site is located on an elevated ridge with a northerly aspect, with residential dwellings immediately east and west and agricultural land to the north. This agricultural land has recently been rezoned Area E urban release area. The investigation area extended along an east-west transect parallel to the northern boundary of the site.

**Table 1 - Site Identification Summary**

| | |
|---|---|
| Street Address | 420-434 Terranora Road, Terranora |
| Allotment size | 7 lots each ~858m$^2$ |
| Total Site Area | ~5.5 Ha |
| Allotment Description | Lots 2 – 8 DP 28597 |
| Property No. | 104161 & 104162 |
| Land No. | 12846 (Lots 2-5) & 12850 (Lots 6-8) |
| Local Government | Tweed Shire |
| Parish | Terranora |
| County | Rous |
| Zoning | 1(b1) Agricultural protection |
| Land use - Existing | Agricultural |
| Land use - Proposed | Residential |
| Site Services | Power, townwater, on-site sewage management |
| Surrounding land uses | Residential & agricultural |
| Closest Sensitive Environment | SEPP 14 wetland downgradient ~950m north. |

| | |
|---|---|
| | Overland flow would be through agricultural land via a farm dam located ~500m north-east of the site. |

### *2.2 Geology and Soil Landscape*

**Table 2 Geology & Soil Landscape Summary**

| | |
|---|---|
| **Geology (Hashimoto et al (2008)** | Bedrock geology with tertiary volcanic rocks: basalt, rhyolite, trachyte, gabbro, syenite (tv) |
| **Soil landscape (Morand, 1996)** | Carool (ca) characterised by rolling hills on Tertiary basalt caps which overlie hills of the Burringbar (bu) and Billinudgel (bi) soil landscapes. Soils are deep well-drained krasnozems on upper slopes and crests |

### *2.3 Site Drainage and Hydrogeology*

**Table 3 Site Drainage & Hydrogeology Summary**

| | |
|---|---|
| **Site drainage** | The site grades from the Terranora Road to the northern boundary and agricultural land. An open drain currently collects road stormwater and bisects the site. |
| **Hydrogeology** | The site is elevated with basalt residual material. The nearest registered bore is ~400m downgradient on the southern side of the ridgeline located south of the site. This bore is not within the catchment of the site. |

## 3 LAND USE ACTIVITIES

### *3.1 Aerial Photograph Interpretation*

**Table 4 Historic Aerial Photography Summary**

| Year | Changes from previous photograph | Potentially contaminating land use identified | Description of potentially contaminating land use |
|---|---|---|---|
| 1947 | Site cleared of native vegetation, No dwelling or other structures onsite or adjoin sites | No | Nil. No evidence of retaining or fill. |
| 1962 | Some veg. Re-growth. Dwelling now located on adjoining property (west) | No | Nil. No evidence of retaining or fill |
| 1970 | Evidence of terracing and enclosure of plots in area | No | Retaining wall appears to be now installed along northern boundary |
| 1976 | Evidence of terracing and enclosure of plots in area | No | Similar to 1970 |

### *3.2 Site inspection*

A site inspection was undertaken prior to soil sample collection on 10 February 2014. The details of the site inspection are shown in table 6. Selected photographs collected during the inspection and on 16 January 2013 are provided in Appendix 7.

**Table 5 Site Features Indicating Potential Contamination**

| Features of contamination | Details of features if identified |
|---|---|
| Disturbed, discoloured or stained soil | None recorded |
| Disturbed or distressed vegetation | None recorded – site cleared of native vegetation |
| Presence of chemical/fuel containers | None recorded |
| Chemical/fuel odours | None recorded |
| Surface water quality | No standing water |
| Condition of buildings, surface finishes | None recorded |
| Presence of fill | Retaining wall on northern boundary appears to confirm fill on site. A number borelogs from soil investigation (10 February 2015) show the presence of fill |

The site was generally cleared of native vegetation. Vegetation noted was exotic grasses, and several Camphor lauryl trees on boundary lines.

### *3.3 Potentially Contaminating Activities*

Table 6 lists the potential sources of contamination as determined via the DSI process:

**Table 6 List of Potential Contaminating Activities**

| Potential sources of contamination | Identified |
|---|---|
| Asbestos waste or use in structures | NO |
| PoEO licensed activities | NO |
| EPA issued notices | NO |
| Dangerous goods | NO |
| Cattle dip sites <200m buffer | NO |
| Chemical/fuel storage | NO |
| UXO | NO |
| Fill from unapproved source | YES |
| Waste storage | NO |
| Agrichemical use | YES (see PSI (HMC 2013.125)) |

### *3.4 Surrounding Land Use*

A review of available information and a site inspection shows the site is bounded on the east and west by residential dwellings. The site is bounded by Terranora Road to the south and, further south, the Azzura rural/residential estate. Agricultural landholdings bound the site to the north. These landholdings appear to be currently used for intermittent cattle grazing. This land forms part of the recently rezoned Area E urban release area

### *3.5 Land Use Summary*

A review of available information including interviews, historic aerial photography and a site inspection show gaps in available information particularly before 1944, after 1944 through to 1962 and between 1962 and 1970. Banana growing and sugar cane activities were reported widespread in the Terranora area in the late 1800s and early 1900s. Although the residual organochlorines were not available at this time, arsenic and other pesticides were in use. There was cropping identified from historic aerial photography on surrounding

properties and also scattered trees on the site that may have been fruit trees. A 1935 topographic map nominates banana cultivation in the area. The following land use has been associated with the site:

Agricultural activities, including cattle grazing and, possibly, intensive cropping including bananas and other cash crops. Presence of fill material from unknown source.

## 4 CONTAMINANTS, MEDIA AND ENVIRONMENTAL CRITERIA

### *4.1 Potential contaminants and areas of concern*

Based on the desktop investigation and the site inspection the potential contaminants of concern (PCoC) and the areas of potential concern (AoPC) are listed in table 7.

**Table7 List of Potential Contaminants of Concern and Areas of Potential Concern**

| PCoC | Description and common relationship | Hotspot/AoPC |
|---|---|---|
| Organochlorine and organophosphorus pesticides/herbicides | Pest control, weed control | Identified fill material |
| Heavy metals (arsenic (As), cadmium(Cd), copper (Cu), chromium (Cr), nickel (Ni), lead (Pb), zinc (Zn), mercury (Hg)) Laboratory heavy metal 8 suite completed. | Pest control, fungal control, weed control & fertiliser contaminants | Identified fill material |

### *4.2 Relevant Environmental Media*

Based on the site history, the relevant environmental media is the surface soil. Applications of agrichemicals would be applied directly to the crops and the surface soil. However fill has been identified on the northern part of the site and the source of this fill has not been confirmed. As the proposed sewer is to be located within the area affected by the identified fill material there would be disturbance of this subsoil that may include fill.

Due to the clay soil within the profile (relevantly impermeable) and the physical buffer (depth), groundwater is not expected to be subject to contamination from the application of agrichemicals to the soil surface on this site.

### *4.3 Environmental Criteria*

- Health Investigation Levels for a Residential A (HIL-A) exposure setting, as shown in Table 1A(1)of *Schedule B1 Guidelines on Investigation Levels for Soil and Groundwater* in the National Environmental Protection (Assessment of Site Contamination) Measure 1999 (April 2013).
- Ecological Investigation Levels Tables 1B (1) -1B (5) in *Schedule B1 Guidelines on Investigation Levels for Soil and Groundwater* in the National Environmental Protection (Assessment of Site Contamination) Measure 1999 (April 2013)

To address phytotoxicity, Environmental Investigation Levels (EIL) have been developed. The EIL is calculated on a site specific basis including the measured Ambient Background Concentration of the potential contaminant:

**EIL = ABC + ACL**
where:

**EIL** Environmental Investigation Level
**ABC** Ambient Background Concentration

**ACL** Added Contaminant Limits

## 5 SOIL SAMPLING AND ANALYSIS PROGRAM

A sampling and analysis quality plan (SAQP) and a sampling and analysis program were developed for the DSI.

The sampling intensity reflected the earlier PSI. An east-west transect was established parallel with the northern boundary and the existing retaining wall. The transect was located approximately 2-3m south of the retaining wall where the maximum fill depth would be expected to be intercepted.

The samples were delivered to the laboratory with information on the chain of custody requesting:

- Metals 2 x composite samples to be formed from the 8 0.5-0.6m depth interval sub-samples and a discrete sample from the single 1.0-1.1m depth interval (TR20B). Adjacent samples were used in each composite as shown in Appendix 3 -4 x sub-samples were composited into a single composite sample.
- OCP/OPP 9 x discrete primary samples.

| Primary Sample | Depth (m) | Composite (metals only) |
|---|---|---|
| TR17A | 0.2-0.3 | TRA |
| TR18A | 0.2-0.3 | |
| TR19A | 0.2-0.3 | |
| TR20A | 0.2-0.3 | |
| TR21A | 0.2-0.3 | TRB |
| TR22A | 0.2-0.3 | |
| TR23A | 0.2-0.3 | |
| TR24A | 0.2-0.3 | |
| TR20B | 1.0-1.1m | Discrete |

### *5.1 Fieldwork*

A sampling program was undertaken on 10 February 2015 in accordance with the SAQP. Nine primary samples were collected along the east-west transect as shown in Appendix 3. As the fill depth was generally less than 0.5m, samples were collected at 0.2-0.3m depth. Sample TR20B was collected at 1.0-1.1m depth. QA/QC measures included a replicate sample, and a split sample forwarded to a separate laboratory.

### *5.2 Sampling Methodology and Quality Control*

The following basic measures were undertaken by HMC Environmental Consulting to conform to the minimum standards for sampling and quality control procedures:

- Samples collected directly off drill rig auger using sterile disposable gloves by Mark Tunks of HMC Environmental Consulting, with experience in site contamination investigations.
- Soil samples were placed in clean laboratory supplied jars and stored on ice (<4°C) and were delivered to the HMC offices for storage in secure refrigeration (<4°C ) overnight prior to delivery to the Tweed Laboratory Centre.
- A field replicate soil samples were collected for the purposes of field quality control and a split sample forwarded to a separate NATA laboratory.
- Samples subjected to metals analysis were composited. Compositing of the samples was carried out by the laboratory, and sub-samples correctly stored for future analysis if required.
- Samples subjected to semi-volatile organic OCC/OPP were not composited.
- Chain of custody documentation was completed and is attached in the Appendices

The laboratory results and quality control reports include a description of the analytical methods used and reporting for surrogates are available from Tweed Shire Council Laboratory. The results are attached as Appendix 9.

### *5.3 Sample Analysis*

All soil samples collected were analysed for the following parameters:

- Heavy metals – arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc
- Organochlorine pesticides (OCPs)
- Organophosphorus pesticides (OPPs).

## 6 BASIS FOR ASSESSMENT CRITERIA

A change in land use from agricultural to residential purposes is proposed for the site.

The land is zoned 1b(1) Agricultural Protection and the site is bordered by both residential and agricultural land uses.

The soil surface is currently partially vegetated with exotic and native grasses. It is expected some landform modification would be required especially in the vicinity of the existing open drain. Any imported fill would be from approved sources. Proposed land use would include structures, driveways, paths and landscaping to reduce exposure of persons to the native soil surface.

A potential site contamination assessment confirms that the Health Investigation Level that is most applicable, based on land use, as nominated in Table 1A (1) of *Schedule B(1) Guideline of the Investigation Levels for Soil and Groundwater National Environmental Protection (Assessment of Site Contamination) Measure 1999* (April 2013), EPHC 2013, is **"A"** described as:

> "*Standard Residential with garden/accessible soil (home grown produce contributing less than 10% of vegetable and fruit intake, no poultry). This category includes children's day care, kindergarten and primary schools".*

This Health Investigation Level is reported as HIL-A.

The following guidance notes were considered in the preparation of this report

- *National Environmental Protection (Assessment of Site Contamination) Measure 1999* (April 2013), EPHC 2013, Canberra.

  *(Schedule B)*
  - *(1) Guidelines on the Investigation Levels for Soil and Groundwater, and*
  - *(2) Guidelines on Site Characterisation*

  In NSW the Measure is now being implemented by way of endorsement under section 105 of the Contaminated Land Management Act 1997. This will provide expanded technical guidance to site auditors, contaminated land consultants, planning authorities and the public when assessing a contaminated site.

- **NSW EPA (1995)** ***Sampling Design Guidelines*** – were followed during design of the sampling and analysis plan and predetermination of data quality objectives (DQOs).

- **NSW EPA (1997)** ***Guidelines for Consultants Reporting on Contaminated Sites*** – were followed throughout the investigations and during preparation of this report.

- **NSW EPA (1997)** ***Guidelines for Assessing Banana Plantation Sites –*** were used to assist in sampling and analysis plan and preliminary screening criteria

- **SEPP 55 (1998)** ***State Environmental Planning Policy No. 55 – 'Remediation of Land –*** provided guidance on project objectives'

The laboratory results and quality control reports include a description of the analytical methods used and reporting for surrogates are available from Tweed Shire Council Laboratory. The results are attached as **Appendix 16**.

## 7 RESULTS

Analytical results are summarised in Table 8.
Laboratory certificates are attached in Appendix 9.

### *7.1 Metals*

Arsenic, cadmium and mercury concentrations were below the laboratory level of reporting (LOR).

Where results for composite samples were reviewed, in accordance with the NSW EPA Sampling Design Guidelines, the HIL-A for each contaminant of concern was adjusted (divided by number of sub-samples) to resolve the problem of hot spot dilution and ineffective mixing.

The concentrations for chromium, copper, nickel, zinc and lead in the composite samples were all below the adjusted EIL and HIL-A criteria. The results for the replicate samples were also below the nominated (unadjusted) EIL and HIL-A criteria.

### *7.2 Organochlorine/Organophosphorus Pesticides*

All results for OCPs and OPPs in the composite samples were below the laboratory practical quantification level and therefore below the adjusted EIL and HIL-A. The results for the replicate samples were also below the nominated (unadjusted) EIL and HIL-A.

| Parameter | Number of primary samples | Number of Composites | PQL (mg/kg) | Criteria (1) (HIL-A) (mg/kg) | Adjusted Composite Criteria (HIL-A) For 4 x sub-samples (mg/kg) | Criteria (adjusted HIL-A) Exceedances | Range (mg/kg) | Typical Background (Olszowy et al, 1995) |
|---|---|---|---|---|---|---|---|---|
| **Metals/Metalloids** | | | | | | | | |
| Arsenic | 9 | 2 + 1 Discrete | 5 | 100 | 25 | 0 | <5 | 5-53 |
| Chromium (VI) | 9 | 2 + 1 Discrete | 5 | 100 | | 0 | 69-96 (Total Cr) | 5-56 |
| Copper | 9 | 2 + 1 Discrete | 5 | 6000 | 1500 | 0 | 8-10 | 3-412 |
| Nickel | 9 | 2 + 1 Discrete | 5 | 400 | 100 | 0 | 36-39 | 5-38 |
| Zinc | 9 | 2 + 1 Discrete | 5 | 7400 | 1850 | 0 | 74-86 | 5-92 |
| Cadmium | 9 | 2 + 1 Discrete | 1 | 20 | 5 | 0 | <1 | nd |
| Lead | 9 | 2 + 1 Discrete | 1 | 300 | 75 | 0 | <1-4 | 5-56 |
| Mercury (inorganic) | 9 | 2 + 1 Discrete | 1 | 40 | 10 | 0 | <1 | nd |
| **Organochlorine/Organophosphorus** | | | | | | | | |
| Chlordane | 9 | 0 (All discrete) | 0.5 | 50 | 12.5 | 0 | <0.5 | |
| Dieldrin + Aldrin | 9 | 0 (All discrete) | 0.5 | 6 | 1.5 | 0 | <1.0 | |
| DDT+DDD+DDE | 9 | 0 (All discrete) | 0.5 | 240 | 60 | 0 | <1.5 | |
| Heptachlor | 9 | 0 (All discrete) | 0.5 | 6 | 1.5 | 0 | <0.5 | |

**Table 8 Laboratory Soil Results Summary**

Table 1A (1) Health based Investigation Levels - Residential A - *Schedule B1 Guideline on Investigation Levels for Soil and Groundwater - National Environmental Protection (Assessment of Site Contamination) Measure 1999* (April 2013), EPHC 2013, Canberra.
nd not detected

**Table 9 Environmental Investigation Levels**

| Contaminant | ABC | ACL [1] | EIL | EIL adjusted for compositing | Range | Exceedance |
|---|---|---|---|---|---|---|
| Zinc | Not measured | 180 | >180 | >45 | 74-86 | Yes[2] |
| Copper | | 210 | >210 | >52.5 | 9-10 | Nil |
| Chromium III | | 400 | >400 | >100 | 69-96 (total) | Nil |
| Lead | | 1100 | >1100 | >275 | <1-4 | Nil |
| Arsenic | | 100 | >100 | >25 | <5 | Nil |

[1]Based on CEC 20me/100g Carool Soil Landscape Appendix 4 Morand ((1996) Clay content >10% & measured pH 5.0
[2] Zinc slight exceedance of adjusted EIL however duplicate & TR20B (both discrete) <EIL.

The laboratory results are attached as **Appendix 9 of this** report. The human health investigation thresholds are attached as **Appendix 8** of this report.

## 8 DISCUSSION

Following Council concerns a site inspection on 10 February 2015 confirmed the presence of a rock retaining wall along the northern boundary of the site. As fill material form an unknown source was likely soil samples were collected from drilled boreholes along a transect parallel with the northern boundary. The samples were generally collected at 0.2-0.3m depth depending on the borelogs. In a single location the fill extended greater than 1m below the existing ground surface and a sample in this borehole (TR20) was also collected at 1.0-1.1m depth.

It is likely the fill material was sourced on the site or surrounding area to maximise the agricultural use of the land especially around the eroded gully.

## 9 CONCLUSION

The DSI conclusions are based on the information described in this report and appendices, and should be read in conjunction with the complete report, including section 10 Limitations.

Tweed Shire Council requested that the identified fill material on the site be assessed for the presence of contaminants of potential concern.

A sampling and analysis program targeted the area adjacent the existing rock retaining wall on the northern boundary. Soil samples were collected from the soil profile within the identified fill material along an east-west transect.

The concentrations of all organochlorine and organophosphorus pesticides and arsenic, cadmium and mercury were below the laboratory level of reporting and therefore below the Environmental Investigation Level (EIL) and residential criteria - Health Investigation Level –A (HIL-A).

No exceedances of the residential criteria (HIL-A) for the other targeted contaminants of concern (chromium, copper, nickel, lead and zinc) were recorded. Slight exceedances for the adjusted EIL for zinc was recorded in composite samples however the results for the discrete duplicate samples were below the nominated EIL.

In relation to potential site contamination associated with current and former land use and, based on the information provided within this report, a site inspection carried out on 10 February 2015, and the soil and analysis program, it is concluded that Lots 2-8 DP 28597 Nos. 420-434 Terranora Road, Terranora are considered suitable for the proposed land use.

After consideration of these findings, it is concluded that further sampling and laboratory analysis is not required. A remediation action plan is not required.

## 10 LIMITATIONS

Any conclusions presented in this report are relevant to the site condition at the time of inspection and legislation enacted as at date of this report. Actions or changes to the site after time of inspection or in the future will void this report as will changes in relevant legislation.

The findings of this report are based on the objectives and scope of work outlined in Section 2. HMC Environmental has performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties or guarantees expressed or implied, are given. This report does not comment on any regulatory issues arising from the findings, for which a legal opinion should be sought. This report relates only to the objectives and scope of work stated, and does not relate to any other works undertaken for the client. The report and conclusions are based on the information obtained at the time of the assessment.

The site history and associated uses, areas of use, and potential contaminants were determined based on the activities described in the scope of work. Additional site information held by the client, regulatory authorities or in the public domain, which was not provided to HMC Environmental or was not sourced by HMC Environmental under the scope of work, may identify additional uses, areas of use and/or potential contaminants. The information sources referenced have been used to determine the site history.

Whilst HMC Environmental has used reasonable care to avoid reliance on data and information that is inaccurate and unsuitable, HMC Environmental is not able to verify the accuracy or completeness of all information and data made available. Further chemicals or categories of chemicals may exist at the sites, which were not identified in the site history, and which may not be expected at the site. The absence of any identified hazardous or toxic materials on the subject land should not be interpreted as a warranty or guarantee that such materials do not exist on the site. If additional certainty is required, additional site history or desktop studies, or environmental sampling and analysis should be commissioned.

The results of this assessment are based upon site inspections and fieldwork conducted by HMC Environmental personnel and information provided by the client. All conclusions regarding the property area are the professional opinions of the HMC Environmental personnel involved with the project, subject to the qualifications made above. HMC Environmental assume no responsibility or liability for errors in any data obtained from regulatory agencies, information from sources outside of HMC Environmental, or developments resulting from situations outside the scope of this project.

**SIGNATURE**
This report has been prepared by Helen Tunks of HMC Environmental Consulting Pty Ltd.

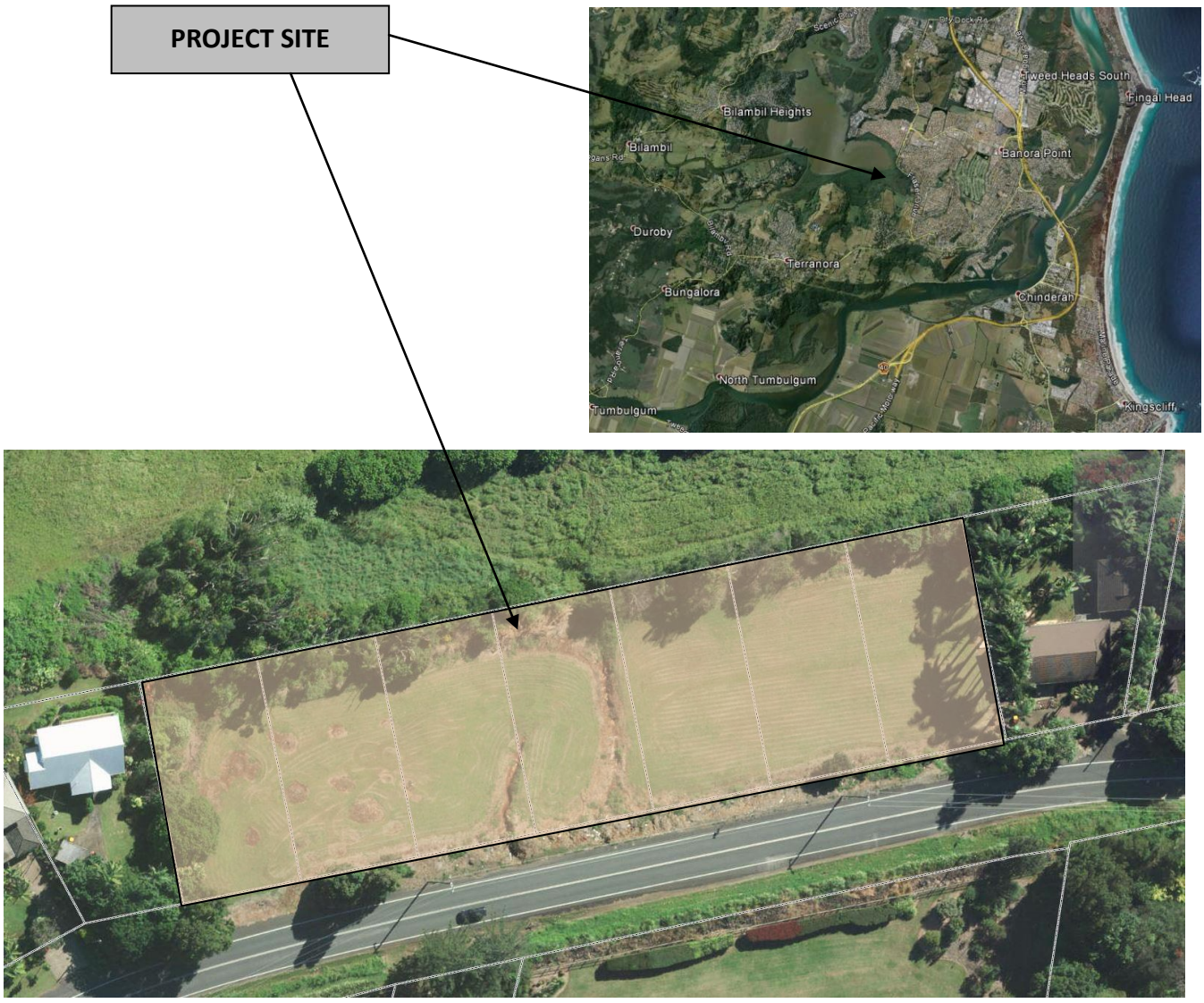
……

25 February 2015
Completion Date

Mark Tunks
Principal

## 11 APPENDICES

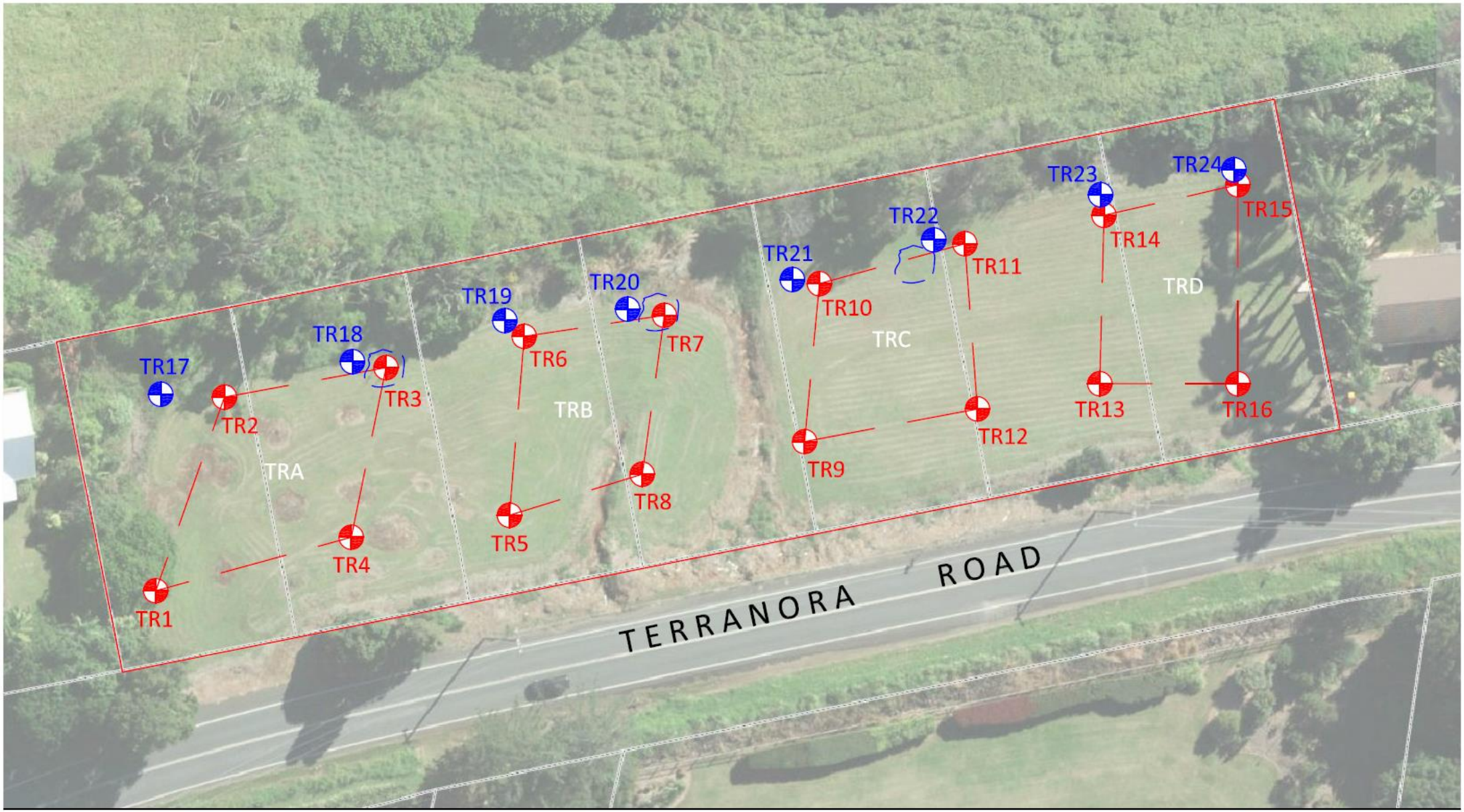
### *Appendix 1 Location Map*



***Appendix 2 Aerial showing site and surrounding area***

***Appendix 3 Site Plan showing Investigation Area and Sampling Locations***

SEE NEXT PAGE




HMC Sampling Locations 20/12/2013
Note:Locations are indicative only

HMC Sampling Locations 9/02/2015
Note:Locations are indicative only

Test Pit

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ABN: 60160808614

DETAILED SITE INVESTIGATION - SAMPLING LOCATIONS

Lots 2 - 8 DP 28597
No's 420-434 Terranora Road Terranora

Base Drawing Source: Land & Property Information 2012 HMC REF: HMCDWG2015.009.1

Job No: 2015.009
Date: February 2015
Revision Date:

## *Appendix 4 Geology and Soil Landscape*

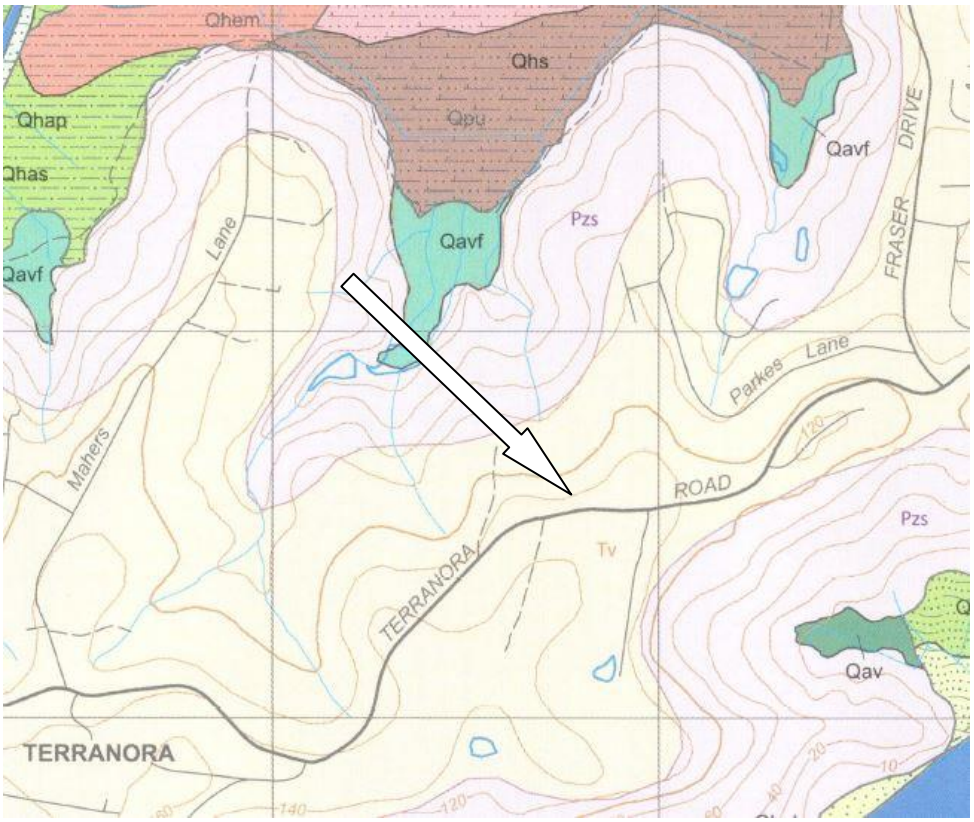


**Figure 1 - Geology Map (Source dipnsw.gov.au)**

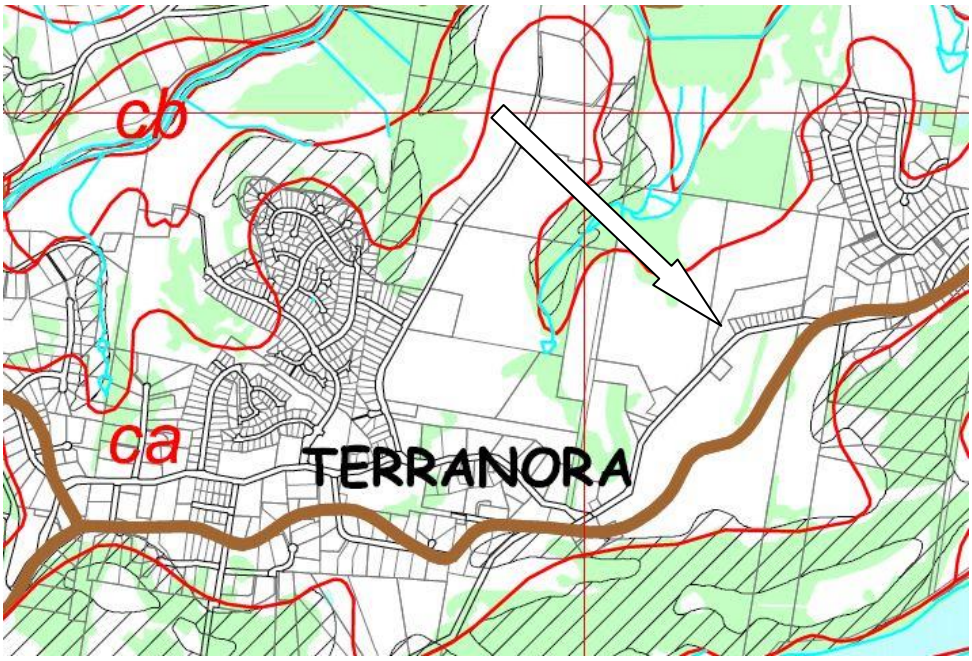


**Figure 2 – Soil Landscape Map (Source: Tweed.nsw.gov.au)**

***Appendix 5 Zone Map***

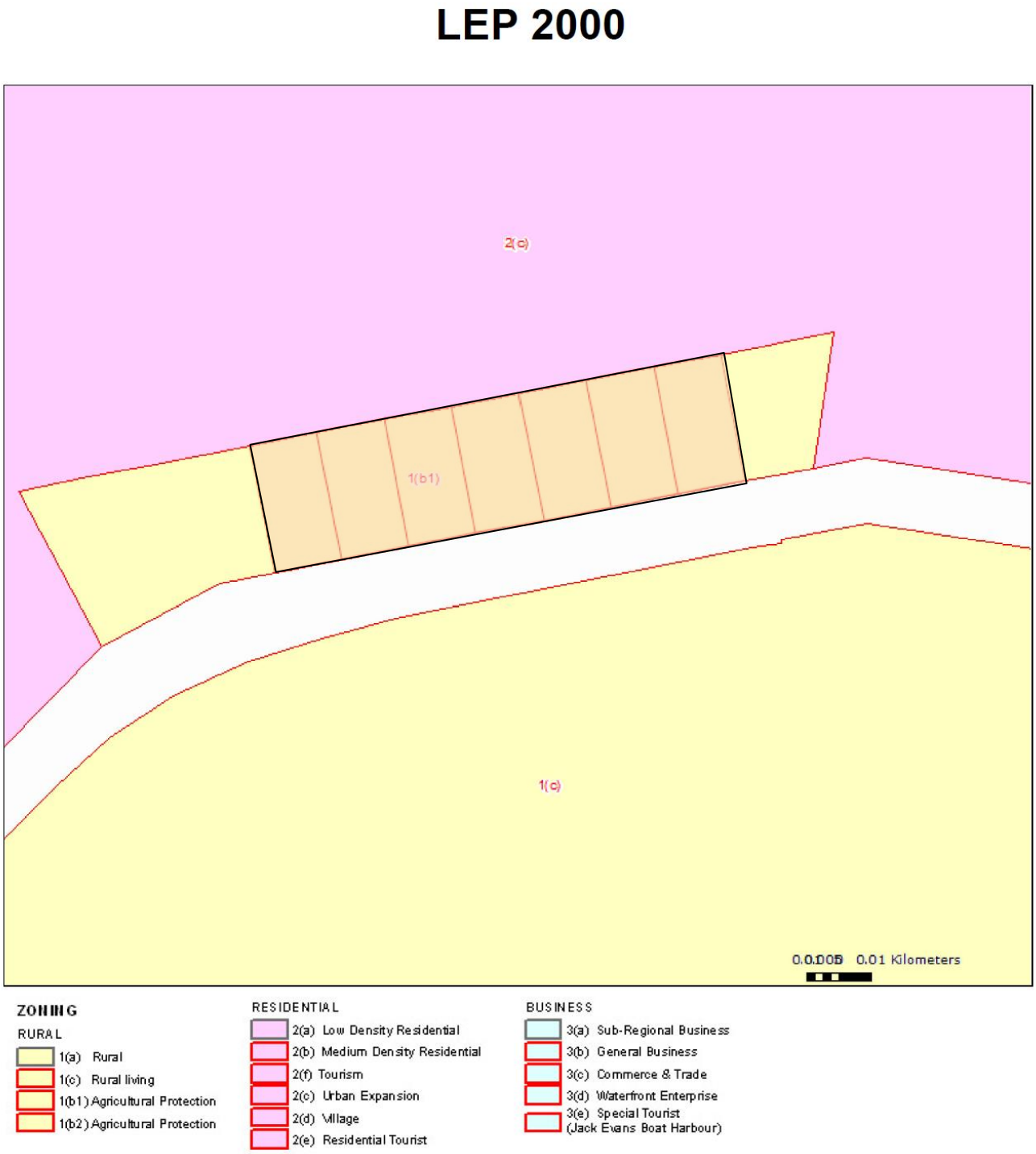


**Figure 3 – Tweed Shire Council Cattle Dip Search (Source: tweed.nsw.gov.au)**

## *Appendix 6 Historic Aerial Photography*

**Figure 4 - 1947 (Geoscience Australia)**

**Figure 5 - 1962 (TSC GIS)**

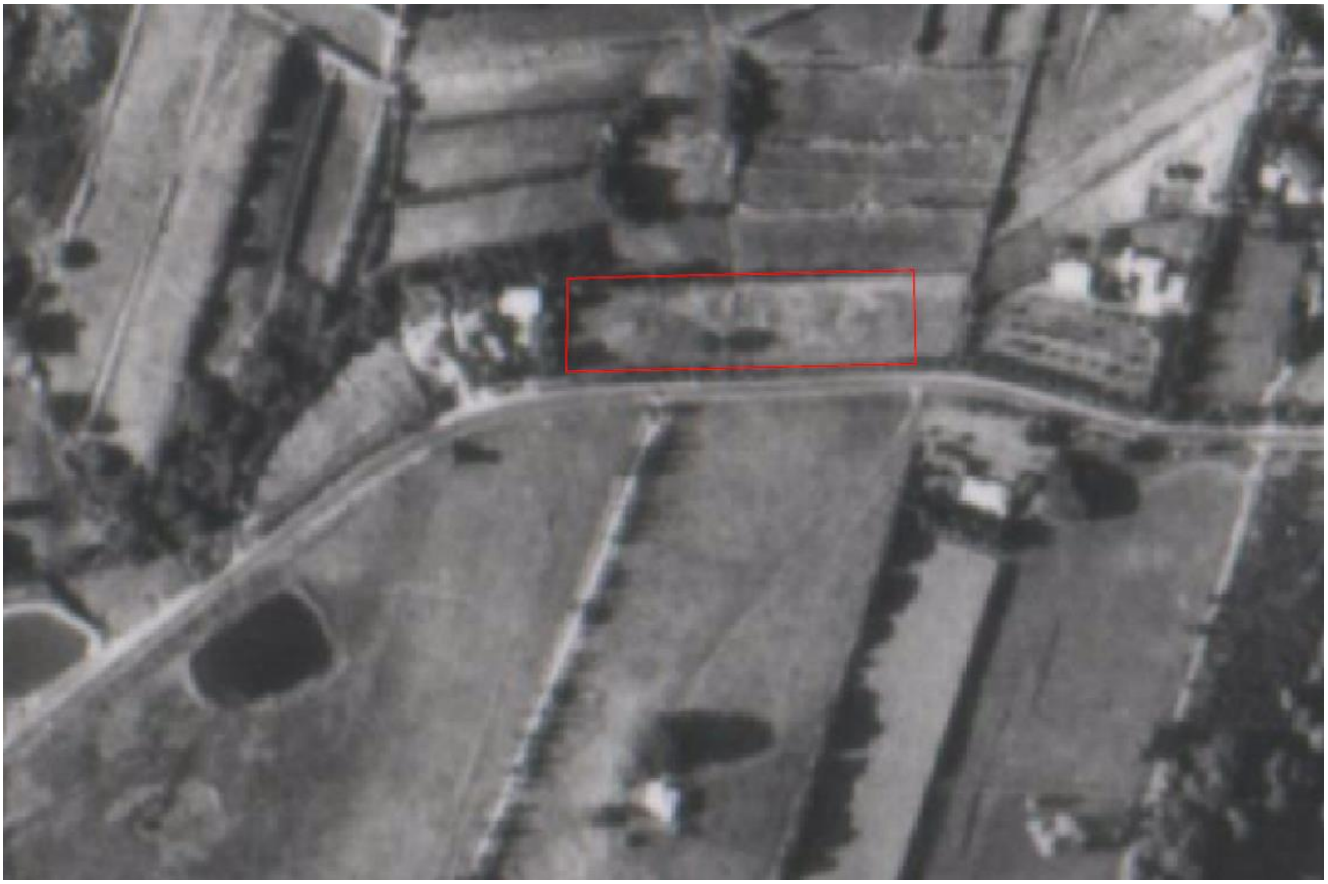

**Figure 6 - 1970 (TSC GIS)**

**Figure 7 - 1976 (TSC GIS)**

## *Appendix 7 Site Photos*

**Photo 1 View NE across site**

**Photo 2 View E across site**

**Photo 3 View NW across site showing Terranora Broadwater**

**Photo 4 View East along transect**

**Photo 5 View West along transect**

## *Appendix 8 Human Health Investigation Levels*

| Chemical | Health-based investigation levels (mg/kg) | | | |
|---|---|---|---|---|
| | Residential[1] A | Residential[1] B | Recreational[1] C | Commercial/ industrial[1] D |
| **Metals and Inorganics** | | | | |
| Arsenic[2] | 100 | 500 | 300 | 3 000 |
| Beryllium | 60 | 90 | 90 | 500 |
| Boron | 4500 | 40 000 | 20 000 | 300 000 |
| Cadmium | 20 | 150 | 90 | 900 |
| Chromium (VI) | 100 | 500 | 300 | 3600 |
| Cobalt | 100 | 600 | 300 | 4000 |
| Copper | 6000 | 30 000 | 17 000 | 240 000 |
| Lead[3] | 300 | 1200 | 600 | 1 500 |
| Manganese | 3800 | 14 000 | 19 000 | 60 000 |
| Mercury (inorganic)[5] | 40 | 120 | 80 | 730 |
| Methyl mercury[4] | 10 | 30 | 13 | 180 |
| Nickel | 400 | 1200 | 1200 | 6 000 |
| Selenium | 200 | 1400 | 700 | 10 000 |
| Zinc | 7400 | 60 000 | 30 000 | 400 000 |
| Cyanide (free) | 250 | 300 | 240 | 1 500 |
| **Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | |
| Carcinogenic PAHs (as BaP TEQ)[6] | 3 | 4 | 3 | 40 |
| Total PAHs[7] | 300 | 400 | 300 | 4000 |
| **Phenols** | | | | |
| Phenol | 3000 | 45 000 | 40 000 | 240 000 |
| Pentachlorophenol | 100 | 130 | 120 | 660 |
| Cresols | 400 | 4 700 | 4 000 | 25 000 |
| **Organochlorine Pesticides** | | | | |
| DDT+DDE+DDD | 240 | 600 | 400 | 3600 |
| Aldrin and dieldrin | 6 | 10 | 10 | 45 |
| Chlordane | 50 | 90 | 70 | 530 |
| Endosulfan | 270 | 400 | 340 | 2000 |
| Endrin | 10 | 20 | 20 | 100 |
| Heptachlor | 6 | 10 | 10 | 50 |
| HCB | 10 | 15 | 10 | 80 |
| Methoxychlor | 300 | 500 | 400 | 2500 |
| Mirex | 10 | 20 | 20 | 100 |
| Toxaphene | 20 | 30 | 30 | 160 |
| **Herbicides** | | | | |
| 2,4,5-T | 600 | 900 | 800 | 5000 |
| 2,4-D | 900 | 1600 | 1300 | 9000 |
| MCPA | 600 | 900 | 800 | 5000 |
| MCPB | 600 | 900 | 800 | 5000 |
| Mecoprop | 600 | 900 | 800 | 5000 |
| Picloram | 4500 | 6600 | 5700 | 35000 |
| **Other Pesticides** | | | | |
| Atrazine | 320 | 470 | 400 | 2500 |
| Chlorpyrifos | 160 | 340 | 250 | 2000 |

| Chemical | Health-based investigation levels (mg/kg) | | | |
|---|---|---|---|---|
| | Residential[1] A | Residential[1] B | Recreational[1] C | Commercial/ industrial[1] D |
| Bifenthrin | 600 | 840 | 730 | 4500 |
| **Other Organics** | | | | |
| PCBs[8] | 1 | 1 | 1 | 7 |
| PBDE Flame Retardants (Br1–Br9) | 1 | 2 | 2 | 10 |

Health Investigation Levels for residential "A" land use (HIL A) as stated in Table 1A (1) of *Schedule B (1) Guideline of Investigation Levels for Soil and Groundwater* within the *National Environment Protection (Assessment of Site Contamination) Measure 1999* as amended and in force from 16 May 2013

**Notes:**

(1) Generic land uses are described in detail in Schedule B7 Section 3

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.

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.

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 where the potential for exposure is lower and where a site-specific assessment may be more appropriate.

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

(2) Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability may be important and should be considered where appropriate (refer Schedule B7).

(3) Lead: HIL is based on blood lead models (IEUBK for HILs A, B and C and adult lead model for HIL D where 50% oral bioavailability has been considered. Site-specific bioavailability may be important and should be considered where appropriate.

(4) Methyl mercury: assessment of methyl mercury should only occur where there is evidence of its potential source. It may be associated with inorganic mercury and anaerobic microorganism activity in aquatic environments. In addition the reliability and quality of sampling/analysis should be considered.

(5) Elemental mercury: HIL does not address elemental mercury. A site-specific assessment should be considered if elemental mercury is present, or suspected to be present,

Carcinogenic PAHs: HIL is based on the 8 carcinogenic PAHs and their TEFs (potency relative to B(a)P) adopted by CCME 2008 (refer Schedule B7). The B(a)P TEQ is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its B(a)P TEF, given below, and summing these products.

## *Appendix 9 Laboratory Results*

### Metals/Metalloids

| Analyte | Sample ID | | | |
|---|---|---|---|---|
| | **TRA Comp** | **TR21A Dup** | **TRB Comp** | **TR20B** |
| Arsenic | <5 | <5 | <5 | <5 |
| Chromium (total) | 96 | 98 | 69 | 82 |
| Copper | 9 | 9 | 10 | 8 |
| Nickel | 39 | 34 | 36 | 37 |
| Zinc | 74 | 72 | 86 | 76 |
| Cadmium | <1 | <1 | <1 | <1 |
| Lead | 4 | 2 | <1 | 4 |
| Mercury (inorganic) | <1 | <1 | <1 | <1 |

### Organochlorine/Organophosphorus

| Analyte | Sample ID | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **TR17A** | **TR18A** | **TR19A** | **TR20A** | **TR21A** | **TR21A dup** | **TR22A** | **TR23A** | **TR24A** | **TR20B** |
| Chlordane | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Dieldrin + Aldrin | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| DDT+DDD+DDE | <1.5 | <1.5 | <1.5 | <1.5 | <1.5 | <1.5 | <1.5 | <1.5 | <1.5 | <1.5 |
| Heptachlor | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |

## Tweed Laboratory Centre

TWEED SHIRE COUNCIL

Tweed Laboratory Centre, 46 Enterprise Avenue, Tweed Heads South NSW 2486 Australia
Phone: 07 5569 3103 Fax: 07 5524 2676 Email: samplereception@tweed.nsw.gov.au ABN: 90 178 732 496
(All correspondence: Tweed Shire Council PO Box 816 Murwillumbah NSW 2484)
www.tweed.nsw.gov.au/tweedlab/

### FINAL CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Client:** | HMC Environmental Consulting Pty Ltd | | Page 1 of 2 |
| **Address:** | PO Box 311<br>TWEED HEADS<br>**NSW 2485** | | |
| | | **Lims1 Report No:** | 15/0389-C |
| **Attention:** | Mark Tunks | **Client Reference:** | 2015.009 |
| **Copy To:** | Fax: 07 5536 7162 | **Date of Report:** | 18/02/2015 |

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| | | | |
|---|---|---|---|
| **Taken By:** | Client | **No of Samples:** | 4 |
| **Date Taken:** | 10/02/2015 | **Date Testing Commenced:** | 11/02/2015 |
| **Date Received:** | 11/02/2015 | **Date Testing Completed:** | 18/02/2015 |

**Sample Description:** Terranora Rd, Terranora Project No. 2015.009

| Sample/Site Identification | Sample/Site Description |
|---|---|
| 1 | TRA Comp |
| 2 | TR21A Dup |
| 3 | TRB Comp |
| 4 | TR20B |

**COMMENTS:**

Results refer to samples as received at the Laboratory.

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025

Accreditation No: 12754 & 13538

Dr Paul J Wright
(Laboratory Coordinator)
paulw@tweed.nsw.gov.au

TWEED SHIRE COUNCIL

## Tweed Laboratory Centre

**Client:** HMC Environmental Consulting Pty Ltd

**Address:** PO Box 311
TWEEDHEADS
NSW 2485

**Attention:** Mark Tunks

**Lims1 Report No:** 15/0389-C
**Date Testing Completed:** 18/02/2015
**Date of Report:** 18/02/2015

**Sample Description:** Terranora Rd, Terranora Project No. 2015.009

| Sample Identification: | | | TRA Comp | TR21A Dup | TRB Comp | TR20B |
|---|---|---|---|---|---|---|
| Date Taken: | | | 10/02/2015 | 10/02/2015 | 10/02/2015 | 10/02/2015 |
| Date Received: | | | 11/02/2015 | 11/02/2015 | 11/02/2015 | 11/02/2015 |
| Date Testing Commenced: | | | 11/02/2015 | 11/02/2015 | 11/02/2015 | 11/02/2015 |
| Test | Method | Units | 15/0389-C-1 | 15/0389-C-2 | 15/0389-C-3 | 15/0389-C-4 |
| Arsenic in Soil | M8 | mg/Kg | <5 | <5 | <5 | <5 |
| Chromium in Soil | M8 | mg/Kg | 96 | 98 | 69 | 82 |
| Copper in Soil | M8 | mg/Kg | 9 | 9 | 10 | 8 |
| Nickel in Soil | M8 | mg/Kg | 39 | 34 | 36 | 37 |
| Zinc in Soil | M8 | mg/Kg | 74 | 72 | 86 | 76 |
| Cadmium in Soil | M8 | mg/Kg | <1 | <1 | <1 | <1 |
| Lead in Soil | M8 | mg/Kg | 4 | 2 | <1 | 4 |
| Mercury in Soil | M5 | mg/Kg | <1 | <1 | <1 | <1 |

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www.tweed.nsw.gov.au/tweedlab/

## FINAL CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Client:** | HMC Environmental Consulting Pty Ltd | | Page 1 of 6 |
| **Address:** | PO Box 311<br>TWEED HEADS<br>**NSW 2485** | | |
| **Attention:** | Mark Tunks | **Lims1 Report No:** | 15/0389-O |
| **Copy To:** | Fax: 07 5536 7162 | **Client Reference:** | 2015.009 |
| **Job Description:** | Terranora Rd, Terranora Project No. 2015.009 | | |
| | | **Sample Matrix:** | Soil |
| **Taken By:** | Client | **No of Samples:** | 10 |
| **Date Taken:** | 10/02/2015 | **Date Testing Completed:** | 20/02/2015 |
| **Date Received:** | 11/02/2015 | **Date Reported:** | 24/02/2015 |

This Final Certificate of Analysis consists of sample results, QA/QC, method descriptions, laboratory definitions and internationally recognised NATA accreditation and endorsement. All samples were analysed as received. This report relates specifically to the samples as received. Results relate to the source material only to the extent that the samples as supplied are truly representative of the sample source. This document may not be reproduced except in full.

**QUALITY ASSURANCE CRITERIA:**

| | | |
|---|---|---|
| **Accuracy:** | matrix spike: | 1 in first >=20, then 1 every 20 samples |
| | lcs, crm method: | 1 per analytical batch |
| | surrogate spike: | addition per target organic method |
| **Precision:** | laboratory duplicate: | 1 in first >=10, then 1 every 10 samples |
| **Holding Times:** | soils, waters: | VOC's 14 days water / soil |
| | | SVOC's 7 days water, 14 days soil |
| **Confirmation:** | target organic analysis: | GC/MS, or confirmatory column |
| **Sensitivity:** | PQL: | Typically 2-5 x Method Detection Limit (MDL) |

**QUALITY CONTROL - GLOBAL ACCEPTANCE CRITERIA:**

| | | |
|---|---|---|
| **Accuracy:** | spike, LCS, CRM, surrogate | general analytes 70% - 130% recovery |
| | | phenol analytes 50% - 130% recvoery |
| | | organophosphorous pesticide analytes 60% - 130% |
| **Precision:** | method blank: | not detected >95% of the reported PQL |
| | duplicate lab RPD: | 0 - 50% (>10xPQL), 0 - 75% (4-10xPQL) |
| | | +/- 2xPQL (<4xPQL) |

**RESULT ANNOTATION:**

PQL: Practical Quantitation Limit SS: System Surrogate

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025

**Accreditation No: 12754 & 13538**

Darryl Capner
(Senior Technical Officer – Chemistry)
dcapner@tweed.nsw.gov.au

TWEED SHIRE COUNCIL

## Tweed Laboratory Centre



**Client:** HMC Environmental Consulting Pty Ltd
**Address:** PO Box 311

TWEEDHEADS
NSW 2485

**Attention:** Mark Tunks

**Job Description:** Terranora Rd, Terranora Project No. 2015.009

**Lims1 Report No:** 15/0389-O
**Date Testing Completed:** 20/02/2015
**Date of Report:** 24/02/2015

| Sample Identification<br>Sampling Date on COC<br>Laboratory Extraction Date<br>Laboratory Analysis Date<br>Test | Method | Units | PQL | TR17A<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/1 | TR18A<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/2 | TR19A<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/3 | TR20A<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/4 | TR21A Dup<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/5 | TR21A<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/6 | TR22A<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/7 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Moisture in Soil - Organics** | | | | | | | | | | |
| Moisture Content | ORG03 | % | | 26.3 | 27.0 | 24.7 | 24.7 | 25.4 | 24.7 | 27.0 |
| **Organochlorine Pesticides** | | | | | | | | | | |
| alpha-BHC | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Hexachlorobenzene | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| beta-BHC | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| gamma-BHC(Lindane) | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| delta-BHC | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Heptachlor | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Aldrin | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Heptachlor Epoxide | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Trans Chlordane | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Cis Chlordane | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Endosulfan 1 | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| DDE | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Dieldrin | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Endrin | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Endosulfan 11 | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| DDD | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Endrin Aldehyde | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Endosulfan Sulphate | ORG01 | mg/Kg | 0.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 |
| DDT | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |

-

TWEED SHIRE COUNCIL

## Tweed Laboratory Centre



**Client:** HMC Environmental Consulting Pty Ltd
**Address:** PO Box 311

TWEEDHEADS
NSW 2485

**Attention:** Mark Tunks

**Job Description:** Terranora Rd, Terranora Project No. 2015.009

**Lims1 Report No:** 15/0389-O
**Date Testing Completed:** 20/02/2015
**Date of Report:** 24/02/2015

| Sample Identification | | | | TR17A | TR18A | TR19A | TR20A | TR21A Dup | TR21A | TR22A |
|---|---|---|---|---|---|---|---|---|---|---|
| Sampling Date on COC | | | | 10/02/2015 | 10/02/2015 | 10/02/2015 | 10/02/2015 | 10/02/2015 | 10/02/2015 | 10/02/2015 |
| Laboratory Extraction Date | | | | 12/02/2015 | 12/02/2015 | 12/02/2015 | 12/02/2015 | 12/02/2015 | 12/02/2015 | 12/02/2015 |
| Laboratory Analysis Date | | | | 17/02/2015 | 17/02/2015 | 17/02/2015 | 17/02/2015 | 17/02/2015 | 17/02/2015 | 17/02/2015 |
| Test | Method | Units | PQL | 15/0389-O/1 | 15/0389-O/2 | 15/0389-O/3 | 15/0389-O/4 | 15/0389-O/5 | 15/0389-O/6 | 15/0389-O/7 |
| Endrin Ketone | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Methoxychlor | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 2,4,5,6 Tetrachloro-Xylene(SS) | ORG01 | % | | 99 | 92 | 102 | 97 | 104 | 108 | 104 |
| **Organophosphorus Pesticides** | | | | | | | | | | |
| Dichlorvos | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Mevinphos | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Diazinon | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Chlorpyrifos Methyl | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Parathion Methyl | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ronnel | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Fenitrothion | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Malathion | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Chlorpyrifos (Dursban) | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Fenthion | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Parathion | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethion | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Triphenyl Phosphate (SS) | | % | | 97 | 104 | 105 | 103 | 110 | 122 | 103 |

TWEED SHIRE COUNCIL

## Tweed Laboratory Centre



**Client:** HMC Environmental Consulting Pty Ltd
**Address:** PO Box 311

TWEED HEADS
NSW 2485

**Attention:** Mark Tunks

**Job Description:** Terranora Rd, Terranora Project No. 2015.009

**Lims1 Report No:** 15/0389-O
**Date Testing Completed:** 20/02/2015
**Date of Report:** 24/02/2015

| Sample Identification<br>Sampling Date on COC<br>Laboratory Extraction Date<br>Laboratory Analysis Date<br>Test | Method | Units | PQL | TR23A<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/8 | TR24A<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/9 | TR20B<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/10 |
|---|---|---|---|---|---|---|
| **Moisture in Soil - Organics** | | | | | | |
| Moisture Content | ORG03 | % | | 31.6 | 28.0 | 25.0 |
| **Organochlorine Pesticides** | | | | | | |
| alpha-BHC | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Hexachlorobenzene | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| beta-BHC | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| gamma-BHC(Lindane) | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| delta-BHC | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Heptachlor | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Aldrin | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Heptachlor Epoxide | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Trans Chlordane | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Cis Chlordane | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Endosulfan 1 | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| DDE | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Dieldrin | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Endrin | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Endosulfan 11 | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| DDD | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Endrin Aldehyde | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Endosulfan Sulphate | ORG01 | mg/Kg | 0.5 | <2.5 | <2.5 | <2.5 |
| DDT | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |

TWEED SHIRE COUNCIL

## Tweed Laboratory Centre



**Client:** HMC Environmental Consulting Pty Ltd
**Address:** PO Box 311

TWEED HEADS
NSW 2485

**Attention:** Mark Tunks

**Lims1 Report No:** 15/0389-O
**Date Testing Completed:** 20/02/2015
**Date of Report:** 24/02/2015

**Job Description:** Terranora Rd, Terranora Project No. 2015.009

| Sample Identification<br>Sampling Date on COC<br>Laboratory Extraction Date<br>Laboratory Analysis Date<br>Test | Method | Units | PQL | TR23A<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/8 | TR24A<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/9 | TR20B<br>10/02/2015<br>12/02/2015<br>17/02/2015<br>15/0389-O/10 |
|---|---|---|---|---|---|---|
| Endrin Ketone | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Methoxychlor | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| 2,4,5,6 Tetrachloro-Xylene(SS) | ORG01 | % | | 101 | 101 | 99 |
| **Organophosphorus Pesticides** | | | | | | |
| Dichlorvos | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Mevinphos | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Diazinon | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Chlorpyrifos Methyl | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Parathion Methyl | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Ronnel | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Fenitrothion | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Malathion | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Chlorpyrifos (Dursban) | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Fenthion | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Parathion | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Ethion | ORG01 | mg/Kg | 0.5 | <0.5 | <0.5 | <0.5 |
| Triphenyl Phosphate (SS) | | % | | 108 | 99 | 104 |

TWEED SHIRE COUNCIL

## Tweed Laboratory Centre



**Client:** HMC Environmental Consulting Pty Ltd
**Address:** PO Box 311

TWEEDHEADS
NSW 2485

**Attention:** Mark Tunks

**Lims1 Report No:** 15/0389-O
**Date Testing Completed:** 20/02/2015
**Date of Report:** 24/02/2015

**Job Description:** Terranora Rd, Terranora Project No. 2015.009

| | Description |
|---|---|
| ORG03 | Dried at 105°C |
| ORG01 | Extraction DCM (water matrix) or DCM/Acetone (soil matrix). Analysis by GC/MS. |

**COMMENTS:**
Any results relating to soil samples are reported on a 'dried basis' using the calculated moisture content.

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1512817** | Page | : 1 of 4 |
| Client | : **TWEED SHIRE COUNCIL** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR PAUL WRIGHT | Contact | : Customer Services EB |
| Address | : P O BOX 816<br>MURWILLUMBAH NSW, AUSTRALIA 2484 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| E-mail | : paulw@tweed.nsw.gov.au | E-mail | : ALSEnviro.Brisbane@alsglobal.com |
| Telephone | : +61 07 55693101 | Telephone | : +61-7-3243 7222 |
| Facsimile | : +61 07 55242676 | Facsimile | : +61-7-3243 7218 |
| Project | : | QC Level | : NEPM 2013 Schedule B(3) and ALS QCS3 requirement |
| Order number | : ---- | Date Samples Received | : 13-Feb-2015 13:30 |
| C-O-C number | : ---- | Date Analysis Commenced | : 17-Feb-2015 |
| Sampler | : ---- | Issue Date | : 19-Feb-2015 13:47 |
| Site | : ---- | | |
| | | No. of samples received | : 1 |
| Quote number | : ---- | No. of samples analysed | : 1 |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics |
| Matt Frost | Senior Organic Chemist | Brisbane Inorganics |
| Matt Frost | Senior Organic Chemist | Brisbane Organics |

| | |
|---|---|
| Page | : 2 of 4 |
| Work Order | : EB1512817 |
| Client | : TWEED SHIRE COUNCIL |
| Project | : |

## General Comments

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

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

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

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

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

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

Page : 3 of 4
Work Order : EB1512817
Client : TWEED SHIRE COUNCIL
Project :

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Client sample ID | 15/0389-D/1 | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | [10-Feb-2015] | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1512817-001 | -------- | -------- | -------- | -------- |
| | | | | Result | Result | Result | Result | Result |
| **EA055: Moisture Content** | | | | | | | | |
| ^ Moisture Content (dried @ 103°C) | ---- | 1 | % | 25.8 | ---- | ---- | ---- | ---- |
| **EG005T: Total Metals by ICP-AES** | | | | | | | | |
| Arsenic | 7440-38-2 | 5 | mg/kg | 9 | ---- | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 1 | mg/kg | <1 | ---- | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 2 | mg/kg | 98 | ---- | ---- | ---- | ---- |
| Copper | 7440-50-8 | 5 | mg/kg | 19 | ---- | ---- | ---- | ---- |
| Lead | 7439-92-1 | 5 | mg/kg | 10 | ---- | ---- | ---- | ---- |
| Nickel | 7440-02-0 | 2 | mg/kg | 30 | ---- | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 5 | mg/kg | 74 | ---- | ---- | ---- | ---- |
| **EG035T: Total Recoverable Mercury by FIMS** | | | | | | | | |
| Mercury | 7439-97-6 | 0.1 | mg/kg | 0.2 | ---- | ---- | ---- | ---- |
| **EP068A: Organochlorine Pesticides (OC)** | | | | | | | | |
| alpha-BHC | 319-84-6 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| Hexachlorobenzene (HCB) | 118-74-1 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| beta-BHC | 319-85-7 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| gamma-BHC | 58-89-9 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| delta-BHC | 319-86-8 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| Heptachlor | 76-44-8 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| Aldrin | 309-00-2 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| Heptachlor epoxide | 1024-57-3 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| ^ Total Chlordane (sum) | ---- | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| trans-Chlordane | 5103-74-2 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| alpha-Endosulfan | 959-98-8 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| cis-Chlordane | 5103-71-9 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| Dieldrin | 60-57-1 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| 4.4`-DDE | 72-55-9 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| Endrin | 72-20-8 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| beta-Endosulfan | 33213-65-9 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| ^ Endosulfan (sum) | 115-29-7 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| 4.4`-DDD | 72-54-8 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| Endrin aldehyde | 7421-93-4 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| Endosulfan sulfate | 1031-07-8 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| 4.4`-DDT | 50-29-3 | 0.2 | mg/kg | <0.2 | ---- | ---- | ---- | ---- |
| Endrin ketone | 53494-70-5 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- |
| Methoxychlor | 72-43-5 | 0.2 | mg/kg | <0.2 | ---- | ---- | ---- | ---- |

Page : 4 of 4
Work Order : EB1512817
Client : TWEED SHIRE COUNCIL
Project :

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | | Client sample ID | 15/0389-D/1 | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | [10-Feb-2015] | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1512817-001 | ------- | ------- | ------- | ------- | |
| | | | | Result | Result | Result | Result | Result | |
| **EP068A: Organochlorine Pesticides (OC) - Continued** | | | | | | | | | |
| ^ Sum of Aldrin + Dieldrin | 309-00-2/60-57-1 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| ^ Sum of DDD + DDE + DDT | ---- | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| **EP068B: Organophosphorus Pesticides (OP)** | | | | | | | | | |
| Dichlorvos | 62-73-7 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Demeton-S-methyl | 919-86-8 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Monocrotophos | 6923-22-4 | 0.2 | mg/kg | <0.2 | ---- | ---- | ---- | ---- | |
| Dimethoate | 60-51-5 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Diazinon | 333-41-5 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Chlorpyrifos-methyl | 5598-13-0 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Parathion-methyl | 298-00-0 | 0.2 | mg/kg | <0.2 | ---- | ---- | ---- | ---- | |
| Malathion | 121-75-5 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Fenthion | 55-38-9 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Chlorpyrifos | 2921-88-2 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Parathion | 56-38-2 | 0.2 | mg/kg | <0.2 | ---- | ---- | ---- | ---- | |
| Pirimphos-ethyl | 23505-41-1 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Chlorfenvinphos | 470-90-6 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Bromophos-ethyl | 4824-78-6 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Fenamiphos | 22224-92-6 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Prothiofos | 34643-46-4 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Ethion | 563-12-2 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Carbophenothion | 786-19-6 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| Azinphos Methyl | 86-50-0 | 0.05 | mg/kg | <0.05 | ---- | ---- | ---- | ---- | |
| **EP068S: Organochlorine Pesticide Surrogate** | | | | | | | | | |
| Dibromo-DDE | 21655-73-2 | 0.05 | % | 98.5 | ---- | ---- | ---- | ---- | |
| **EP068T: Organophosphorus Pesticide Surrogate** | | | | | | | | | |
| DEF | 78-48-8 | 0.05 | % | 110 | ---- | ---- | ---- | ---- | |

ALS Environmental

# QUALITY CONTROL REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1512817** | Page | : 1 of 6 |
| Client | : **TWEED SHIRE COUNCIL** | Laboratory | : Environmental Division Brisbane |
| Contact | : MR PAUL WRIGHT | Contact | : Customer Services EB |
| Address | : P O BOX 816<br>MURWILLUMBAH NSW, AUSTRALIA 2484 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| E-mail | : paulw@tweed.nsw.gov.au | E-mail | : ALSEnviro.Brisbane@alsglobal.com |
| Telephone | : +61 07 55693101 | Telephone | : +61-7-3243 7222 |
| Facsimile | : +61 07 55242676 | Facsimile | : +61-7-3243 7218 |
| Project | : | QC Level | : NEPM 2013 Schedule B(3) and ALS QCS3 requirement |
| Order number | : ---- | Date Samples Received | : 13-Feb-2015 |
| C-O-C number | : ---- | Date Analysis Commenced | : 17-Feb-2015 |
| Sampler | : ---- | Issue Date | : 19-Feb-2015 |
| Site | : ---- | No. of samples received | : 1 |
| Quote number | : ---- | No. of samples analysed | : 1 |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.
This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics |
| Matt Frost | Senior Organic Chemist | Brisbane Inorganics |
| Matt Frost | Senior Organic Chemist | Brisbane Organics |

| | |
|---|---|
| Page | : 2 of 6 |
| Work Order | : EB1512817 |
| Client | : TWEED SHIRE COUNCIL |
| Project | : |

## General Comments

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

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

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

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

| | |
|---|---|
| Page | : 3 of 6 |
| Work Order | : EB1512817 |
| Client | : TWEED SHIRE COUNCIL |
| Project | : |

## *Laboratory Duplicate (DUP) Report*

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

Sub-Matrix: **SOIL**

| | | | | *Laboratory Duplicate (DUP) Report* | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Client sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Recovery Limits (%)* |
| **EA055: Moisture Content (QC Lot: 64843)** | | | | | | | | | |
| EB1512676-004 | Anonymous | EA055-103: Moisture Content (dried @ 103°C) | ---- | 1 | % | 7.9 | 7.9 | 0.00 | No Limit |
| EB1512834-084 | Anonymous | EA055-103: Moisture Content (dried @ 103°C) | ---- | 1 | % | 2.5 | 2.5 | 0.00 | No Limit |
| **EG005T: Total Metals by ICP-AES (QC Lot: 64806)** | | | | | | | | | |
| EB1512834-083 | Anonymous | EG005T: Cadmium | 7440-43-9 | 1 | mg/kg | <1 | <1 | 0.00 | No Limit |
| | | EG005T: Chromium | 7440-47-3 | 2 | mg/kg | 46 | 46 | 0.00 | 0% - 20% |
| | | EG005T: Nickel | 7440-02-0 | 2 | mg/kg | 32 | 31 | 0.00 | 0% - 50% |
| | | EG005T: Arsenic | 7440-38-2 | 5 | mg/kg | 30 | 29 | 5.06 | No Limit |
| | | EG005T: Copper | 7440-50-8 | 5 | mg/kg | 60 | 59 | 0.00 | 0% - 50% |
| | | EG005T: Lead | 7439-92-1 | 5 | mg/kg | <5 | <5 | 0.00 | No Limit |
| | | EG005T: Zinc | 7440-66-6 | 5 | mg/kg | 50 | 49 | 2.36 | 0% - 50% |
| EB1512734-001 | Anonymous | EG005T: Cadmium | 7440-43-9 | 1 | mg/kg | <1 | <1 | 0.00 | No Limit |
| | | EG005T: Chromium | 7440-47-3 | 2 | mg/kg | 4 | 4 | 0.00 | No Limit |
| | | EG005T: Nickel | 7440-02-0 | 2 | mg/kg | 4 | 4 | 0.00 | No Limit |
| | | EG005T: Arsenic | 7440-38-2 | 5 | mg/kg | <5 | <5 | 0.00 | No Limit |
| | | EG005T: Copper | 7440-50-8 | 5 | mg/kg | 38 | 39 | 0.00 | No Limit |
| | | EG005T: Lead | 7439-92-1 | 5 | mg/kg | 89 | 88 | 1.40 | 0% - 50% |
| | | EG005T: Zinc | 7440-66-6 | 5 | mg/kg | 89 | 88 | 0.00 | 0% - 50% |
| **EG035T: Total Recoverable Mercury by FIMS (QC Lot: 64807)** | | | | | | | | | |
| EB1512734-001 | Anonymous | EG035T: Mercury | 7439-97-6 | 0.1 | mg/kg | 0.3 | 0.3 | 0.00 | No Limit |
| **EP068A: Organochlorine Pesticides (OC) (QC Lot: 64814)** | | | | | | | | | |
| EB1512817-001 | 15/0389-D/1 | EP068: 4.4'-DDD | 72-54-8 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: 4.4'-DDE | 72-55-9 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Aldrin | 309-00-2 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: alpha-BHC | 319-84-6 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: alpha-Endosulfan | 959-98-8 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: beta-BHC | 319-85-7 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: beta-Endosulfan | 33213-65-9 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: cis-Chlordane | 5103-71-9 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: delta-BHC | 319-86-8 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Dieldrin | 60-57-1 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Endosulfan sulfate | 1031-07-8 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Endrin | 72-20-8 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Endrin aldehyde | 7421-93-4 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Endrin ketone | 53494-70-5 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: gamma-BHC | 58-89-9 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Heptachlor | 76-44-8 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |

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Work Order : EB1512817
Client : TWEED SHIRE COUNCIL
Project :

Sub-Matrix: **SOIL**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Client sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Recovery Limits (%)* |
| **EP068A: Organochlorine Pesticides (OC) (QC Lot: 64814) - continued** | | | | | | | | | |
| EB1512817-001 | 15/0389-D/1 | EP068: Heptachlor epoxide | 1024-57-3 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Hexachlorobenzene (HCB) | 118-74-1 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: trans-Chlordane | 5103-74-2 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: 4.4'-DDT | 50-29-3 | 0.2 | mg/kg | <0.2 | <0.2 | 0.00 | No Limit |
| | | EP068: Methoxychlor | 72-43-5 | 0.2 | mg/kg | <0.2 | <0.2 | 0.00 | No Limit |
| **EP068B: Organophosphorus Pesticides (OP) (QC Lot: 64814)** | | | | | | | | | |
| EB1512817-001 | 15/0389-D/1 | EP068: Azinphos Methyl | 86-50-0 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Bromophos-ethyl | 4824-78-6 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Carbophenothion | 786-19-6 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Chlorfenvinphos | 470-90-6 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Chlorpyrifos | 2921-88-2 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Chlorpyrifos-methyl | 5598-13-0 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Demeton-S-methyl | 919-86-8 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Diazinon | 333-41-5 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Dichlorvos | 62-73-7 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Dimethoate | 60-51-5 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Ethion | 563-12-2 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Fenamiphos | 22224-92-6 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Fenthion | 55-38-9 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Malathion | 121-75-5 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Pirimphos-ethyl | 23505-41-1 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Prothiofos | 34643-46-4 | 0.05 | mg/kg | <0.05 | <0.05 | 0.00 | No Limit |
| | | EP068: Monocrotophos | 6923-22-4 | 0.2 | mg/kg | <0.2 | <0.2 | 0.00 | No Limit |
| | | EP068: Parathion | 56-38-2 | 0.2 | mg/kg | <0.2 | <0.2 | 0.00 | No Limit |

Page : 5 of 6
Work Order : EB1512817
Client : TWEED SHIRE COUNCIL
Project :

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

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

Sub-Matrix: **SOIL**

| | | | | Method Blank (MB) Report | Laboratory Control Spike (LCS) Report | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Spike | Spike Recovery (%) | Recovery Limits (%) | |
| Method: Compound | CAS Number | LOR | Unit | Result | Concentration | LCS | Low | High |
| **EG005T: Total Metals by ICP-AES (QCLot: 64806)** | | | | | | | | |
| EG005T: Arsenic | 7440-38-2 | 5 | mg/kg | <5 | 21.7 mg/kg | 106 | 84 | 123 |
| EG005T: Cadmium | 7440-43-9 | 1 | mg/kg | <1 | 4.64 mg/kg | 102 | 88 | 117 |
| EG005T: Chromium | 7440-47-3 | 2 | mg/kg | <2 | 43.9 mg/kg | 110 | 83 | 125 |
| EG005T: Copper | 7440-50-8 | 5 | mg/kg | <5 | 32 mg/kg | 106 | 86 | 122 |
| EG005T: Lead | 7439-92-1 | 5 | mg/kg | <5 | 40 mg/kg | 106 | 84 | 119 |
| EG005T: Nickel | 7440-02-0 | 2 | mg/kg | <2 | 55 mg/kg | 110 | 89 | 126 |
| EG005T: Zinc | 7440-66-6 | 5 | mg/kg | <5 | 60.8 mg/kg | 110 | 87 | 127 |
| **EG035T: Total Recoverable Mercury by FIMS (QCLot: 64807)** | | | | | | | | |
| EG035T: Mercury | 7439-97-6 | 0.1 | mg/kg | <0.1 | 2.57 mg/kg | 100 | 78 | 122 |
| **EP068A: Organochlorine Pesticides (OC) (QCLot: 64814)** | | | | | | | | |
| EP068: 4.4`-DDD | 72-54-8 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 116 | 60 | 123 |
| EP068: 4.4`-DDE | 72-55-9 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 97.3 | 62 | 121 |
| EP068: 4.4`-DDT | 50-29-3 | 0.2 | mg/kg | <0.2 | 0.5 mg/kg | 94.5 | 80 | 142 |
| EP068: Aldrin | 309-00-2 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 97.9 | 70 | 130 |
| EP068: alpha-BHC | 319-84-6 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 100.0 | 54 | 121 |
| EP068: alpha-Endosulfan | 959-98-8 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 95.1 | 51 | 125 |
| EP068: beta-BHC | 319-85-7 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 93.6 | 49 | 121 |
| EP068: beta-Endosulfan | 33213-65-9 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 90.2 | 61 | 122 |
| EP068: cis-Chlordane | 5103-71-9 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 110 | 57 | 118 |
| EP068: delta-BHC | 319-86-8 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 92.1 | 61 | 122 |
| EP068: Dieldrin | 60-57-1 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 93.4 | 67 | 129 |
| EP068: Endosulfan sulfate | 1031-07-8 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 68.7 | 55 | 125 |
| EP068: Endrin | 72-20-8 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 101 | 60 | 137 |
| EP068: Endrin aldehyde | 7421-93-4 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 95.0 | 52 | 125 |
| EP068: Endrin ketone | 53494-70-5 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 83.5 | 55 | 129 |
| EP068: gamma-BHC | 58-89-9 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 97.6 | 55 | 129 |
| EP068: Heptachlor | 76-44-8 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 109 | 65 | 130 |
| EP068: Heptachlor epoxide | 1024-57-3 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 100.0 | 58 | 118 |
| EP068: Hexachlorobenzene (HCB) | 118-74-1 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 88.0 | 54 | 112 |
| EP068: Methoxychlor | 72-43-5 | 0.2 | mg/kg | <0.2 | 0.5 mg/kg | 110 | 53 | 136 |
| EP068: trans-Chlordane | 5103-74-2 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 112 | 56 | 119 |
| **EP068B: Organophosphorus Pesticides (OP) (QCLot: 64814)** | | | | | | | | |
| EP068: Azinphos Methyl | 86-50-0 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 49.2 | 35 | 127 |
| EP068: Bromophos-ethyl | 4824-78-6 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 102 | 80 | 130 |

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Work Order : EB1512817
Client : TWEED SHIRE COUNCIL
Project :

Sub-Matrix: **SOIL**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report: Result | Laboratory Control Spike (LCS) Report: Spike Concentration | Spike Recovery (%): LCS | Recovery Limits (%): Low | Recovery Limits (%): High |
|---|---|---|---|---|---|---|---|---|
| **EP068B: Organophosphorus Pesticides (OP) (QCLot: 64814) - continued** | | | | | | | | |
| EP068: Carbophenothion | 786-19-6 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 104 | 57 | 124 |
| EP068: Chlorfenvinphos | 470-90-6 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 104 | 62 | 127 |
| EP068: Chlorpyrifos | 2921-88-2 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 101 | 66 | 120 |
| EP068: Chlorpyrifos-methyl | 5598-13-0 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 109 | 70 | 130 |
| EP068: Demeton-S-methyl | 919-86-8 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 115 | 25 | 120 |
| EP068: Diazinon | 333-41-5 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 89.6 | 70 | 131 |
| EP068: Dichlorvos | 62-73-7 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 102 | 41 | 114 |
| EP068: Dimethoate | 60-51-5 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 103 | 44 | 131 |
| EP068: Ethion | 563-12-2 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 103 | 61 | 123 |
| EP068: Fenamiphos | 22224-92-6 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 99.9 | 55 | 106 |
| EP068: Fenthion | 55-38-9 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 106 | 69 | 115 |
| EP068: Malathion | 121-75-5 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 103 | 64 | 125 |
| EP068: Monocrotophos | 6923-22-4 | 0.2 | mg/kg | <0.2 | 0.5 mg/kg | 97.9 | 35 | 135 |
| EP068: Parathion | 56-38-2 | 0.2 | mg/kg | <0.2 | 0.5 mg/kg | 99.8 | 57 | 118 |
| EP068: Pirimphos-ethyl | 23505-41-1 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 111 | 70 | 130 |
| EP068: Prothiofos | 34643-46-4 | 0.05 | mg/kg | <0.05 | 0.5 mg/kg | 98.5 | 80 | 134 |

## *Matrix Spike (MS) Report*

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

Sub-Matrix: **SOIL**

| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | Matrix Spike (MS) Report: Spike Concentration | SpikeRecovery(%): MS | Recovery Limits (%): Low | Recovery Limits (%): High |
|---|---|---|---|---|---|---|---|
| **EG005T: Total Metals by ICP-AES (QCLot: 64806)** | | | | | | | |
| EB1512734-002 | Anonymous | EG005T: Arsenic | 7440-38-2 | 50 mg/kg | 118 | 70 | 130 |
| | | EG005T: Cadmium | 7440-43-9 | 25 mg/kg | 104 | 70 | 130 |
| | | EG005T: Chromium | 7440-47-3 | 50 mg/kg | 110 | 70 | 130 |
| | | EG005T: Copper | 7440-50-8 | 50 mg/kg | # Not Determined | 70 | 130 |
| | | EG005T: Lead | 7439-92-1 | 50 mg/kg | # Not Determined | 70 | 130 |
| | | EG005T: Nickel | 7440-02-0 | 50 mg/kg | 114 | 70 | 130 |
| | | EG005T: Zinc | 7440-66-6 | 50 mg/kg | # Not Determined | 70 | 130 |
| **EG035T: Total Recoverable Mercury by FIMS (QCLot: 64807)** | | | | | | | |
| EB1512734-002 | Anonymous | EG035T: Mercury | 7439-97-6 | 5 mg/kg | 101 | 70 | 130 |

***Appendix 10 Chain of Custody***

## HMC Environmental Consulting

Unit 29, Wharf Central
75-77 Wharft Street
Tweed Heads NSW 2485
PO Box 311, Tweed Heads, NSW 2485 Ph (07) 5536 8863 Fax (07) 5536 7162 Email: admin@hmcenvironment.com.au

Page 1 of 1

### ENVIRONMENTAL ANALYSIS REQUEST – CHAIN OF CUSTODY RECORD

Company: HMC Environmental
Address: PO Box 311
Tweed Heads NSW 2485
Contact:
Telephone: 07 55368863 Fax: 07 55367162
Email: admin@hmcenvironment.com.au

Project Name: Terranora Rd Terranora
Project Number: 2015.009
Quote Reference: 2015.009
Purchase Order No:
Results Required by: 24 hours ☐ 48 hours ☐ 3 – 5 Day X Other ☐
Send Results to: admin@hmcenvironment.com.au
Results to be provided by: Mail: ☐ Fax: ☐ Email: X

| SAMPLE DESCRIPTION | | | | | | ANALYSIS REQUIRED | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | Date Sampled | Time | Lab No | Soil / Water Other | Comments# | COMPOSITE | VOC scan (8260) | TPH – C6-C10 | TPH – C>10-40 | MAHs | BTEX | SVOC scan (8270) | PAHs | PCBs | (OCs | (OPs | Speciated Phenols | Metals – Std 17 | Metals 8 | Hg | EPA Screen (Vic only) | Alkalinity | Colour - TRUE | Colour - APPAR | Soluble Lead | Chloride | Soluble Iron | Sulfate | Total Acidity | Soluble Aluminium | pH | Turbidity |
| TR17A | 10/2/15 | | | S | | | | | | | | | | | X | X | | | | | | | | | | | | | | | |
| TR18A | | | | S | | | | | | | | | | | X | X | | | | | | | | | | | | | | | |
| TR19A | | | | S | TR Comp TRA | | | | | | | | | | X | X | | | X ← Comp TRA | | | | | | | | | | | | |
| TR20A | | | | S | | | | | | | | | | | X | X | | | | | | | | | | | | | | | |
| TR21A JS | | | | S | Duplicate | | | | | | | | | | X | X | | | X | | | | | | | | | | | | |
| TR21A IL | | | | S | Inter laboratory | | | | | | | | | | X | X | | | X | | | | | | | | | | | | |
| TR22A | | | | S | Comp TRB | | | | | | | | | | X | X | | | | | | | | | | | | | | | |
| TR23A | | | | S | | | | | | | | | | | X | X | | | X ← Comp TRB | | | | | | | | | | | | |
| TR24A | | | | S | | | | | | | | | | | X | X | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | X | X | | | | | | | | | | | | | | | |
| TR20B | | | | S | | | | | | | | | | | X | X | | | X | | | | | | | | | | | | |
| # Please Provide Field PID Readings where possible | | | | | Totals | | | | | | | | | | | | | | | | | | | | | | | | | | |

Relinquished by: [signature] Date/Time: 11/2/15 2:45pm
Received by: [signature] Date/Time: 11.2.15 2:45pm
Relinquished by: Date/Time:
Received by: Date/Time:

Special Requirements (eg. OHS issues etc.)
OC/OP do not composite
Total metals in soil ~~and rinsate~~
~~All discrete – no composites~~
Metals 8 composite

** METALS (Please circle):
Ag, Al, As, B, Ba, Be, Bi, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn

Sample Receipt Advice (Lab Use Only)
All Samples Received in Good Condition ☑
All Documentation in Proper Order ☑
Samples Received Properly Chilled ☑ 16°C
Samples Received Within Recommended Holding Times ☑
For Enquires please quote Batch No.

## *Appendix 11 Borelogs*

MAZLAB Pty Ltd
Environmental Testing, Sampling and Drilling (Vibracore)
ABN 90 151 684 436 ACN 151 684 436

*U1/ 33 MACHINERY DR., TWEED HEADS SOUTH, 2486*
*PO BOX 6879 TWEED HEADS SOUTH, 2486*
*PHONE: (07) 55239922 FAX: (07) 55239822*
*EMAIL: mazlab@bigpond.com*

| | | |
|---|---|---|
| **CLIENT:** HMC Environmental | **DATE:** 10/02/2015 | **BH#:** |
| **MAZLAB JOB NO:** HMC2513 | **PROJECT:** 420-434 Terranora Rd., Terranora | |

| DEPTH | DESCRIPTION | TEST | DEPTH / RESULT |
|---|---|---|---|
| | **Borehole 17** | | |
| 0.00 | Sandy CLAY(CH) v/stiff, dark red brown, sand fine grained with fine to medium gravel, moist | | |
| 0.80 | As above – only with some pale orange & yellow brown mottling | | |
| 1.00 | Hole terminated - No water encountered | | |
| | **Borehole 18** | | |
| 0.00 | Sandy CLAY(CH) loose, dark brown/ red brown, sand fine grained with fine to medi gravel, moist – Band of organics @ 0.3-0.4m | | |
| Fill | | | |
| 0.40 | Sandy CLAY(CH) v/stiff, dark red brown, sand fine grained with fine to medium gravel, moist | | |
| 1.00 | Hole terminated - No water encountered | | |
| | **Borehole 19** | | |
| 0.00 | Sandy CLAY(CH) loose, dark brown/ red brown, sand fine grained with fine to medi gravel, moist | | |
| Fill | | | |
| 0.20 | Sandy CLAY(CH) v/stiff, dark red brown, sand fine grained with fine to medium gravel, moist | | |
| 1.00 | Hole terminated - No water encountered | | |
| | **Borehole 20** | | |
| 0.00 | Sandy CLAY(CH) firm, dark red brown, sand fine grained with fine to medium gravel, moist | | |
| Fill | | | |
| 1.10 | Sandy CLAY(CH) v/stiff, dark red brown, sand fine grained with fine to medium gravel, moist | | |
| 1.80 | Boulder - Hole terminated - No water encountered | | |

MAZLAB Pty Ltd
Environmental Testing, Sampling and Drilling (Vibracore)
ABN 90 151 684 436 ACN 151 684 436

*U1/ 33 MACHINERY DR., TWEED HEADS SOUTH, 2486*
*PO BOX 6879 TWEED HEADS SOUTH, 2486*
*PHONE: (07) 55239922 FAX: (07) 55239822*
*EMAIL: mazlab@bigpond.com*

| **CLIENT:** HMC Environmental | **DATE:** 10/02/2015 | **BH#:** |
|---|---|---|
| **MAZLAB JOB NO:** HMC2513 | **PROJECT:** 420-434 Terranora Rd., Terranora | |

| **DEPTH** | **DESCRIPTION** | **TEST** | **DEPTH / RESULT** |
|---|---|---|---|
| | **Borehole 21** | | |
| 0.00 | Sandy CLAY(CH) firm, dark red brown, sand fine grained with fine to medium gravel, moist | | |
| Fill | | | |
| 0.20 | Sandy CLAY(CH) v/stiff, dark red brown, sand fine grained with fine to medium gravel, moist | | |
| 0.80 | As above – only pale orange brown with some orange mottling, sand fine to coarse grained | | |
| 2.00 | Hole terminated - No water encountered | | |
| | **Borehole 22** | | |
| 0.00 | Sandy CLAY(CH) firm, dark red brown, sand fine grained with fine to medium gravel, moist | | |
| Fill | | | |
| 0.30 | Sandy CLAY(CH) stiff, pale orange brown with some orange mottling, sand fine to coarse grained, some weathered gravel, moist | | |
| 1.00 | Hole terminated - No water encountered | | |
| | **Borehole 23** | | |
| 0.00 | Sandy CLAY(CI) firm, dark brown, sand fine to coarse grained, moist | | |
| Fill | | | |
| 0.70 | Sandy CLAY(CH) v/stiff, dark red brown, sand fine grained, moist | | |
| 1.00 | Hole terminated - No water encountered | | |
| | **Borehole 24** | | |
| 0.00 | Sandy CLAY(CI) firm, dark brown, sand fine to coarse grained, moist | | |
| Fill | | | |
| 0.30 | Sandy CLAY(CH) v/stiff, dark red brown, sand fine grained, moist | | |
| 1.00 | Hole terminated - No water encountered | | |