Preliminary Site Contamination Report

Development Application
Byron Hospital
Lot 100 DP 1140936
Ewingsdale Road, Ewingsdale

HEALTH SCIENCE ENVIROMENTAL EDUCATION
ENVIRONMENTAL AUDITOR

Preliminary Site Contamination Report

Development Application
Byron Hospital
Lot 100 DP 1140936
Ewingsdale Road, Ewingsdale

Prepared for: Health Infrastructure
Version: FINAL - Revision 1
Date: 24 July 2014
Tim Fitzroy & Associates
ABN: 94120188829
ACN: 120188829

environmental

tim fitzroy & associates

environmental health | environmental education environmental auditing

52 Alston Avenue
Alstonville NSW 2477
T | 02 6628 3837
F | 02 6628 1349
M| 0448 483 837
tim@timfitzroy.com.au
www.timfitzroy.com.au

TABLE OF CONTENTS

Section ***Page***

Illustrations

Tables

Appendices

Executive Summary

Tim Fitzroy & Associates has been engaged by Health Infrastructure to undertake a preliminary site investigation (PSI) of Lot 100 DP 1140936, Ewingsdale Road, Ewingsdale in relation to the proposed establishment of a hospital at the subject site.

The site is located approximately 5 km north west of the centre of Byron Bay and adjoins the rural residential area of Ewingsdale. A power substation and depot and a concrete batching plant adjoin the site. Land to the north comprises dispersed rural settlement with low scale cattle grazing being the predominant agricultural use. The site is 6ha. The soils of the area are krasnozem soils are clay loam overlying clay.

The site has been previously used for dairy cattle, beef cattle, and goat grazing. Site improvements include a timber dwelling, two metal sheds, perimeter and paddock fencing (now part of adjoining lot 101, located to the west of the subject site). A goat dip operated from 1985 to 1988 on adjoining lot 101. Residual chemicals in the dip were removed in 1988. A detailed site investigation of the goat dip site was undertaken in 2007 revealing that it is not likely that the site is contaminated.

A search of contaminated land records has not identified anything significant on or near the subject site apart from the aforementioned dip site.

Site inspections of the subject site did not reveal any obvious physical signs of contamination. There was no evidence of fill material across the site. There was no evidence of used drums or containers on the site.

In May 2014, a total of 40 soil samples were taken from across the site and tested for heavy metals and organochlorine pesticides. Analysis of the samples show contaminant levels were below the relevant Australian and New Zealand Environment and Conservation Council (ANZECC) and National Environmental Protection, Assessment of Site Contamination, Measure (NEPM 2013) guideline limits.

Based on the site history, site inspections and the soil analysis results, there is considered to be no impediment to the proposed development of a hospital on the subject site.

1. Introduction

Tim Fitzroy & Associates has been engaged by Health Infrastructure to undertake a preliminary site investigation (PSI) under State Environmental Planning Policy No.55 in relation to the proposed development of a hospital on land described in real property terms as Lot 100 DP 1140936, Ewingsdale Road, Ewingsdale.

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) relates to contaminated land issues. Clause 7(1) of SEPP 55 sets out the obligations a planning authority must consider when granting a development application. Clause 7 relevantly provides:

7 Contamination and remediation to be considered in determining development application

(1) A consent authority must not consent to the carrying out of any development on land unless:

(a) it has considered whether the land is contaminated, and

(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and

(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

(2) Before determining an application for consent to carry out development that would involve a change of use on any of the land specified in subclause (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines.

(3) The applicant for development consent must carry out the investigation required by subclause (2) and must provide a report on it to the consent authority. The consent authority may require the applicant to carry out, and provide a report on, a detailed investigation (as referred to in the contaminated land planning guidelines) if it considers that the findings of the preliminary investigation warrant such an investigation.

(4) The land concerned is:

(a) land that is within an investigation area,

(b) land on which development for a purpose referred to in Table 1 to the contaminated land planning guidelines is being, or is known to have been, carried out,

(c) to the extent to which it is proposed to carry out development on it for residential, educational, recreational or child care purposes, or for the purposes of a hospital—land:

(i) in relation to which there is no knowledge (or incomplete knowledge) as to whether development for a purpose referred to in Table 1 to the contaminated land planning guidelines has been carried out, and

(ii) on which it would have been lawful to carry out such development during any period in respect of which there is no knowledge (or incomplete knowledge).

As the land was formerly used for agricultural activities and a former goat dip is located on the neighbouring lot 101 to the west, clause 7 applies.

This report has been prepared to satisfy Council and the Department of Planning that the site is suitable for the use proposed in the development application.

1.1 Summary

Tim Fitzroy & Associates has extensive experience working in this locale on a wide range of environmental assessments. These assessments have included, but are not limited to the following:

- Preliminary Site Contamination Report, Proposed Byron District Hospital (March 2007); and
- Detailed Site Contamination Report Proposed Byron District Hospital – Grissels Goat Dip (May 2007).

In March 2007, the previous site owners and managers were contacted and an oral site history was obtained back to 1970. This indicated that the site has been used for dairy and beef cattle grazing, and goat grazing. Site improvements include a timber dwelling, two metal sheds, perimeter and paddock fencing (now part of adjoining lot 101, located to the west of the subject site). Discussions with past owners and a review of Council records confirmed the presence of a goat dip site on adjoining lot 101, located to the west of the subject site.

The goat dip is approximately 135 metres from the western boundary of the proposed Byron hospital site. The goat dip was operated by Ian and Eric Grissell from 1985 to 1988. The Grissells collected goats from the local area and processed the goats through the private dip site, prior to transporting the goats to the Dorrigo abattoir. Mr Ian Grissell confirmed that *Barricade S* was the only chemical used in the Goat Dip. The use of *Barricade S* as a tickicide in the late 1980's was confirmed by Larry Falls, NSW Department of Primary (pers. comm., March 2007) as being the most likely chemical to be used during this period. *Barricade S* active constituent is: Cypermethrin, a synthetic pyrethoroid; and Chlorfenvinphos, an organophosphate. According to Larry Falls the organophosphate component is only a small percentage of the active constituent of *Barricade S*.

Apart from the use of *Barricade S* no other pesticides or herbicides have been used on the subject site, and there are no records of any other registered cattle dip located on the site or within 200m of the site and no crops were grown on the site since 1970.

In May 2007 (TFA May 2007) a total of 17 soil samples were taken within the vicinity of the goat dip as part of a detailed contaminated site assessment which accompanied the planning proposal for the proposed Byron Shire Hospital, now located on the neighbouring site. Analysis of the samples shows contaminant levels well below the relevant National Environment Protection Council (NEPC) guideline limits and the limit of reporting.

Given the time that has lapsed since the original PSI (TFA May 2007) and the introduction of the new National Environmental Protection Measure (2013) and following discussions with Council's environmental officer, Lara Gallagher, it was agreed with Health Infrastructure that a fresh PSI circa 2014 ought to be undertaken.

Although the area nominated for the new Byron District Hospital is considered to represent a low risk of soil contamination, soil sampling was undertaken to ensure that

if contamination was contained within the soils it would be identified prior to further consideration of the development application.

In May 2014, a total of 40 soil samples were taken from across the site as part of the Preliminary Site Investigation to accompany the Development Application to Byron Shire Council. Analysis of the samples show contaminant levels were below the relevant Australian and New Zealand Environment and Conservation Council (ANZECC) and National Environmental Protection, Assessment of Site Contamination, Measure (NEPM 2013) guideline limits.

It is important to note that the Grissels Goat Dip is incorrectly located on the NSW Department of Primary Industries Cattle Dip Site Locator and consequently on Byron Shire Council's GIS. The dip is actually located further to the west and can be identified by the existing fencing. The Grissels Goat Dip is described as *demolished* (NSW DPI 2014). *Demolished* is where the dip site has been partially or wholly dismantled or demolished prior to the introduction of the decommissioning policy. In many cases there are no physical signs of the dip ever being there (NSW Department of Primary Industries Cattle Dip Site Locator March 2014).

Based on the site history, site inspections and the laboratory results from soil sampling there is, in our considered opinion, no impediment to the proposed Development Application.

1.2 Scope of Works

This assessment has been undertaken to determine the relative risk associated with the development application for the use of the subject site for the new Byron District Hospital with respect to soil contamination. The tasks involved in undertaking this assessment were to:

- identify the land use history of the site, with particular attention to any uses that may have led to potential contamination;
- assess the site condition and surrounding environment to determine any visual signs of contamination, sensitive local environments or potential contamination "hot spots";
- based on the above, determine if soil sampling is required and if so, design a soil sampling pattern for the subject site; and
- analyse individual samples for a range of potential contaminants in relation to the environmental and health investigation levels recommended by the ANZECC guidelines (ANZECC, 1992) in addition to those recommended by NEPM guidelines (NEPM, 2013) to confirm if the presence of any contaminants represents a risk for the development proposal.

2. Site Description and History

2.1 Site Location

The site is located approximately 5 km north west of the centre of Byron Bay and approximately 1 km east of the northern interchange with the Pacific Highway. The site adjoins the rural residential area of Ewingsdale, an Essential Energy substation and depot installation and the Holcim concrete batching plant. The area of the proposed hospital grounds is in the order of 6 ha while the actual footprint of the building envelope is approximately 2.5 ha.

A site locality diagram is provided in **Illustration 2.1**.

2.2 Topography, Soils and Geology

The site is on gently undulating terrain. The highest point on the site is approximately RL 24.5 metres AHD while the lowest point of the site is located at the most eastern point, at approximately RL 13.5 metres AHD. A small unnamed creek traverses alongside the eastern boundary of the site in a northerly direction. The creek is a tributary of Simpsons Creek which drains the Tyagarah catchment.

The site predominately drains to the east and into the unnamed creek. Given the topography, it is unlikely that the site is subject to landslip or instability.

The soils of the area are mapped by Morand (1994) as being Ewingsdale Landscape. These krasnozem soils are described as up to 300 cm of self-mulching dark red clay loam overlying between 100 cm and 300 cm of reddish brown strongly structured clay. Below this there is mottled medium clay with weathered basalt overlying Lismore basalt bedrock. Typically basaltic clays such as these are slightly to moderately reactive and exhibit Class S to M classification under AS2870-1996 (Standards Australia, 1996).

Field observations taken while on site were consistent with the soil descriptions and mapping provided by Morand (1994).

2.3 Surrounding Environment

A broad representation of land use is found in the locality of the subject site. Land to the north of the subject site comprises dispersed rural settlement, with low scale cattle grazing being the predominant agricultural use.

The rural residential area of Ewingsdale is located immediately to the south of the subject site, containing approximately 160 dwellings located in lots ranging in size from 2,000 m^2 to 5,000 m^2. A school is located to the south-east of this rural-residential area.

The Holcim concrete batching plant and Essential Energy substation are located to the west of the subject site. Work is currently underway on the Pacific Highway upgrade to the west and south of the subject site.

2.4 Site History

In 1990 Jewelbond Pty Limited purchased the site from Alan and Elsie Grissell.

According to Mr Max Grissell, a son of Alan and Elsie Grissell, his parents purchased the property in approximately 1970 from a Mr Bob Higgins. The Grissel's inherited a dairy farm which they maintained for a period of approximately 5 to 6 years, whereupon the dairy cattle were progressively sold off and replaced with beef cattle.

Max Grissell advised that no chemicals or pesticides were used on the property by his family. Furthermore his father Alan Grissell utilised manual means to remove weeds, either by hoe or mattock. The family utilised the now defunct Flicks Dip to dip their cattle. Flick's dip is located approximately 300 metres from the original timber dwelling in an easterly direction.

Following a review of Councils records the identification of Grissells Goat Dip at the subject site resulted in further discussions with Max Grissell. Following further discussion Max advised that his brothers Eric and Ian operated Grissells Goat Dip at the subject site.

An inspection was conducted with Mr Ian Grissell and the author in 2007. Ian Grissell identified the goat dip approximately 6.5 metres south of the south eastern corner of the Essential Energy site and approximately 100 metres from the western curtilage of the proposed hospital building envelope. The Goat Dip, while categorised as demolished on the NSW Department of Primary Industries Dip Site Register, remains standing. Mr Grissell advised that the goat dip operated from 1985 to 1988. Feral goats were collected and processed through the dip in the presence of the local Tick inspector and transported directly to the Dorrigo Abattoir.

Mr Ian Grissell advised that *Barricade S* was the only chemical used in the dip. This view was confirmed by Larry Falls, NSW Department of Primary (pers. comm. March 2007) as being the most likely chemical to be used during this period. *Barricade S* active constituent is Cypermethrin, a synthetic pyrethroid and Chlorfenvinphos, and organophosphate. According to Larry Falls the organophosphate component is only a small percentage of the active constituent of *Barricade S*.

Ian Grissell advised that following the closure of the Dorrigo abattoir and the decreasing local feral goat population, the Grissell goat meat business desisted operating in 1988. As a consequence the Department of Agriculture organised for the residual chemical in the dip to be removed by tanker from the site. The race remains and the metal covers are now corroded. The dip has filled with rainwater and remains unused. The concrete entry and draining pad are still evident while six fence posts and a steel mesh mark the perimeter of the dip (see photo plate, **Appendix A**)

The primary use of the property by the Grissell family was for beef cattle grazing until its sale by Elsie Grissell to Mr John McDonald in 1990.

In 2007 discussions were held with Miss Leigh Belbeck, daughter of Mr John McDonald, the current owner. Ms Belbeck advised that the cattle had been agisted on the property for the last 18 years. Ms. Bellbeck advised that she had no knowledge of any chemicals or pesticides being applied to the property. She advised that Mr Ron Barnes had agisted cattle on the property for the previous 10 years.

In 2007 discussions were held initially by phone with Mr Barnes and subsequently a joint site inspection was conducted by Mr Barnes and the author. Mr Barnes advised that he had applied Grazen to control Camphor Laurel reshoots, predominately in the southern and south-western portions of the subject site. In February 2014 further discussions were held with Mr Barnes onsite. Mr Barnes continues to agist his cattle onsite as he has done constantly now for the last 17 years.

A document search of Byron Council's records was undertaken, identifying a subdivision of the subject site in 1989. Mr Max Grissell confirmed that the subdivision resulted in the establishment of 3 additional lots, including that occupied currently by Essential Energy and the Holcim concrete batching plant to the west of the subject site and a residential lot to the south of the site now occupied by Mr Grissell.

In accordance with the SEPP55 Guidelines, soil sampling should be undertaken to confirm that the soils on the site do not pose a risk to human health or the environment through past contamination if site history cannot categorically conclude that soil contamination is unlikely. Due to the incomplete site history and previous land use (agriculture) soil sampling was undertaken across the subject site.

2.5 Previous Contamination Assessments

2.5.1 Preliminary Site Investigation Proposed Byron Hospital Site (Tim Fitzroy & Associates February 2007)

In February 2007 *Tim Fitzroy & Associates* were engaged by the North Coast Area Health Service (NCAHS) through Newton Denny Chapelle to undertake a preliminary contamination investigation under State Planning Policy No.55 for land described in real property terms as Lot 17 DP 816451, Ewingsdale Road, Ewingsdale. The proponents of the land wished to proceed with rezoning the land to allow for a future district hospital for Byron Shire (Proposed Hospital Site).

The Grissels goat dip was identified on the subject site approximately 100 metres from the western edge of the proposed hospital building envelope on the Proposed Hospital Site. Although the area nominated for the hospital was considered to represent a low risk of soil contamination, soil sampling was undertaken to ensure that if contamination was contained within the soils it would be identified prior to rezoning. A total of 40 soil samples were taken from across the subject site. Analysis of the samples showed contaminant levels well below the relevant Australian and New Zealand Environment and Conservation Council (ANZECC) and National Environment Protection Council (NEPC) guideline limits.

Given the location of Grissels Goat dip on the subject site, it was proposed that a more detailed assessment of the immediate area around the dip site be undertaken to determine the extent of contamination (if present) in accordance with SEPP 55 guidelines to determine whether the land was suitable for rezoning for the Proposed Hospital Site.

2.5.2 Detailed Contamination Investigation (Tim Fitzroy & Associates May 2007)

In May 2007 TFA were engaged by the North Coast Area Health Service (NCAHS) to undertake a detailed site investigation of the Grissels Goat Dip. Following a review of the site history and discussions with the operator of the Grissels goat dip and officers from the NSW Department of Primary Industries it was decided to adopt a judgmental soil sampling plan concentrating on the active constituents of the nominated chemical used on site.

Samples were analysed for the following organophosphates: bromophos ethyl, carbophnenothion, chlorfenvinphos, chlorpyrifos, chlorpyifos methyl, diazinon, dichlrorvos, dimethoate, dioxathion, ethion, fenchlorphos, fenitrothion, fenthion, malathion, methacrifos and pirmiphos methyl.

A synthetic pyrethroid analysis screen was also undertaken for the following chemicals: cypermethrin, deltamethrin, fenvalerate and permethrin.

Organochlorins and Arsenic were not analysed for as these chemicals were not used at the dip site. As the site history determined that the dip site has operated for a limited period of time from 1985 to 1988 with a specific chemical it was considered a composite sampling program was appropriate to be used, as recommended in the NSW EPA Sampling Guidelines (September, 1995). Soil sampling concentrated on the immediate vicinity of the dip site, with an additional background soil sample taken some 35 metres to the east of the dip. The number of samples taken can be used to calculate the radius of detection for a hotspot of a particular size.

A judgemental sampling pattern was undertaken based on the knowledge gained from discussions with Ian Grissell on past practices at the site and discussion with NSW DPI staff (see **Appendix B).**

Given the site history, proposed rezoning and the characteristics of the soils in the locality (i.e., deep, well drained, Krasnozem soils), the majority of soil samples were taken at the surface (approximately 75 mm deep) while two samples were taken at depth (1400mm) alongside the dip bath. The sampling pattern and density adopted was considered sufficient to ensure that should soil contamination be present on the site, it would have been detected.

All samples returned results well below the threshold investigation limits. In fact none of the chemicals tested exceeded the limit of reporting.

2.6 Contaminated Land Record Search

2.6.1 Contaminated Land Record

A search of the Contaminated Land Record (EPA 2010b) for the Byron Shire Council Local Government Area (LGA) did not identify any notices on or near the subject site.

2.6.2 Protection of the Environmental Operations Act Licenses

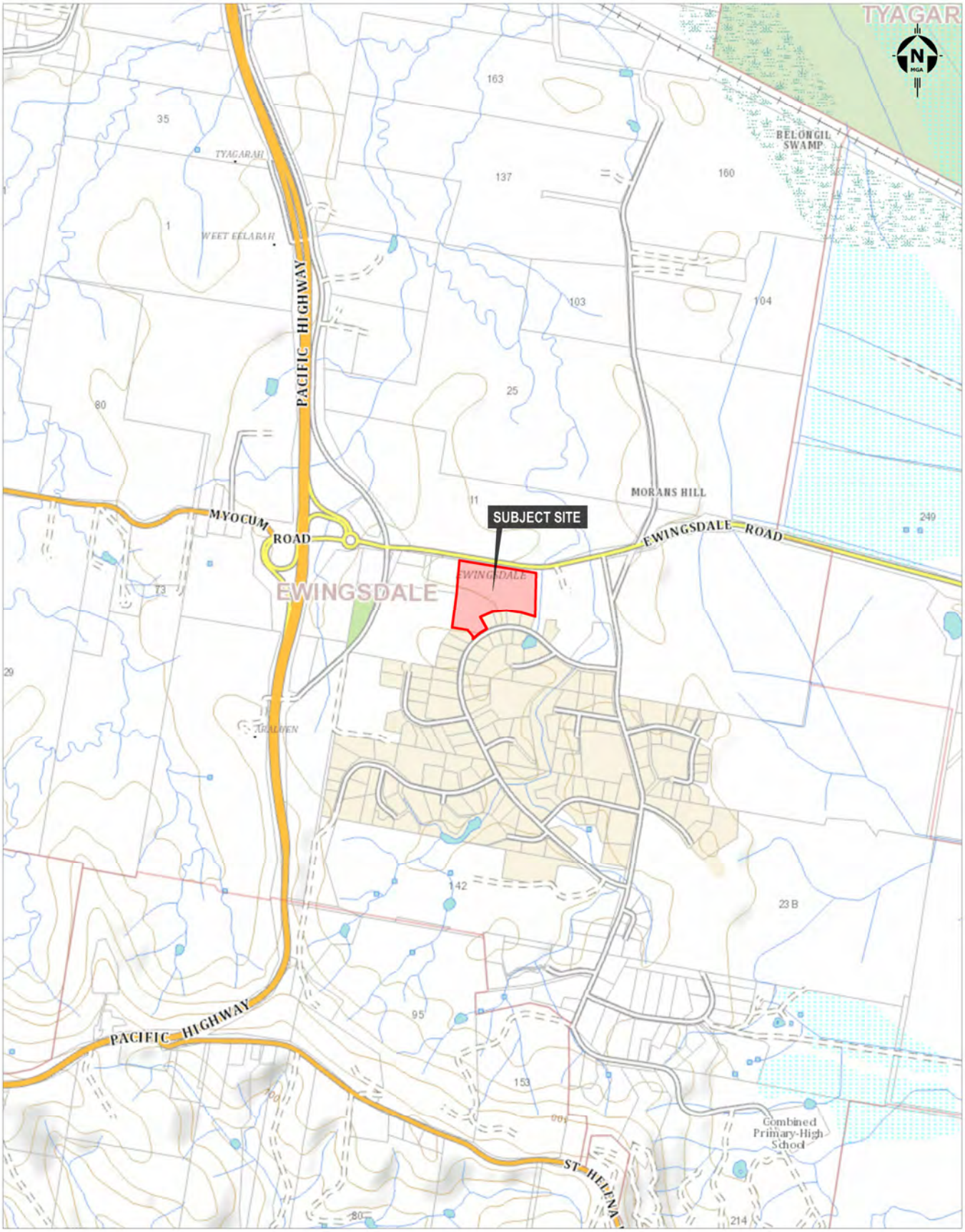
A search of the current list (EPA 2010c) of licensed activities as per Schedule 1 of the Protection of the Environment Operations Act 1997 identified thirteen (13) licensed activities in the Byron Shire. No current licenses were identified pertaining to the site or lands adjoining the site.

2.6.3 Cattle Tick Dip Sites

A search of the Department of Primary Resources dip site register was undertaken to determine if any dip sites had been located on or near the property. Apart from the Grissels Goat Dip the database indicates that there has never been a cattle dip site on the property, or within close proximity of the property.

The subject site is within the EPA investigation zone for Grissels Goat and Ewingsdale Dip (see **Appendix C)**. Given that the detailed site investigation (TFA May 2007) of the Grissels Goat Dip site did not indicate any evidence of contamination and the fact that both dipsites are no longer in use it is submitted that contamination from previous dip site activities offers negligible risk to future occupants of the subject site.

Accordingly, we consider that Byron Shire Council and the Department of Planning can be satisfied that the subject site is suitable for the uses proposed in the development proposal.



0 400m

SCALE:	1:20,000 (A4)
DRAWN:	azaCAD.com.au
BASE SOURCE:	SIX
DATE:	JUNE 2014
REFERENCE:	22-153-A

Illustration 2.1: Site Locality

Preliminary Site Investigation • Proposed Byron Hospital • Lot 100 in DP 1140936 • Ewingsdale Road, Ewingsdale

Notes
CONTRACTOR MUST VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK OR PREPARING WORKSHOP DRAWINGS. DO NOT SCALE DRAWING.

EWINGSDALE ROAD

SITE BOUNDARY

Table Drain

AMBULANCE BAY

ED ENTRY

CARPARK

Trpt. of Bank

NSW AMBULANCE STATION

Floor Level
R.L. 15.865

DAM

LOADING ZONE

CARPARK

SITE BOUNDARY

LOT 171
DP 1121005

LOT 101
DP 1140936

RIGHT OF CARRIAGEWAY (7m wide)

LOT 101
DP 1140936

LOT 9
DP 816451

LOT 10
DP 816451

LOT 11
DP 816451

LOT 12
DP 816451

PARKWAY DRIVE

Date generated 23-05-14 3:09:19 PM C:\My Documents\Autodesk\Revit\RAC2014\120433_ByronBay_BUILDING_Tasky.rvt

Rev	Description	Date	App'd

Client
HEALTH INFRASTRUCTURE

Project
BYRON SHIRE HEALTH SERVICE REDEVELOPMENT
Enter address here

WOODS BAGOT
AUSTRALIA
ASIA
MIDDLE EAST
EUROPE
NORTH AMERICA

Drawing title
SITE PLAN - OPTION 1

Checked AD
Approved GS
Scale 1 : 500 @ A1 sheet size
50mm on original

Project number 120433
Drawing number A1001-1
Revison

Status

3. Site Soil Investigations

3.1 Site Inspection

3.1.1 General

A site inspection was conducted of the subject site on 26 May 2014. The site is covered with exotic grass. The site is screened from Ewingsdale Road with an informal vegetated hedge. The new Byron Ambulance Station is located on the subject allotment in the north east corner.

A small unnamed creek, traverses along the eastern boundary of the site in a northerly direction. The creek is a tributary of Simpsons Creek which drains the Tyagarah catchment. The site predominately drains to the east and into the unnamed creek.

Photographs of the subject site can be seen in **Appendix A**.

3.1.2 Visible Signs of Contamination/Plant Stress

Site inspections did not reveal any obvious physical signs of contamination, or any signs of plant stress that may indicate contamination.

3.1.3 Odours

There were no obvious odours akin to contamination observed during site inspections.

3.1.4 Flood Potential

The highest point on the site is approximately RL 24.5 metres AHD while the lowest point of the site, at approximately RL 13.5 metres AHD, is located at the most eastern point. There appears to be low risk of flooding within the proposed building envelope.

3.1.5 Presence of Drums, Wastes and Fill Material

There was no evidence of fill material across the site. There was no evidence of used drums or containers on the site.

3.2 Soil Sampling and Analysis

The following sampling, analysis and data quality objectives have been adopted for this site investigation:

- to confirm the soils on the subject site do not pose a risk to human health or the environment through soil contamination
- to employ quality assurance when sampling, assessing and during evaluation of the subject soils
- to ensure that decontamination techniques are applied during the sampling procedure and that no cross contamination of samples occurs.

Table A of the Contaminated Sites Sampling Design Guidelines (NSW EPA 1995) was taken into consideration when designing the sampling program.

This preliminary site contamination assessment included the analysis of ten (10) composite samples formed from forty (40) sub-samples from the subject property. **Table 3.1** below provides a reference of the sub-samples composited together to constitute the corresponding composite sample for subsequent analysis.

In addition blind, rinsate and split samples were collected as part of the Quality Control System.

Table 3.1 Constitution of Composite Sample

Composite Sample No.	*Sub-samples*
TFA 1	TFA 1A to TFA 1D
TFA 2	TFA 2A to TFA 2D
TFA 3	TFA 3A to TFA 3D
TFA 4	TFA 4A to TFA 4D
TFA 5	TFA 5A to TFA 5D
TFA 6	TFA 6A to TFA 6D
TFA 7	TFA 7A to TFA 7D
TFA 8	TFA 8A to TFA 8C
TFA 9	TFA 9A to TFA 9D
TFA 10	TFA 10A to TFA 10D

As the site history has determined that the land has been used for grazing purposes since the 1970's and not significantly disturbed since, it was considered that a composite sampling program was appropriate to be used, as recommended in the NSW EPA Sampling Guidelines (September, 1995). Soil sampling concentrated on the footprint of the proposed development and adjacent land. Soil sampling concentrated on the footprint of the proposed hospital being approximately 2.5 ha in size. A sampling density of 16 samples per hectare was adopted requiring the collection of

approximately 40 individual samples. A systematic sampling pattern which covered the majority of the developable area of the site was also adopted (**Illustration 3.1**).

Given the site history, the nature of the proposal and the characteristics of the soils in the locality (i.e., deep, well drained, Krasnozem soils), it was not considered necessary to conduct soils sampling at depth. Thus, for the preliminary soil sampling investigation, surface soil samples only were taken. The sampling pattern and density adopted is considered sufficient to ensure that should soil contamination be present on the site, it will be detected.

The preliminary soil investigation was undertaken on 26 May 2014. The weather was fine during sampling.

In accordance with the Sampling Design Guidelines, the following sampling method was used:

- Forty (40) sub-samples (TFA BH 01-40) were taken from the surface soil horizon between 0 and 75 mm below the surface in the immediate vicinity of the proposed hospital site and the immediate surrounds using a 70 mm diameter hand auger.
- One rinsate, four blind and four split samples were also taken.
- Equal portions from each of the sub-samples within each quadrat were thoroughly mixed to form a composite sample. The resulting ten (10) TFA 1 to TFA 10 (inclusive) composite samples and Quality Assurance (QA) samples was sent to NATA accredited laboratories.

Our experience in site contamination is that organo-phosphate pesticides are rarely identified in soil sampling as they breakdown readily in the environment. This view is supported by Graham Lancaster (Manager, Environmental Analysis Laboratory, Southern Cross University, Lismore) who confirmed that organophosphate pesticides do not persist for more than a couple of months in local soils, hence they were not included in this investigation. Results are provided in **Section 3.5**.

3.3 Quality Assurance

The following basic measures were undertaken by *Tim Fitzroy & Associates* to conform to the minimum standards for sampling and quality control procedures:

- Hand auger excavation and sampling was undertaken by Tim Fitzroy, with experience in site contamination investigations.
- Auger equipment was decontaminated between samples by rinsing thoroughly with de-mineralise water, scrubbing with cleanser (Decon 90), and finally re-rinsing with de-mineralised water.
- A Chain of Custody form, which identified the sample identification code, the collection date and the type of analysis to be undertaken were fully completed and despatched with the samples (**Appendix D**).
- Residual samples were stored in sealed plastic bags, frozen and retained by *Tim Fitzroy & Associates* pending the need for additional or repeat analysis.
- Laboratory Results are available in **Appendix E.**

- Full Laboratory Quality Assurance Procedures (QAP) and field QAP results are provided in **Appendix E**. The analysis results and quality control data has been evaluated against recognised procedures to allow for the interpretation of accuracy, precision and representativeness of the data. The results of analysis of field duplicates and spilt samples indicate compliance with Table 5 Acceptable Criteria for Quality Control Samples AS 4482.1- 1997 *Guide to the sampling and investigation of potentially contaminated soils*.

3.4 Assessment Criteria

The ANZECC Guidelines are the accepted guidelines in Australia and New Zealand for establishing "threshold" levels in relation to soil contamination. These threshold levels suggest further investigation is required if levels are exceeded. The NEPM guidelines (2013) further expand on the ANZECC threshold limits based on health and environmental risk assessments for a variety of land uses including residential with varying levels of accessible soil risks, open space, commercial and industrial.

The investigation threshold levels identified by "ANZECC Guidelines for the Assessment and Management of Contaminated Sites" 1992 are provided below and were used to identify if high levels of contaminates exist at the site:

- Lead 300 mg/kg
- Arsenic (total) 100 mg/kg
- Cadmium 20 mg/kg

In addition, the results were compared to the Health Investigation Guidelines from NEPM (National Environmental Protection, Assessment of Site Contamination, Measure), 2013; Schedule B1).

- OC (DDT+DDD+DDE) 240 mg/kg

3.5 Results

The laboratory soil analysis reports containing the full results are provided in **Appendix E.**

A summary of the results and comparison to the guideline limits is provided below in **Table 3.2**. A full suite of heavy metals were tested for and results are provided in full in **Appendix E**. Only those heavy metals considered relevant to the subject site have been reported in the main body of this report. Similarly, the 22 chemicals constitutes of organochlorine pesticides were tested for. Full results of each chemical constitute are provided in **Appendix E**. A summary of all OC's is reported within the main body of this report.

In accordance with the NSW EPA Sampling Design Guidelines, the acceptable threshold concentration values for the suspected contaminates were adjusted by (x4) to resolve the problem of hot spot dilution*.

Note:

- Hot Spot dilution*

Hot spot dilution can occur where an elevated concentration of contaminant remains undetected because its concentration was diluted in the compositing process.

- Manganese

Elevated manganese levels were identified across the site. These levels are indicative of naturally occurring levels in the local krasnozem soils. This view is supported by research undertaken by the Environmental Analysis Laboratory (July 2006).

- Chromium

Elevated chromium is common in local north coast soils. The levels are not indicative of contamination. This view is supported by research undertaken by the Environmental Analysis Laboratory (July 2006). The levels of chromium are within the background levels (total Cr from 0.5 – 110ppm) ANZECC and NHMRC (1992) Table 3"Environmental Soil Quality Guidelines" page 40.

Table 3.2 Sampling Results

Sample ID	Analyte	Lead	Arsenic	Cadmium	OC's
	Single Sample Threshold (mg/kg)	*<300*	*<100*	*<20*	*<240*
	Composite Sample Threshold (mg/kg)	***<75***	***<25***	***<5***	***<60***
TFA 1		13	4	<0.5	<0.1
TFA 2		13	3	<0.5	<0.1
TFA 3		10	3	<0.5	<0.1
TFA 4		10	3	<0.5	<0.1
TFA 5		11	3	<0.5	<0.1
TFA 6		9	3	<0.5	<0.1
TFA 7		10	4	<0.5	<0.1
TFA 8		9	2	<0.5	<0.1
TFA 9		10	3	<0.5	<0.1
TFA 10		26	2	<0.5	<0.1

As can be seen from the above table, the adjusted laboratory results for all contaminants of concern were below the Health-Based investigation levels identified by "Guideline on Health Based Investigation Levels" for residential areas with gardens, as provided in the Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites and the NEPM (National Environmental Protection, Assessment of Site Contamination, Measure), 2013; Schedule B1.

0 50m

SCALE:	1:2500 (A4)
DRAWN:	azaCAD.com.au
BASE SOURCE:	SIX
DATE:	JUNE 2014
REFERENCE:	22-153-A

Illustration 3.1: Soil Sampling Locations

Preliminary Site Investigation • Proposed Byron Hospital • Lot 100 in DP 1140936 • Ewingsdale Road, Ewingsdale

4. Conclusions and Recommendations

In May 2014 a total of 40 soil samples were taken from across the site as part of the preliminary site investigation to accompany the Development Application to Byron Shire Council. Analysis of the samples show contaminant levels were below the relevant Australian and New Zealand Environment and Conservation Council (ANZECC) and Health Investigation Guidelines from NEPM (National Environmental Protection, Assessment of Site Contamination, Measure), 2013; Schedule B1.

It is important to note that the Grissels Goat Dip is incorrectly located on the NSW Department of Primary Industries Cattle Dip Site Locator and consequently on Byron Shire Council's GIS. The dip is actually located further to the west and can be identified by the existing fencing. The Grissels Goat Dip is described as *demolished* (NSW DPI 2014). *Demolished* is where the dip site has been partially or wholly dismantled or demolished prior to the introduction of the decommissioning policy. In many cases there are no physical signs of the dip ever being there (NSW Department of Primary Industries Cattle Dip Site Locator March 2014).

Based on the site history, site inspections and the laboratory results from soil sampling, there is, in our considered opinion, no impediment to the proposed Development Application for a Hospital at the subject site.

This report has been prepared by Tim Fitzroy of *Tim Fitzroy & Associates.*

Tim Fitzroy
Environmental Health Scientist

References

Australia and New Zealand Environment and Conservation Council (ANZECC), 1992, Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, Australia and New Zealand Environment and Conservation Council.

D. T. Morand, 1994. Soil Landscapes of the Lismore/Ballina 1:100,000 Sheet.

Environment Protection Authority, 1995, Contaminated Sites Sampling Design Guidelines, Environment Protection Authority, Sydney.

National Environment Protection Council (NEPC), 1999, National Environment Protection (Assessment of Site Contamination) Measure 1999, National Environment Protection Council.

National Environment Protection Council (2013) 'Schedule B (1) Guideline on the Investigation Levels for Soil and Groundwater'

Personal Communication 2007 and 2014, Mr Ron Barnes

Tim Fitzroy & Associates, March 2007, Preliminary Site Contamination Report, Proposed Byron District Hospital

Tim Fitzroy & Associates, March 2007, Detailed Site Contamination Report Proposed Byron District Hospital – Grissels Goat Dip

Copyright and Usage

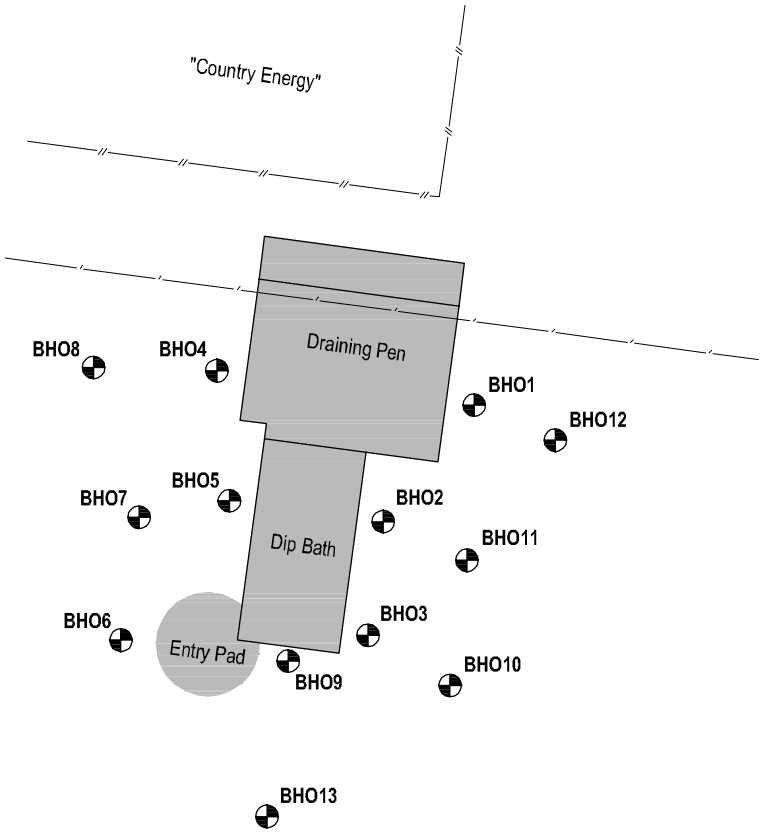
A Photo Plate

Figure 1 Goat Dip in foreground, Essential Energy Site in background, looking north east

Figure 2 Subject site Looking south

Figure 3 Subject site looking north east

B Grissels Dip Site Detailed Sampling Plan (TFA May 2007)



Schedule of Soil Samples:

TFA BHO1(A) - deep soil sample *(1.4m deep)*
TFA BHO1(B) - surface soil sample *(0.75mm deep)*
TFA BHO2 - surface soil sample *(0.75mm deep)*
TFA BHO3 - surface soil sample *(0.75mm deep)*
TFA BHO4(A) - deep soil sample *(1.4m deep)*
TFA BHO4(B) - surface soil sample *(0.75mm deep)*
TFA BHO5 - surface soil sample *(0.75mm deep)*
TFA BHO6 - surface soil sample *(0.75mm deep)*
TFA BHO7 - surface soil sample *(0.75mm deep)*
TFA BHO8 - surface soil sample *(0.75mm deep)*
TFA BHO9 - surface soil sample *(0.75mm deep)*
TFA BHO10 - surface soil sample *(0.75mm deep)*
TFA BHO11 - surface soil sample *(0.75mm deep)*
TFA BHO12 - surface soil sample *(0.75mm deep)*
TFA BHO13 - surface soil sample *(0.75mm deep)*
TFA BHO14(A) - deep soil sample *(1.4m deep)*
TFA BHO14(B) - surface soil sample *(0.75mm deep)*

Source: GIS
Date: April 2007
Ref: 0022-05

Illustration
Soil Sampling Locations

C Dip Site Locator

Disclaimer : While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no warranty is given that the information contained on this map is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of the information prior to using it.
Note : The information shown on this map is a copyright of the Byron Shire Council and the NSW Department of Lands.

Scale = 1:11,206

Metres 200 400 600

(Scale correct at A4 size)

18/10/2011

D Chain of Custody

TWEED

D3736

x48 soil

→40 comp + 8 individual

Investigator: Tim Fitzroy
Tim Fitzroy & Associates
52 Alston Ave
Alstonville NSW 2477
Ph 02 66283837 Mobile 044 848 3837
Fax 02 6628 1349
Email: tim@timfitzroy.com.au

CHAIN OF CUSTODY FORM

Water, Soil or Sludge Samples for Laboratory Analysis

Project No. Name & Location: PN 34/3014 Byron Hospital Lot 100 DP 1140936 Ewingsdale Rd Ewingsdale

Date of Sampling:
26 May 2014

Name & Signature of Sampling Personnel:
TimFitzroy.....

Name of Courier: Tim Fitzroy.....

Sample Identification Code	Sample Type	Preservation Method	Laboratory Analysis Required
1-4 TFA 1 (TFA 1A, TFA 1B, TFA 1C, TFA 1D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
5-8 TFA 2 (TFA 2A, TFA 2B, TFA 2C, TFA 2D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
9-12 TFA 3 (TFA 3A, TFA 3B, TFA 3C, & TFA 3D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
13-16 TFA 4 (TFA 4A, TFA 4B, TFA 4C, & TFA 4D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
17-20 TFA 5, (TFA 5A, TFA 5B, TFA 5C, & TFA 5D)	Sample Depth 500mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)

21-24	TFA 6 (TFA 6A, TFA 6B, TFA 6C, & TFA 6D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
25-28	TFA 7 (TFA 7A, TFA 7B, TFA 7C, & TFA 7D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
29-32	TFA 8 (TFA 8A, TFA 8B, TFA 8C, & TFA 8D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
33-36	TFA 9 (TFA 9A, TFA 9B, TFA 9C, & TFA 9D)	Sample Depth 500mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
37-40	TFA 10 (TFA 10A, TFA 10B, TFA 10C, & TFA 10D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
	Quality Assurance			SU-PACK-029 Total Av. Metals
	~~Rinsate Blank~~		~~Chilled~~	
41	Blind Sample 1A	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
42	Blind Sample 1B	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
43	Blind Sample 2A	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
44	Blind Sample 2B	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
45	Spilt Sample 1A	Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
46	Spilt Sample 1B	Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)

47

48

Spilt Sample 2A	Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
Spilt Sample 2B	Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)

Investigator: I attest that the proper field sampling procedures were used during the collection of these samples: (Investigator signature required)

Laboratory Name & Address: Enviornmnetal Analysis Laboratory, Southern Cross University, Lismore.....

Relinquished By: Sampler Name (Print) (signature)

Date & Time Delivered:

Received By: Name & Signature of Laboratory Staff: L Whitby 26.5.14

Date & Time Delivered 26.5.14 3:25 pm.

Environmental Analysis Laboratory
Division of Research
Southern Cross University

Sample Receipt Notification (SRN)

Project:	**EAL/D3736**
Customer:	Tim Fitzroy & Associates
Contact:	Tim Fitzroy
Client Job ID:	PN 34/3014 Byron Hospital
No. of Samples	48 x soil; 10 x Composites.
Date Received:	26 MAY 2014
Comments:	composites 1-4, 5-8, 9-12, 13-16, 17-20, 21-24, 25-28, 29-32, 33-36, 37-40
Biller:	**Tim Fitzroy & Associates** - Tim Fitzroy - 02 66 283837

Division of Research
Southern Cross University
PO Box 157 Lismore NSW 2480

T: (02) 6620 3678
F: (02) 6620 3957
E: eal@scu.edu.au
W: scu.edu.au/eal
ABN: 41 995 651 524

Test Request

Sample Text ID	Client Sample ID	Contaminated Site Assessment 3	Soil Compositing
		SS-PACK-008	SS-PREP-004
D3736/(C)001	Samples(1,2,3,4)	1	0
D3736/(C)002	Samples(5,6,7,8)	1	0
D3736/(C)003	Samples(9,10,11,12)	1	0
D3736/(C)004	Samples(13,14,15,16)	1	0
D3736/(C)005	Samples(17,18,19,20)	1	0
D3736/(C)006	Samples(21,22,23,24)	1	0
D3736/(C)007	Samples(25,26,27,28)	1	0
D3736/(C)008	Samples(29,30,31,32)	1	0
D3736/(C)009	Samples(33,34,35,36)	1	0

Sample Receipt Notification (SRN) for EAL/D3736

		Contaminated Site Assessment 3	Soil Compositing
		SS-PACK-008	SS-PREP-004
D3736/(C)010	Samples(37,38,39,40)	1	0
D3736/001	TFA 1 A	0	1
D3736/002	TFA 1 B	0	1
D3736/003	TFA 1 C	0	1
D3736/004	TFA 1 D	0	1
D3736/005	TFA 2 A	0	1
D3736/006	TFA 2 B	0	1
D3736/007	TFA 2 C	0	1
D3736/008	TFA 2 D	0	1
D3736/009	TFA 3 A	0	1
D3736/010	TFA 3 B	0	1
D3736/011	TFA 3 C	0	1
D3736/012	TFA 3 D	0	1
D3736/013	TFA 4 A	0	1
D3736/014	TFA 4 B	0	1
D3736/015	TFA 4 C	0	1

Sample Receipt Notification (SRN) for EAL/D3736

		SS-PACK-008	SS-PREP-004
		Contaminated Site Assessment 3	Soil Compositing
D3736/016	TFA 4 D	0	1
D3736/017	TFA 5 A	0	1
D3736/018	TFA 5 B	0	1
D3736/019	TFA 5 C	0	1
D3736/020	TFA 5 D	0	1
D3736/021	TFA 6 A	0	1
D3736/022	TFA 6 B	0	1
D3736/023	TFA 6 C	0	1
D3736/024	TFA 6 D	0	1
D3736/025	TFA 7 A	0	1
D3736/026	TFA 7 B	0	1
D3736/027	TFA 7 C	0	1
D3736/028	TFA 7 D	0	1
D3736/029	TFA 8 A	0	1
D3736/030	TFA 8 B	0	1
D3736/031	TFA 8 C	0	1

Sample Receipt Notification (SRN) for EAL/D3736

		Contaminated Site Assessment 3	Soil Compositing
		SS-PACK-008	SS-PREP-004
D3736/032	TFA 8 D	0	1
D3736/033	TFA 9 A	0	1
D3736/034	TFA 9 B	0	1
D3736/035	TFA 9 C	0	1
D3736/036	TFA 9 D	0	1
D3736/037	TFA 10 A	0	1
D3736/038	TFA 10 B	0	1
D3736/039	TFA 10 C	0	1
D3736/040	TFA 10 D	0	1
D3736/041	Blind Sample 1A	1	0
D3736/042	Blind Sample 1B	1	0
D3736/043	Blind Sample 2A	1	0
D3736/044	Blind Sample 2B	1	0
D3736/045	Split Sample 1A	1	0
D3736/046	Split Sample 1B	1	0
D3736/047	Split Sample 2A	1	0

Sample Receipt Notification (SRN) for EAL/D3736

		Contaminated Site Assessment 3	Soil Compositing	SS-PACK-008	SS-PREP-004
D3736/048	Split Sample 2B	1	0		
Total		18	40		

Sample Receipt Notification (SRN) for EAL/D3736

Test Descriptions

Test List Item	Item Description
SS-PREP-004	**Soil Compositing** 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.
SS-PACK-008	**Contaminated Site Assessment 3** 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

x1 rinsate

03737-
rinsate

Investigator: Tim Fitzroy
Tim Fitzroy & Associates
52 Alston Ave
Alstonville NSW 2477
Ph 02 66283837 Mobile 044 848 3837
Fax 02 6628 1349
Email: tim@timfitzroy.com.au

CHAIN OF CUSTODY FORM

Water, Soil or Sludge Samples for Laboratory Analysis

Project No. Name & Location: PN 34/3014 Byron Hospital Lot 100 DP 1140936 Ewingsdale Rd Ewingsdale

Date of Sampling:
26 May 2014

Name & Signature of Sampling Personnel:
TimFitzroy.....

Name of Courier: Tim Fitzroy.....

Sample Identification Code	Sample Type	Preservation Method	Laboratory Analysis Required
TFA 1 (TFA 1A, TFA 1B, TFA 1C, TFA 1D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
TFA 2 (TFA 2A, TFA 2B, TFA 2C, TFA 2D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
TFA 3 (TFA 3A, TFA 3B, TFA 3C, & TFA 3D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
TFA 4 (TFA 4A, TFA 4B, TFA 4C, & TFA 4D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
TFA 5, (TFA 5A, TFA 5B, TFA 5C, & TFA 5D)	Sample Depth 500mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)

TFA 6 (TFA 6A, TFA 6B, TFA 6C, & TFA 6D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
TFA 7 (TFA 7A, TFA 7B, TFA 7C, & TFA 7D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
TFA 8 (TFA 8A, TFA 8B, TFA 8C, & TFA 8D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
TFA 9 (TFA 9A, TFA 9B, TFA 9C, & TFA 9D)	Sample Depth 500mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
TFA 10 (TFA 10A, TFA 10B, TFA 10C, & TFA 10D)	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
Quality Assurance Rinsate Blank		Chilled	SU-PACK-029 as per phone Total Av. Metals call 245
Blind Sample 1A	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
Blind Sample 1B	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
Blind Sample 2A	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
Blind Sample 2B	Soil (Composite) Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
Spilt Sample 1A	Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
Spilt Sample 1B	Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)

Spilt Sample 2A	Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)
Spilt Sample 2B	Sample Depth 0-75mm	Chilled	SS Pack 008 Contaminated Soil Analysis 3 Metal Screen & Organics Screen (OC's) ADD basic texture, boron, cobalt and beryllium to comply with NEPM (2013)

Investigator: I attest that the proper field sampling procedures were used during the collection of these samples: (Investigator signature required)

Laboratory Name & Address: Enviornmnetal Analysis Laboratory, Southern Cross University, Lismore.....

Relinquished By: Sampler Name (Print) (signature)

Date & Time Delivered:

Received By: Name & Signature of Laboratory Staff: L Whitby 26.5.14

Date & Time Delivered 26.5.14 3:25 pm.....

Environmental Analysis Laboratory
Division of Research
Southern Cross University

Sample Receipt Notification (SRN)

Project:	**EAL/D3737**
Customer:	Tim Fitzroy & Associates
Contact:	Tim Fitzroy
Client Job ID:	PN 34/3014 Byron Hospital
No. of Samples	1 x water
Date Received:	26 MAY 2014
Comments:	Rinsate
Biller:	**Tim Fitzroy & Associates** - Tim Fitzroy - 02 66 283837

Division of Research
Southern Cross University
PO Box 157 Lismore NSW 2480

T: (02) 6620 3678
F: (02) 6620 3957
E: eal@scu.edu.au
W: scu.edu.au/eal
ABN: 41 995 651 524

Test Request

Sample Text ID	Client Sample ID	Basic Metals Scan - Total Available/Acid Soluble	SW-PACK-029
D3737/001	Quality Assurance Rin	1	
Total		1	

Sample Receipt Notification (SRN) for EAL/D3737

Test Descriptions

Test List Item	Item Description
SW-PACK-029	**Basic Metals Scan - Total Available/Acid Soluble** Metals (Al, As, Cd, Cr,Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, Zn)

E Laboratory Results

RESULTS OF WATER ANALYSIS (Page 1 of 1)

1 sample supplied by Tim Fitzroy & Associates on the 26th May, 2014 - Lab. Job No. D3737

Analysis requested by Tim Fitzroy. **Your Project: 34/3014 Byron Hospital Lot 100 DP 1140936 Ewingsdale Rd, Ewingsdale**

(52 Alston Ave, ALSTONVILLE NSW 2477)

PARAMETER	METHODS REFERENCE	Sample 1 QA Rinsate Blank
	Job No.	*D3275/1*
SILVER (mg/L)	APHA 3125 ICPMS*note 1&2	<0.001
ALUMINIUM (mg/L)	APHA 3125 ICPMS*note 1&2	0.735
ARSENIC (mg/L)	APHA 3125 ICPMS*note 1&2	<0.001
CADMIUM (mg/L)	APHA 3125 ICPMS*note 1&2	<0.001
CHROMIUM (mg/L)	APHA 3125 ICPMS*note 1&2	0.001
COPPER (mg/L)	APHA 3125 ICPMS*note 1&2	0.009
IRON (mg/L)	APHA 3125 ICPMS*note 1&2	0.651
MANGANESE (mg/L)	APHA 3125 ICPMS*note 1&2	0.025
NICKEL (mg/L)	APHA 3125 ICPMS*note 1&2	0.002
LEAD (mg/L)	APHA 3125 ICPMS*note 1&2	0.001
SELENIUM (mg/L)	APHA 3125 ICPMS*note 1&2	<0.002
ZINC (mg/L)	APHA 3125 ICPMS*note 1&2	0.169
MERCURY (mg/L)	APHA 3125 ICPMS*note 1&2	<0.0005

Notes:

1. Total available (acid soluble/ extractable) metals - samples acidified with nitric acid to <2pH.
2. Metals analysed by ICP-MS (Inductively Coupled Plasma - Mass Spectrometry) or ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry)
3. 1 mg/L (milligram per litre) = 1 ppm (part per million) = 1000 µg/L (micrograms per litre)= 1000 ppb (part per billion)
4. Analysis performed according to APHA, 2012, "Standard Methods for the Examination of Water & Wastewater", 22nd Edition, except where stated otherwise.
5. Analysis conducted between sample arrival date and Report provision date

NATA
WORLD RECOGNISED ACCREDITATION
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

48 soil samples supplied by Tim Fitzroy & Associates on the 26th May, 2014 - Lab Job No. D3736
Soil samples supplied were composited by EAL into 10 composite samples for analysis
Analysis requested by Tim Fitzroy. **Your Job: PN 34/3014 - Byron Hospital**
(52 Alston Ave, ALSTONVILLE NSW 2477).

ANALYTE	METHOD REFERENCE	Sample 41 Blind Sample 1A	Sample 42 Blind Sample 1B	Sample 43 Blind Sample 2A	Sample 44 Blind Sample 2B	Sample 45 Split Sample 1A	Sample 46 Split Sample 1B	Sample 47 Split Sample 2A	Sample 48 Split Sample 2B	*RESIDENTIAL A Guideline Limit* *Composite - Column A*	*RESIDENTIAL A Guideline Limit* *Individual - Column A*	*Background Range*
	Job No.	*D3736/41*	*D3736/42*	*D3736/43*	*D3736/44*	*D3736/45*	*D3736/46*	*D3736/47*	*D3736/48*	*See note 1a*	*See note 1a*	*See note 2*
TEXTURE (SAND, CLAY, SILT)	inhouse	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	..	..	..
MOISTURE %	c	20	27	21	23	18	18	20	28	..	..	..
SILVER (mg/Kg DW)	*a*	<1	<1	<1	<1	<1	<1	<1	<1	*na*	*na*	*na*
ARSENIC (mg/Kg DW)	*a*	4	3	2	1	3	2	2	1	*25*	*100*	*0.2-30*
LEAD (mg/Kg DW)	*a*	9	11	13	13	10	9	7	8	*75*	*300*	*<2-200*
CADMIUM (mg/Kg DW)	*a*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	*5*	*20*	*0.04-2.0*
CHROMIUM (mg/Kg DW)	*a*	85	90	80	81	80	75	73	76	*(<25)*	*(<100)*	*0.5-110*
COPPER (mg/Kg DW)	*a*	21	23	26	25	20	19	20	22	*1,500*	*6,000*	*1-190*
MANGANESE (mg/Kg DW)	*a*	1,094	1,188	1,407	1,401	1,095	1,001	1,307	1,427	*950*	*3,800*	*4 - 12,600*
NICKEL (mg/Kg DW)	*a*	31	33	26	25	23	24	23	25	*100*	*400*	*2-400*
SELENIUM (mg/Kg DW)	*a*	2	2	2	2	<2	<2	<2	<2	*50*	*200*	*na*
ZINC (mg/Kg DW)	*a*	92	95	77	75	87	85	76	87	*1,850*	*7,400*	*2-180*
MERCURY (mg/Kg DW)	*a*	0.24	0.22	0.19	0.16	0.19	0.15	0.19	0.18	*10*	*40*	*0.001-0.1*
IRON (% DW)	*a*	10.61	11.48	11.06	10.89	10.85	10.34	9.93	10.34	*na*	*na*	*na*
ALUMINIUM (% DW)	*a*	7.89	8.73	5.85	6.16	6.82	7.13	5.52	5.79	*na*	*na*	*na*
BERYLLIUM (mg/Kg DW)	*a*	<1	<1	<1	<1	<1	<1	<1	<1	*15*	*60*	*na*
BORON (mg/Kg DW)	*a*	3	3	2	2	3	3	2	2	*1,125*	*4,500*	*na*
COBALT (mg/Kg DW)	*a*	8	9	11	10	7	7	8	9	*25*	*100*	*na*
PESTICIDE ANALYSIS SCREEN												
DDT+DDE+DDD (mg/Kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*60*	*240*	*<0.1*
Aldrin + Dieldrin (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*2*	*6*	*<0.1*
Chlordane (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*13*	*50*	*<0.1*
Endosulfan (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*68*	*270*	*<0.1*
Endrin (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*3*	*10*	*<0.1*
Heptachlor (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*2*	*6*	*<0.1*
HCB (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*3*	*10*	*<0.1*
Methoxychlor (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*75*	*300*	*<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*

METHODS REFERENCE

a. 1:3 Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3 Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab report no. 110574

NATA
Accreditation No. 14906
Accredited for compliance with ISO/IEC 17025.

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.

Additional NOTES

DW = Dry Weight. na = no guidelines available

Organochlorine pesticide (OC's) screen: (HCB, alpha-BHC, gamma-BHC, Heptachlor, delta-BHC, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, Endosulfan 1, pp-DDE, Dieldrin, Endrin, pp-DDD, Endosulfan 2, pp-DDT, Endrin Aldehyde, Endosulfan Sulphate, Methoxychlor)

checked:.....

RESULTS OF SOIL ANALYSIS

48 soil samples supplied by Tim Fitzroy & Associates on the 26th May, 2014 - Lab Job No. D3736
Soil samples supplied were composited by EAL into 10 composite samples for analysis
Analysis requested by Tim Fitzroy. **Your Job: PN 34/3014 - Byron Hospital**
(52 Alston Ave, ALSTONVILLE NSW 2477).

ANALYTE	METHOD REFERENCE	Sample 41 Blind Sample 1A	Sample 42 Blind Sample 1B	Sample 43 Blind Sample 2A	Sample 44 Blind Sample 2B	Sample 45 Split Sample 1A	Sample 46 Split Sample 1B	Sample 47 Split Sample 2A	Sample 48 Split Sample 2B	*RESIDENTIAL A Guideline Limit* *Composite - Column A*	*RESIDENTIAL A Guideline Limit* *Individual - Column A*	*Background Range*
	Job No.	*D3736/41*	*D3736/42*	*D3736/43*	*D3736/44*	*D3736/45*	*D3736/46*	*D3736/47*	*D3736/48*	*See note 1a*	*See note 1a*	*See note 2*
TEXTURE (SAND, CLAY, SILT)	inhouse	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	..	..	..
MOISTURE %	c	20	27	21	23	18	18	20	28	..	..	..
SILVER (mg/Kg DW)	*a*	<1	<1	<1	<1	<1	<1	<1	<1	*na*	*na*	*na*
ARSENIC (mg/Kg DW)	*a*	4	3	2	1	3	2	2	1	*25*	*100*	*0.2-30*
LEAD (mg/Kg DW)	*a*	9	11	13	13	10	9	7	8	*75*	*300*	*<2-200*
CADMIUM (mg/Kg DW)	*a*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	*5*	*20*	*0.04-2.0*
CHROMIUM (mg/Kg DW)	*a*	85	90	80	81	80	75	73	76	*(<25)*	*(<100)*	*0.5-110*
COPPER (mg/Kg DW)	*a*	21	23	26	25	20	19	20	22	*1,500*	*6,000*	*1-190*
MANGANESE (mg/Kg DW)	*a*	1,094	1,188	1,407	1,401	1,095	1,001	1,307	1,427	*950*	*3,800*	*4 - 12,600*
NICKEL (mg/Kg DW)	*a*	31	33	26	25	23	24	23	25	*100*	*400*	*2-400*
SELENIUM (mg/Kg DW)	*a*	2	2	2	2	<2	<2	<2	<2	*50*	*200*	*na*
ZINC (mg/Kg DW)	*a*	92	95	77	75	87	85	76	87	*1,850*	*7,400*	*2-180*
MERCURY (mg/Kg DW)	*a*	0.24	0.22	0.19	0.16	0.19	0.15	0.19	0.18	*10*	*40*	*0.001-0.1*
IRON (% DW)	*a*	10.61	11.48	11.06	10.89	10.85	10.34	9.93	10.34	*na*	*na*	*na*
ALUMINIUM (% DW)	*a*	7.89	8.73	5.85	6.16	6.82	7.13	5.52	5.79	*na*	*na*	*na*
BERYLLIUM (mg/Kg DW)	*a*	<1	<1	<1	<1	<1	<1	<1	<1	*15*	*60*	*na*
BORON (mg/Kg DW)	*a*	3	3	2	2	3	3	2	2	*1,125*	*4,500*	*na*
COBALT (mg/Kg DW)	*a*	8	9	11	10	7	7	8	9	*25*	*100*	*na*
PESTICIDE ANALYSIS SCREEN												
DDT+DDE+DDD (mg/Kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*60*	*240*	*<0.1*
Aldrin + Dieldrin (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*2*	*6*	*<0.1*
Chlordane (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*13*	*50*	*<0.1*
Endosulfan (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*68*	*270*	*<0.1*
Endrin (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*3*	*10*	*<0.1*
Heptachlor (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*2*	*6*	*<0.1*
HCB (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*3*	*10*	*<0.1*
Methoxychlor (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*75*	*300*	*<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*

METHODS REFERENCE

a. 1:3 Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3 Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab report no. 110574

NATA
Accreditation No. 14906
Accredited for compliance with ISO/IEC 17025.

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.

Additional NOTES

DW = Dry Weight. na = no guidelines available

Organochlorine pesticide (OC's) screen: (HCB, alpha-BHC, gamma-BHC, Heptachlor, delta-BHC, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, Endosulfan 1, pp-DDE, Dieldrin, Endrin, pp-DDD, Endosulfan 2, pp-DDT, Endrin Aldehyde, Endosulfan Sulphate, Methoxychlor)

checked:.....

RESULTS OF SOIL ANALYSIS

48 soil samples supplied by Tim Fitzroy & Associates on the 26th May, 2014 - Lab Job No. D3736
Soil samples supplied were composited by EAL into 10 composite samples for analysis
Analysis requested by Tim Fitzroy. **Your Job: PN 34/3014 - Byron Hospital**
(52 Alston Ave, ALSTONVILLE NSW 2477).

ANALYTE	METHOD REFERENCE	Composite Sample 1 TFA 1A, TFA 1B, TFA 1C & TFA 1D	Composite Sample 2 TFA 2A, TFA 2B, TFA 2C & TFA 2D	Composite Sample 3 TFA 3A, TFA 3B, TFA 3C & TFA 3D	Composite Sample 4 TFA 4A, TFA 4B, TFA 4C & TFA 4D	Composite Sample 5 TFA 5A, TFA 5B, TFA 5C & TFA 5D	Composite Sample 6 TFA 6A, TFA 6B, TFA 6C & TFA 6D	Composite Sample 7 TFA 7A, TFA 7B, TFA 7C & TFA 7D	Composite Sample 8 TFA 8A, TFA 8B, TFA 8C & TFA 8D	Composite Sample 9 TFA 9A, TFA 9B, TFA 9C & TFA 9D	Composite Sample 10 TFA 10A, TFA 10B, TFA 10C & TFA 10D	*RESIDENTIAL A Guideline Limit*		*Background Range*
												Composite - Column A	*Individual - Column A*	
	Job No.	*D3736/C1*	*D3736/C2*	*D3736/C3*	*D3736/C4*	*D3736/C5*	*D3736/C6*	*D3736/C7*	*D3736/C8*	*D3736/C9*	*D3736/C10*	*See note 1a*	*See note 1a*	*See note 2*
TEXTURE (SAND, CLAY, SILT)	inhouse	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	..	..	..
MOISTURE %	c	26	24	22	23	20	19	17	24	22	22	..	..	..
SILVER (mg/Kg DW)	*a*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	*na*	*na*	*na*
ARSENIC (mg/Kg DW)	*a*	4	3	3	3	3	3	4	2	3	2	*25*	*100*	*0.2-30*
LEAD (mg/Kg DW)	*a*	13	13	10	10	11	9	10	9	10	26	*75*	*300*	*<2-200*
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	*5*	*20*	*0.04-2.0*
CHROMIUM (mg/Kg DW)	*a*	82	79	84	68	78	69	89	82	87	82	*(<25)*	*(<100)*	*0.5-110*
COPPER (mg/Kg DW)	*a*	24	19	22	22	17	21	20	20	21	22	*1,500*	*6,000*	*1-190*
MANGANESE (mg/Kg DW)	*a*	1,395	1,070	1,467	1,625	1,179	1,666	1,107	1,157	1,301	1,219	*950*	*3,800*	*4 - 12,600*
NICKEL (mg/Kg DW)	*a*	23	21	23	20	23	20	25	26	29	25	*100*	*400*	*2-400*
SELENIUM (mg/Kg DW)	*a*	2	2	1	1	1	2	2	2	1	2	*50*	*200*	*na*
ZINC (mg/Kg DW)	*a*	81	69	72	85	74	73	78	79	95	83	*1,850*	*7,400*	*2-180*
MERCURY (mg/Kg DW)	*a*	0.22	0.21	0.24	0.23	0.23	0.24	0.20	0.19	0.18	0.18	*10*	*40*	*0.001-0.1*
IRON (% DW)	*a*	10.20	10.26	10.25	9.94	9.73	9.74	11.54	11.01	11.75	11.04	*na*	*na*	*na*
ALUMINIUM (% DW)	*a*	7.32	7.24	7.20	6.74	7.46	6.51	8.27	6.98	8.41	6.26	*na*	*na*	*na*
BERYLLIUM (mg/Kg DW)	*a*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	*15*	*60*	*na*
BORON (mg/Kg DW)	*a*	3	2	2	2	3	3	2	3	2	2	*1,125*	*4,500*	*na*
COBALT (mg/Kg DW)	*a*	10	8	10	8	9	8	9	9	10	9	*25*	*100*	*na*
PESTICIDE ANALYSIS SCREEN														
DDT+DDE+DDD (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*	*<0.1*
Aldrin + Dieldrin (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*	*<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	*13*	*50*	*<0.1*
Endosulfan (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*68*	*270*	*<0.1*
Endrin (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*	*<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*	*<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*	*<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*	*<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*

METHODS REFERENCE

a. 1:3 Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3 Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab report no. 110574

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

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.

Additional NOTES

DW = Dry Weight. na = no guidelines available

Organochlorine pesticide (OC's) screen: (HCB, alpha-BHC, gamma-BHC, Heptachlor, delta-BHC, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, Endosulfan 1, pp-DDE, Dieldrin, Endrin, pp-DDD, Endosulfan 2, pp-DDT, Endrin Aldehyde, Endosulfan Sulphate, Methoxychlor)

Organophosphorus pesticide (OP's) screen: (Diazinon, Dimethoate, Chlorpyriphos-methyl, Ronnel, Chlorpyriphos, Fenitrathion, Bromophos-ethyl, Ethion)

PCB's = Polychloriniated Biphenyls (Arochlor 1016, 1232, 1242, 1248, 1254, 1260)

checked:.....

RESULTS OF SOIL ANALYSIS

48 soil samples supplied by Tim Fitzroy & Associates on the 26th May, 2014 - Lab Job No. D3736
Soil samples supplied were composited by EAL into 10 composite samples for analysis
Analysis requested by Tim Fitzroy. **Your Job: PN 34/3014 - Byron Hospital**
(52 Alston Ave, ALSTONVILLE NSW 2477).

ANALYTE	METHOD REFERENCE	Composite Sample 1 TFA 1A, TFA 1B, TFA 1C & TFA 1D	Composite Sample 2 TFA 2A, TFA 2B, TFA 2C & TFA 2D	Composite Sample 3 TFA 3A, TFA 3B, TFA 3C & TFA 3D	Composite Sample 4 TFA 4A, TFA 4B, TFA 4C & TFA 4D	Composite Sample 5 TFA 5A, TFA 5B, TFA 5C & TFA 5D	Composite Sample 6 TFA 6A, TFA 6B, TFA 6C & TFA 6D	Composite Sample 7 TFA 7A, TFA 7B, TFA 7C & TFA 7D	Composite Sample 8 TFA 8A, TFA 8B, TFA 8C & TFA 8D	Composite Sample 9 TFA 9A, TFA 9B, TFA 9C & TFA 9D	Composite Sample 10 TFA 10A, TFA 10B, TFA 10C & TFA 10D	*RESIDENTIAL A Guideline Limit*		*Background Range*
												Composite - Column A	*Individual - Column A*	
	Job No.	*D3736/C1*	*D3736/C2*	*D3736/C3*	*D3736/C4*	*D3736/C5*	*D3736/C6*	*D3736/C7*	*D3736/C8*	*D3736/C9*	*D3736/C10*	*See note 1a*	*See note 1a*	*See note 2*
TEXTURE (SAND, CLAY, SILT)	inhouse	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	..	..	..
MOISTURE %	c	26	24	22	23	20	19	17	24	22	22	..	..	..
SILVER (mg/Kg DW)	*a*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	*na*	*na*	*na*
ARSENIC (mg/Kg DW)	*a*	4	3	3	3	3	3	4	2	3	2	*25*	*100*	*0.2-30*
LEAD (mg/Kg DW)	*a*	13	13	10	10	11	9	10	9	10	26	*75*	*300*	*<2-200*
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	*5*	*20*	*0.04-2.0*
CHROMIUM (mg/Kg DW)	*a*	82	79	84	68	78	69	89	82	87	82	*(<25)*	*(<100)*	*0.5-110*
COPPER (mg/Kg DW)	*a*	24	19	22	22	17	21	20	20	21	22	*1,500*	*6,000*	*1-190*
MANGANESE (mg/Kg DW)	*a*	1,395	1,070	1,467	1,625	1,179	1,666	1,107	1,157	1,301	1,219	*950*	*3,800*	*4 - 12,600*
NICKEL (mg/Kg DW)	*a*	23	21	23	20	23	20	25	26	29	25	*100*	*400*	*2-400*
SELENIUM (mg/Kg DW)	*a*	2	2	1	1	1	2	2	2	1	2	*50*	*200*	*na*
ZINC (mg/Kg DW)	*a*	81	69	72	85	74	73	78	79	95	83	*1,850*	*7,400*	*2-180*
MERCURY (mg/Kg DW)	*a*	0.22	0.21	0.24	0.23	0.23	0.24	0.20	0.19	0.18	0.18	*10*	*40*	*0.001-0.1*
IRON (% DW)	*a*	10.20	10.26	10.25	9.94	9.73	9.74	11.54	11.01	11.75	11.04	*na*	*na*	*na*
ALUMINIUM (% DW)	*a*	7.32	7.24	7.20	6.74	7.46	6.51	8.27	6.98	8.41	6.26	*na*	*na*	*na*
BERYLLIUM (mg/Kg DW)	*a*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	*15*	*60*	*na*
BORON (mg/Kg DW)	*a*	3	2	2	2	3	3	2	3	2	2	*1,125*	*4,500*	*na*
COBALT (mg/Kg DW)	*a*	10	8	10	8	9	8	9	9	10	9	*25*	*100*	*na*
PESTICIDE ANALYSIS SCREEN														
DDT+DDE+DDD (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*	*<0.1*
Aldrin + Dieldrin (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*	*<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	*13*	*50*	*<0.1*
Endosulfan (mg/kg)	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	*68*	*270*	*<0.1*
Endrin (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*	*<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*	*<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*	*<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*	*<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*

METHODS REFERENCE

a. 1:3 Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3 Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab report no. 110574

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

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.

Additional NOTES

DW = Dry Weight. na = no guidelines available

Organochlorine pesticide (OC's) screen: (HCB, alpha-BHC, gamma-BHC, Heptachlor, delta-BHC, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, Endosulfan 1, pp-DDE, Dieldrin, Endrin, pp-DDD, Endosulfan 2, pp-DDT, Endrin Aldehyde, Endosulfan Sulphate, Methoxychlor)

Organophosphorus pesticide (OP's) screen: (Diazinon, Dimethoate, Chlorpyriphos-methyl, Ronnel, Chlorpyriphos, Fenitrathion, Bromophos-ethyl, Ethion)

PCB's = Polychloriniated Biphenyls (Arochlor 1016, 1232, 1242, 1248, 1254, 1260)

checked:.....