APPENDIX J

Land Contamination Assessment
Stage 1 – Preliminary Assessment

ARDILL PAYNE & PARTNERS

Civil & Structural Engineers – Project Managers – Town Planners – Surveyors

LAND CONTAMINATION ASSESSMENT

STAGE 1 PRELIMINARY INVESTIGATION

Submission to Ballina Shire Council

PROPOSED SAND EXTRACTION INDUSTRY
at
Lot 32 DP 1151612
Newrybar Swamp Road, Lennox Head

for:
Ballina Sands

January 2013

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1 Executive Summary

Ardill Payne and Partners (APP) has been engaged by Ballina Sands Pty Ltd to undertake a Preliminary Contaminated Site Investigation to support a development application and Environmental Impact Assessment for a proposed extractive industry (sand quarry) on Lot 32 DP 1151612.

A desk-top site history assessment of the site and adjacent areas was undertaken. Information to assist in the site history was collected and collated. A site inspection was undertaken to identify potential areas of contamination around the 15 ha proposed sand extraction area.

Based on the desk-top site history assessment and the site inspection, it was considered that one AEC required further investigation:

- agricultural use including sugar cane and cattle grazing.

Two potential contaminants of concern were identified for the site:

- organo-chlorine pesticides/herbicides; and,
- metals.

Systematic soil sampling was undertaken on the site, 9 samples were collected and 3 composite samples analysed for the potential contaminants of concern. None of the samples submitted resulted in levels reaching or exceeding the relevant assessment criteria (HIL A and HIL F) and were consistent with natural background levels (NEPM, 1999).

Based on the findings of this assessment, it is submitted that further investigation is **not required** and that the **site is suitable** for the proposed use.

2 Introduction

Ardill Payne and Partners (APP) has been engaged by Ballina Sands Pty Ltd to undertake a Preliminary Contaminated Site Investigation to inform and support a development application and statement of environmental effects for a new sand extractive industry on Lot 32 DP 1151612, Newrybar Swamp Road, Lennox Head.

An existing sand extraction quarry has been operating on the adjacent site (lot 33 DP 1151612) for the last 10 years. Upon conclusion of extraction of sand at this site, it is proposed to move extraction activities onto the adjacent site which is the subject of this report.

The location of the property is shown in **Figure 1**: - Location of subject land (Google, 2012) below:

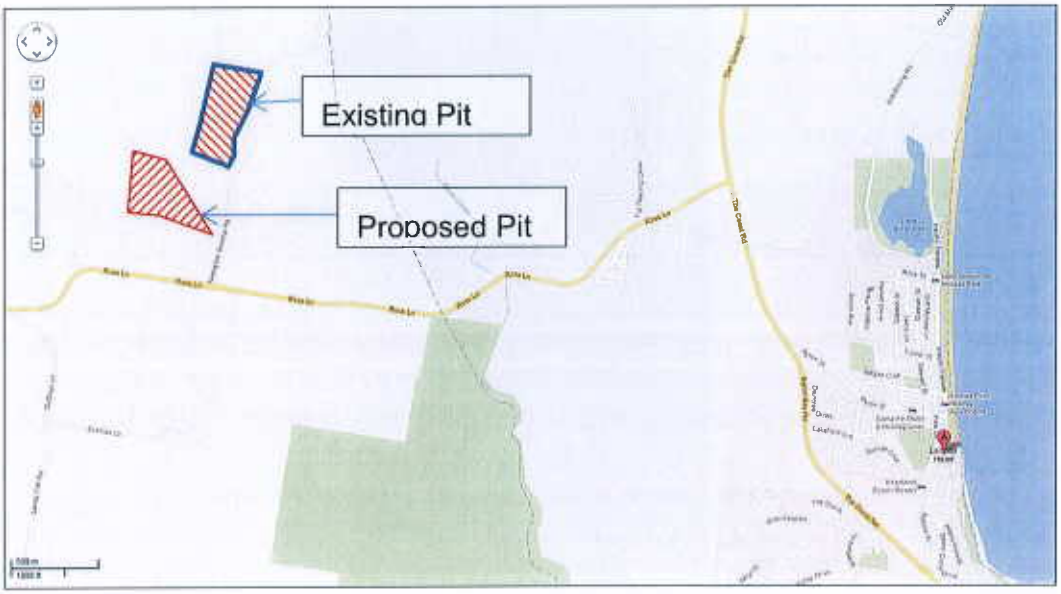


Figure 1: - Location of subject land (Google, 2012)

A plan of the subject property is provided in **Attachment 1**.

It is proposed that there will be a change of use for the property from agricultural use (cattle grazing) to extractive industrial industry.

3 Scope of Works

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

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

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

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

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

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

(3) The applicant for development consent must carry out the investigation required by subclause (2) and must provide a report on it to the consent authority…"

This Land Contamination Assessment has been prepared to address these SEPP 55 requirements. The proposed partial change of use is from existing agriculture (cattle grazing) to extractive industry.

The Land Contamination Assessment takes the form of a Stage 1 – Preliminary Investigation which has been prepared in accordance with the *Managing Land Contamination Planning Guidelines* (Department of Urban

Affairs [DUAP] and Environment Protection Authority [EPA] 1998) and the *Guidelines for Consultants Reporting on Contaminated Sites* (EPA, 2000).

This Stage 1 preliminary investigation has:

- Described the site conditions and surrounding environment;
- Provided a summary of the site history;
- Identified past and present potentially contaminating activities and potential contaminant types;
- Provided a preliminary assessment of the site contamination;
- Assessed the need for further investigations;
- Assessed soil sample analysis results against relevant criteria; and
- Assessed the suitability of the site for the proposed use.

Relevant guidelines and references used in the preparation of this investigation are presented in **Section 14** of this report.

4 Methodology

This Stage 1 – Preliminary Investigation has been undertaken to identify the potential for contamination within the site. A desk-top site history assessment and a site inspection have been conducted as part of this investigation.

The desk-top site history assessment encompassed the site and adjacent areas. Information used to assist in the assessment was collected and collated from the following sources:

- Review of available site history details;
- NSW Land and Property Information (LPI) – Historic Title Search;
- Historical aerial photographs;
- NSW Office of Environment and Heritage's (OEH) *Protection of Environment Operations Act 1997* (POEO Act) Public Register;
- OEH's Contaminated Land – Record of Notices; and
- NSW Primary Industries: Cattle dip site locator.

The site inspection included:

- Identification of potential sources and areas of contamination; and
- Preliminary soil sampling at areas identified as potentially contaminated during the site inspection.

5 Site Identification

Table 1 below provides details of the subject land which are of relevance to the proposed contamination investigation.

Table 1: Current Site Identification Details

Site Address	Newrybar Swamp Road, Lennox Head
Site Area	Total site – approximately 48.69 ha
Real Property Description	Lot 32 DP 1151612
Local Government Area	Ballina Shire Council
Zoning	1 (a2) Rural (Coastal Lands Agriculture Zone) BLEP 1987 RU1 – Primary Production – DRAFT Ballina LEP 2011
Site Features	Flat sugar cane land
Elevation	Between 3.00-5.00m AHD.
Existing Land Use	Agricultural
Surrounding Environment	The subject land is situated within a rural/rural residential area. The broader locality is predominated by a mix of agricultural pursuits including cattle grazing and horticulture (predominantly macadamias and sugar cane). The locality is also characterised by scattered rural dwellings and associated farm buildings and cleared grazing land and stands of bushland. Directly to the north is an existing sand quarry that provides filling sand for developments within the local area.

5.1 Subject Land

A copy of the proposed layout plan is provided in **Attachment 2**,

6 Site Condition and Surrounding Environment

A desk-top study of the site was undertaken to establish the constraints to the project.

6.1 Surrounding Environment

The subject land is situated within a rural/rural residential area. The broader locality is predominated by a mix of agricultural pursuits including cattle grazing and horticulture (predominately macadamia and sugar cane). The locality is also characterised by scattered rural dwellings and associated farm buildings and cleared grazing land and stands of bushland. To the north, the existing sand quarry provides filling sand for developments within the local area. This extractive industry will be completed within the next few years, and hence the requirement for further extractive industries in the area.

6.2 Topography

The subject and adjoining land is situated on the Newrybar coastal plain. The property has elevations ranging from 3 - 5 m AHD. To the east the Newrybar Drain flows into the North Creek, which meets the Richmond River at Ballina.

6.3 Soils

Soils maps for the area were obtained from *Soil Landscapes of the Lismore-Ballina* (Morand, 1994) which map the land proposed to be used for the sand extraction quarry as:

"Ty – Tyagrah" landscape

- Landscape – Quaternary estuarine alluvium overlain by and/or mixed with Quaternary (Pleistocene) sands. Sands are generally aeolian, originating from the adjacent beach ridge systems. Slopes 0-1%, watertables within 100-200cm, elevation 2-5m.
- Soils dark course sand. Soil pH 4.5-5.0, occasionally 7.0-7.5.

A small portion of the site is mapped as:

"waa – Wardell" landscape

- Landscape – Quaternary (Pleistocene) sand sheets and barrier dunes consisting of aeolian and marine quartz sands. Slope 1-3%, elevation 5-6m. Areas shown as waa are very low isolated transgressive sand dunes that are now stabilised. These dunes have formed inland of the inner barrier. Historic sandmining has occurred in places and these areas are marked on the below map as Disturbed Terrain **(xx)**.

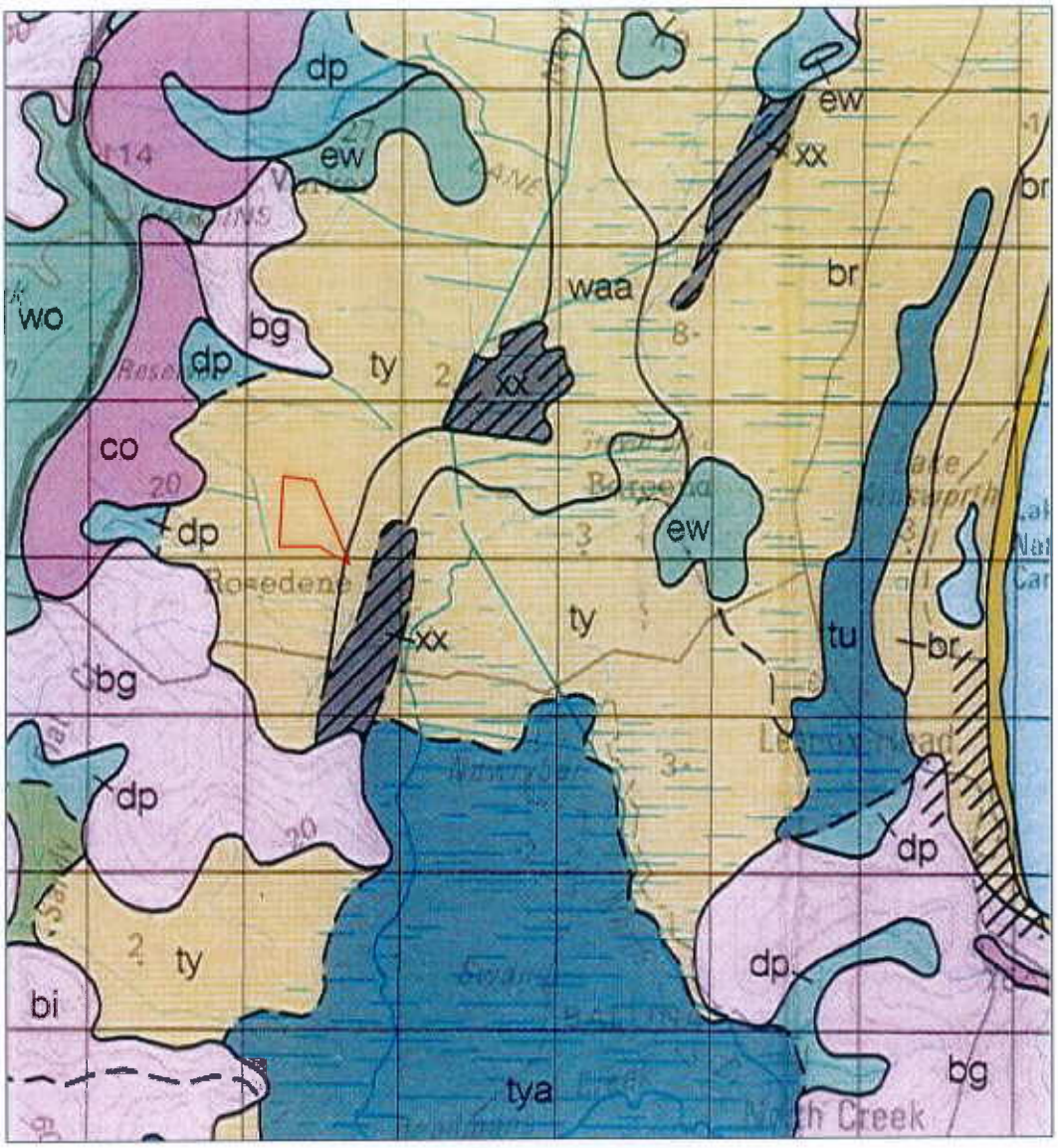


Figure 2 - Soils Map – (Morand, 1994)

6.4 Flooding

The DRAFT Ballina LEP 2011 shows the regional flood level at the site is 2.6m AHD. As the minimum levels on site are 3.0m AHD, the site should not be affected by such flooding.

The site is also surrounded by drains which have been used to reduce groundwater levels to improve agricultural productivity. These drains require routine maintenance to ensure continued conveyance of flash flooding from the catchment to the west. With continued maintenance, localised flooding should not impact the site.

6.5 Acid Sulphate Soils

The elevated areas of the site are mapped as being Class 3 Acid Sulfate Soils (ASS) as indicated in **Figure 3** below. Therefore works more than 1m below the natural ground surface are likely to have an ASS impact. As proposed works will involve excavation to 6m below ground level (mbgl), an Acid Sulfate Soils Management Plan has been prepared as part of the EIS documentation.

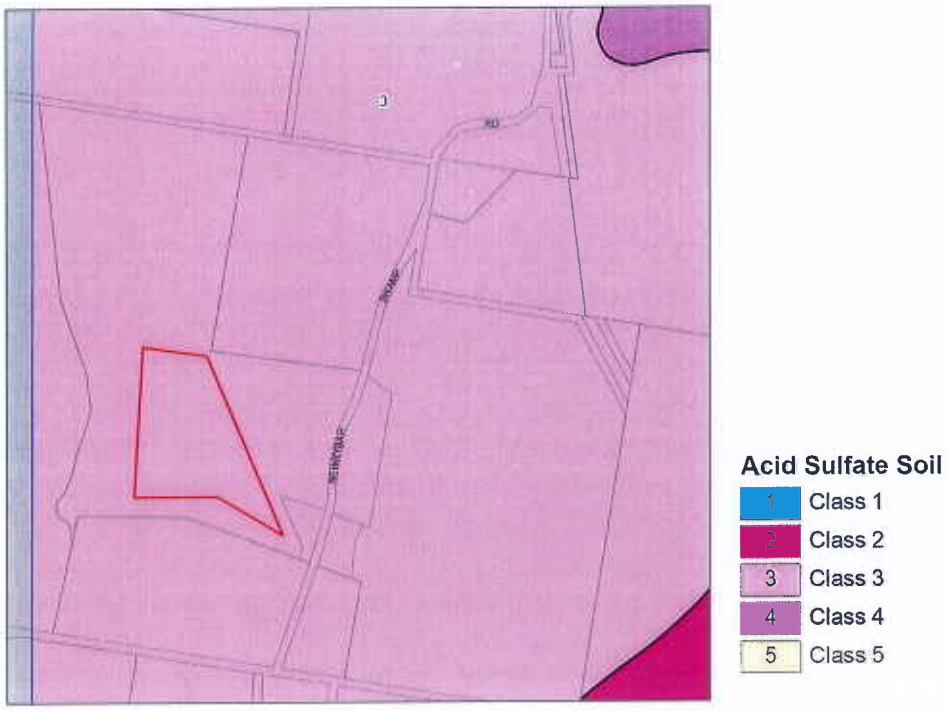


Figure 3: ASS Map (Source BSC DBLEP 2011)

6.6 Groundwater Resources

A search of existing licensed groundwater bores was undertaken on 16th May 2012 using the NSW Natural Resources Atlas (NRA) website (DNR). The search indicates that no groundwater bores are located within 250m of the proposed development. The closest bores are located approximately 2000m to the west and south west. A map showing the groundwater resources is

presented in **Figure 4.**.

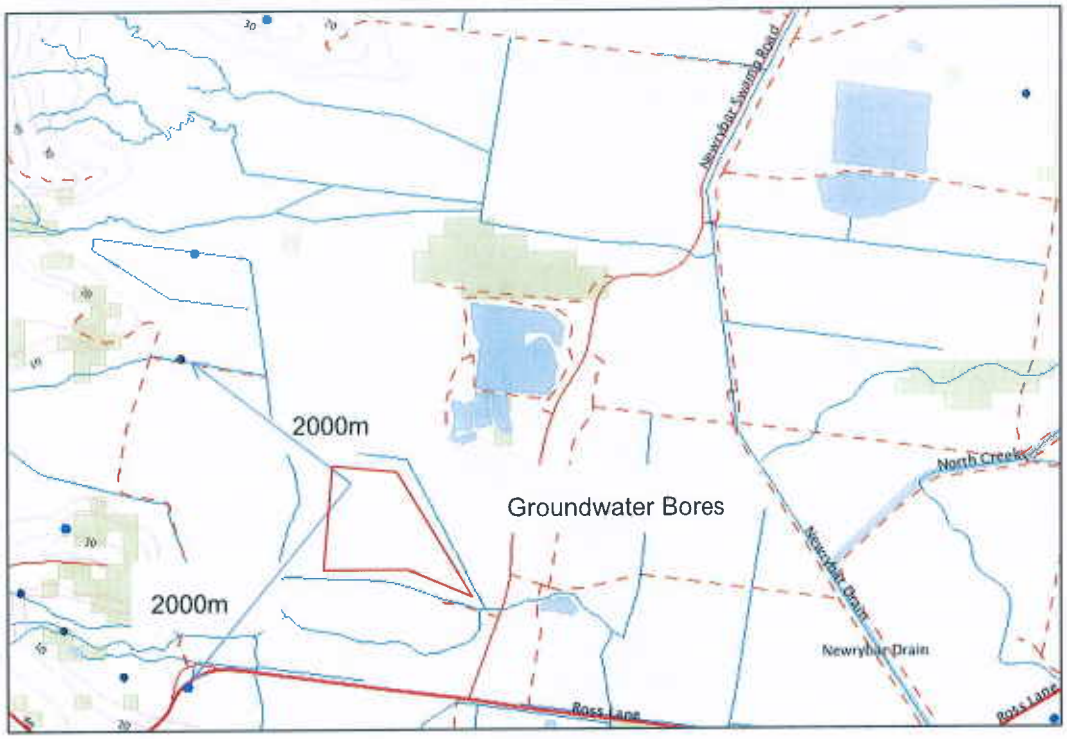


Figure 4: Groundwater resources

(Accessed 16/05/12 www.nratlas.nsw.gov.au © 2012)

7 Site History

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

- Review of available site history details;
- A Site History Statement from the current owner;
- LPI – Historic Title Search;
- Historical aerial photographs;
- OEH's POEO Act Public Register;
- OEH's Contaminated Land – Record of Notices; and
- NSW Primary Industries: Cattle dip site locator.

The findings of the desk-top site history assessment are summarised below.

7.1 Site History Overview

A Site History Assessment Questionnaire was completed by Robert Watson dated 9 May 2012. A copy of the signed site history statement is included in **Attachment 3**.

Length of association of knowledge of the property

- The Watson family has owned the property since January 1989.
- Land had recently been cleared when Watson purchased land.
- Cattle grazed until 1997.
- Sugar cane planted 1997 until 2006.
- Returned to pasture 2006.

Historical Use of Adjacent Land

- Fallow, grazing cattle and sugar cane.

Chemicals

General: Weed control – Roundup, Paraquat, Diuron.

No storage on site. Used according to recommendations.

Tanks

- ***Provide details, uses and locations of any current and former tanks – underground/above ground.***

Nil

Manufacturing/Industry

- ***Description of any manufacturing/industry processes on the site including locations and dates.***

Nil

Asbestos

- ***Provide details of any asbestos used in past or present buildings.***

Nil

Water Use

- ***Describe any usage of ground/surface water and bore/pump locations.***

Nil.

Sewage Disposal

- ***Describe any sewage disposal areas.***

Nil.

Indicators of Contamination

- ***Describe any areas of soil discolouration, bare soil patches, poor plant growth or stress, odours, complaints from neighbours etc.***

Nil

7.2 Historical Aerial Photographs

Copies of the historical aerial photographs are provided in **Figure 5** to **Figure 10**. A summary of the aerial photography is presented in **Table 2** below:

Table 2: Aerial Photo Chronology

Historical Aerial Photographs Observations	
1947	Vegetation visible on approximately one third of property in south eastern corner Less vegetation to the west Ross Lane visible to the south Drainage has not be formalised over the site Cleared area to the east of the site – possible sand mining
1967	Vegetation visible on majority of site Scrubby regrowth over the western side of the property Some improvements to drainage to the north of the subject area
1979	Sugar cane / crop on western portion of property Drainage line visible/ thickly vegetated on eastern half of property Formalised drainage over site as part of sugar cane use Pond has appeared to the east – probable sand mining activity
1987	Property totally cleared of vegetation Planted with sugar cane All drainage lines have been improved and straightened Paddocks have been contoured to facilitated drainage
1997	Sugar cane visible on whole property except small portion in south eastern corner of property 'Pond' area visible on lot 33. No mining activity seen House has been built between the site and Newrybar swamp road Scattered vegetation regrowth visible
2012	Sugar cane visible on whole property with possible grazing areas Electrical substation has been built to the east of Newrybar Swamp Road Sand extraction from Lot 33 well underway House / shed built to the south Drainage lines maintained, contour drains on paddocks evident Vegetation regrowth evident to east of proposed extraction area

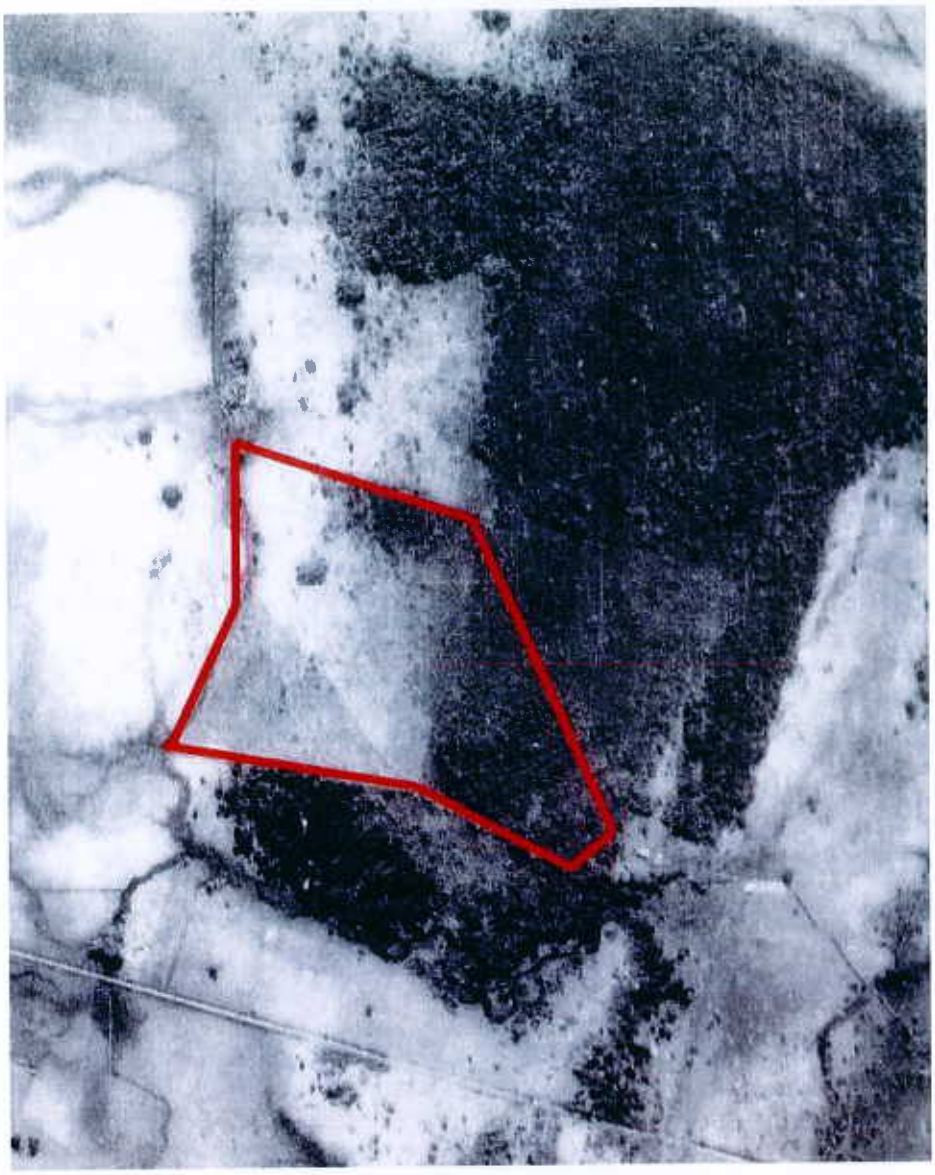


Figure 5: Aerial photo subject land 1947

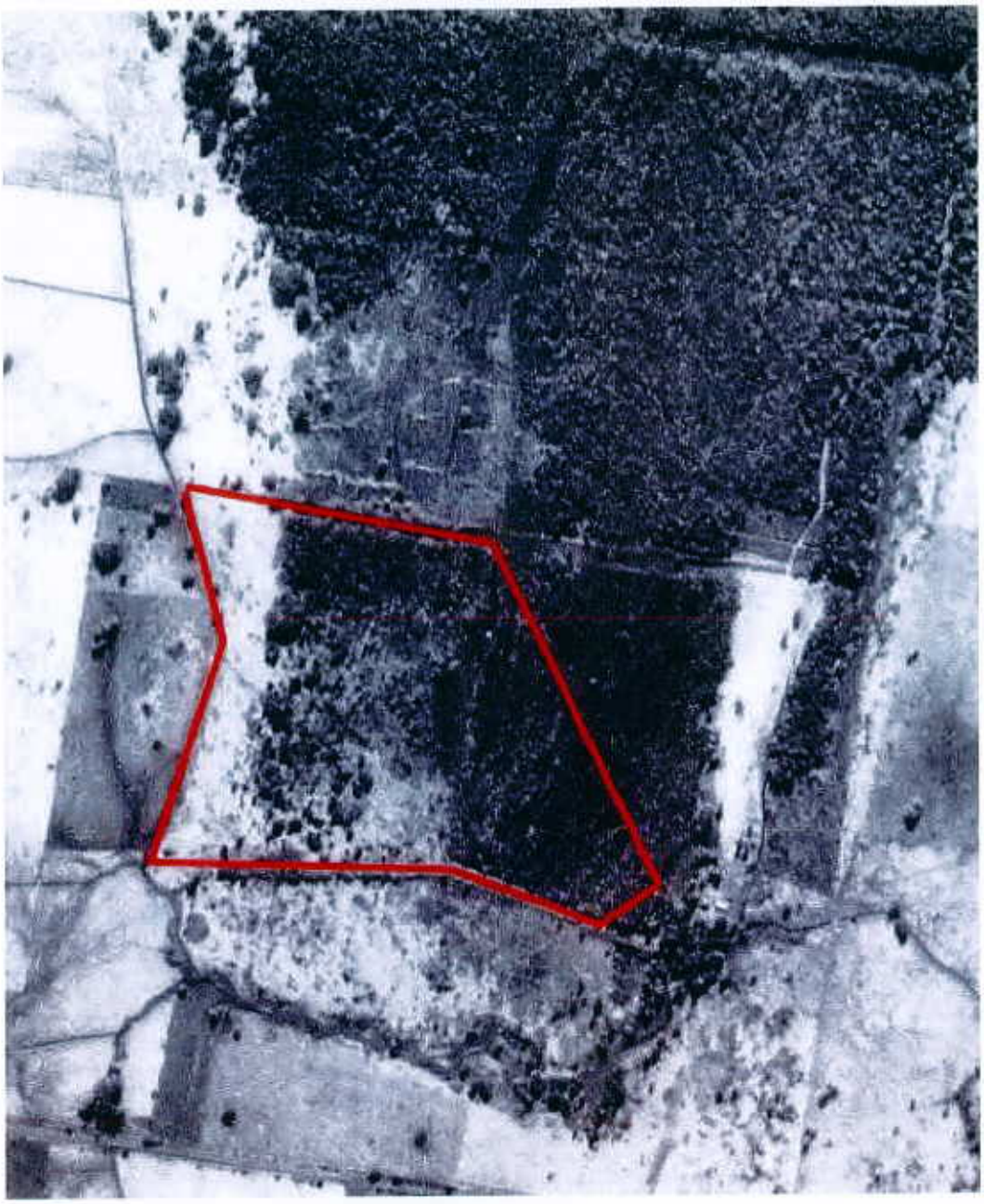


Figure 6: Aerial photo subject land 1967

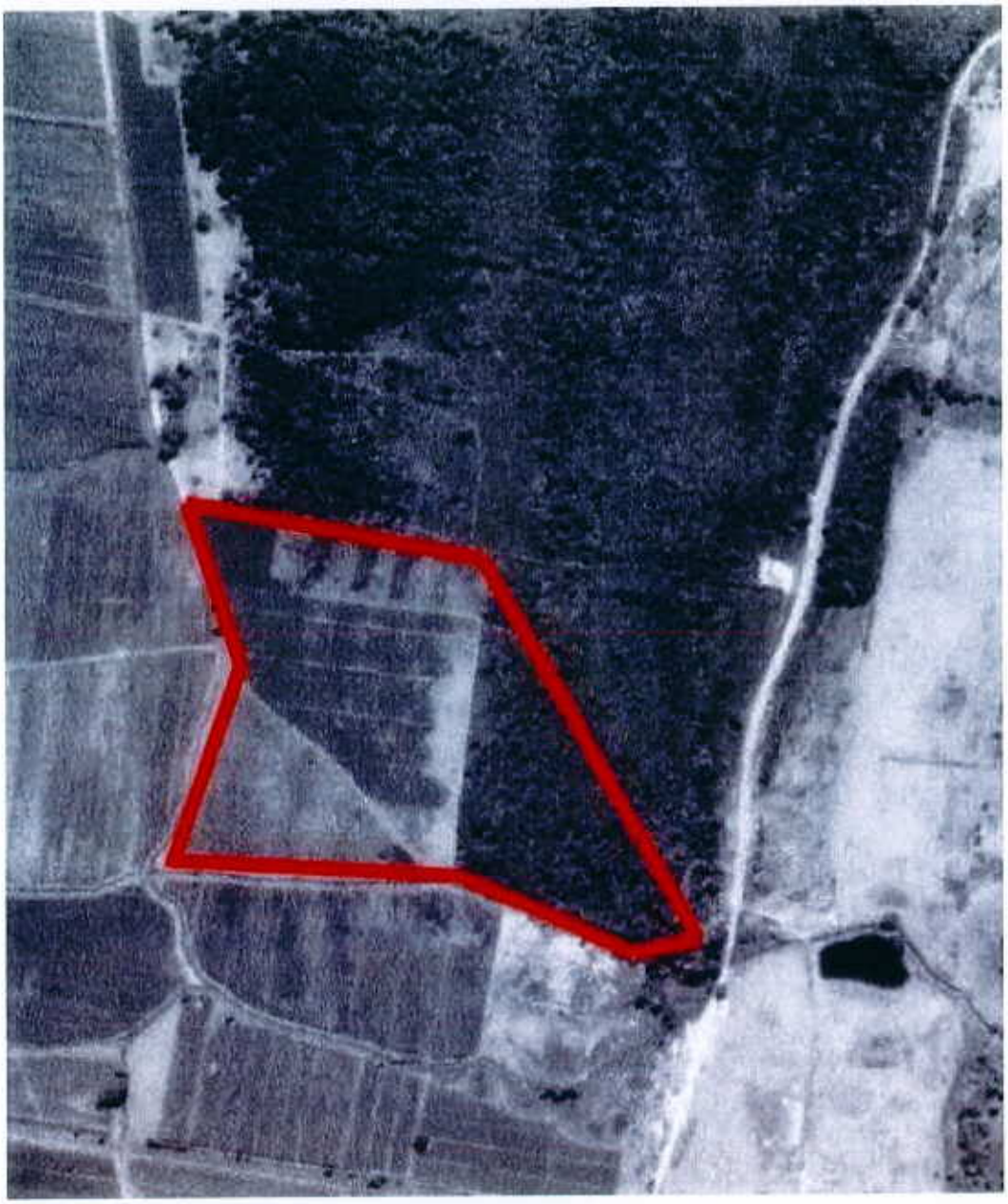


Figure 7: Aerial photo subject land 1979

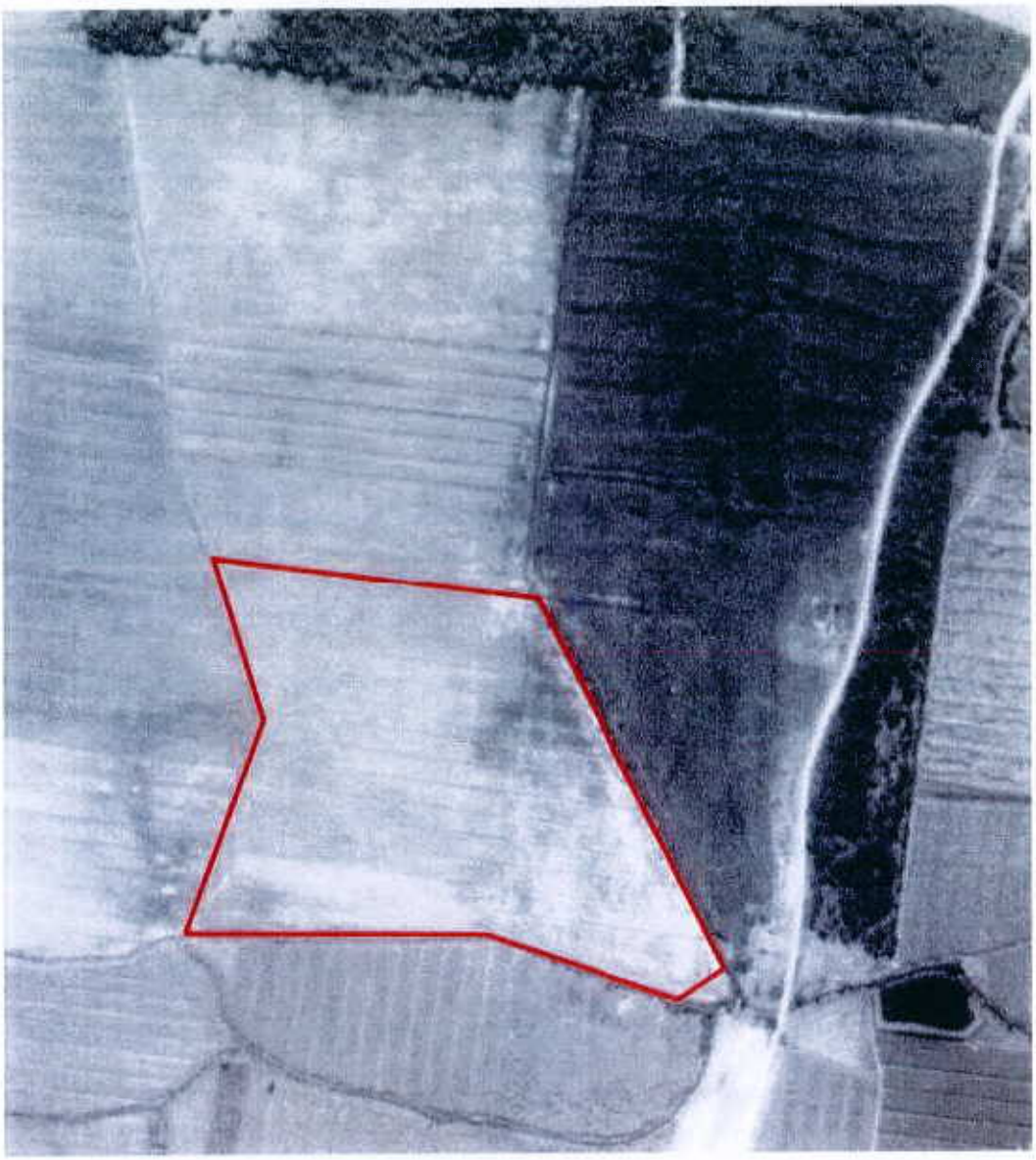


Figure 8: Aerial photo subject land 1987

Figure 9: Aerial photo subject land 1997

Figure 10: Aerial photo subject land 2012

7.3 Historical Title Search

The Parish Map for Newrybar was obtained from the LPI. This map is presented in **Figure 11**. This map shows the location of the Newrybar Drain. The original owners of the property were TG Jackson & WH Shepherd.

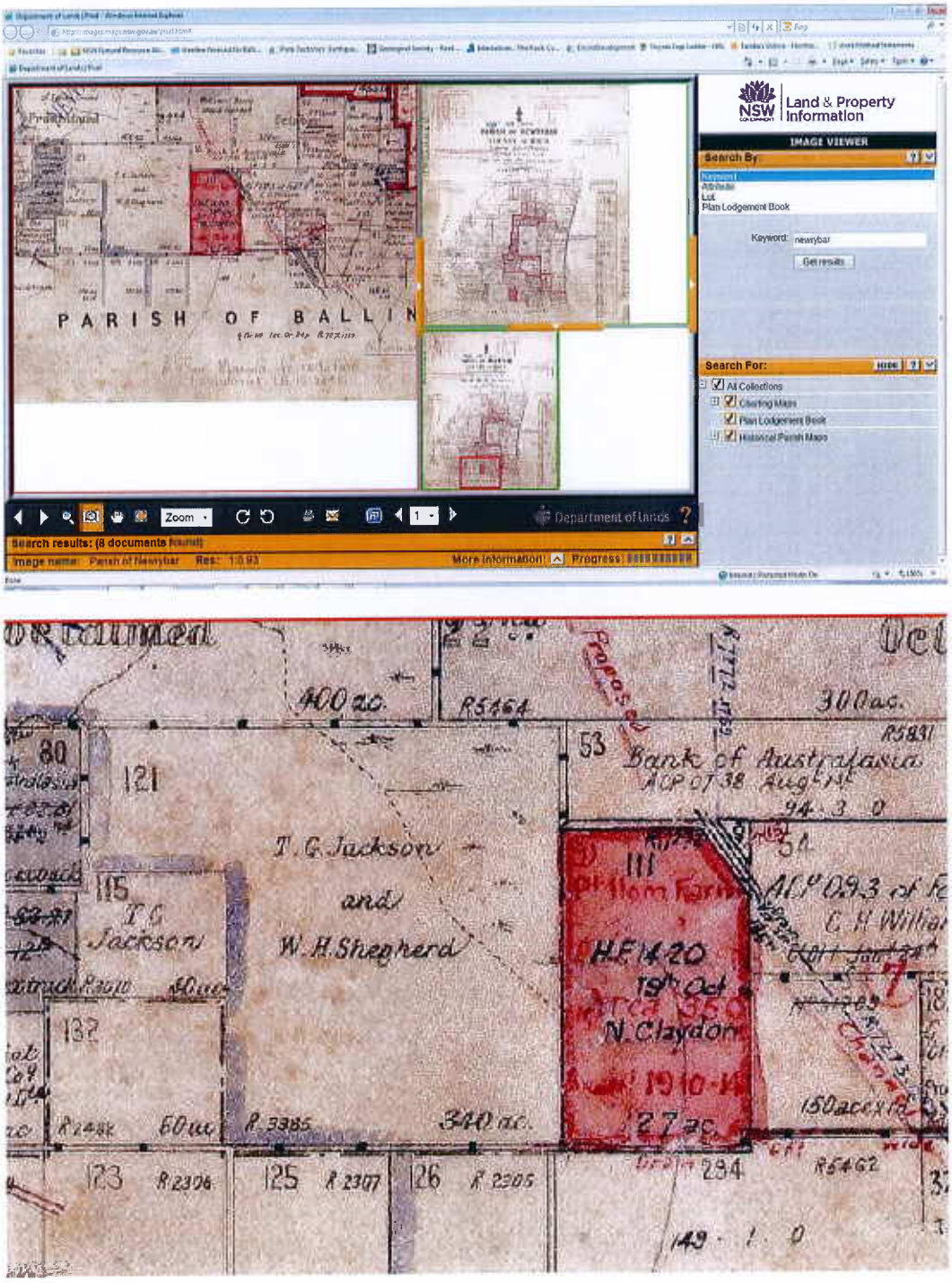


Figure 11: Historic Parish Map Newrybar 1908
(LPI, accessed 16th May 2012)

Newrybar Parish map from 1937 shows a gazettal of a Public Road on the subject land **(Figure 12).** The dotted line through the property is the drainage line which still exists today.

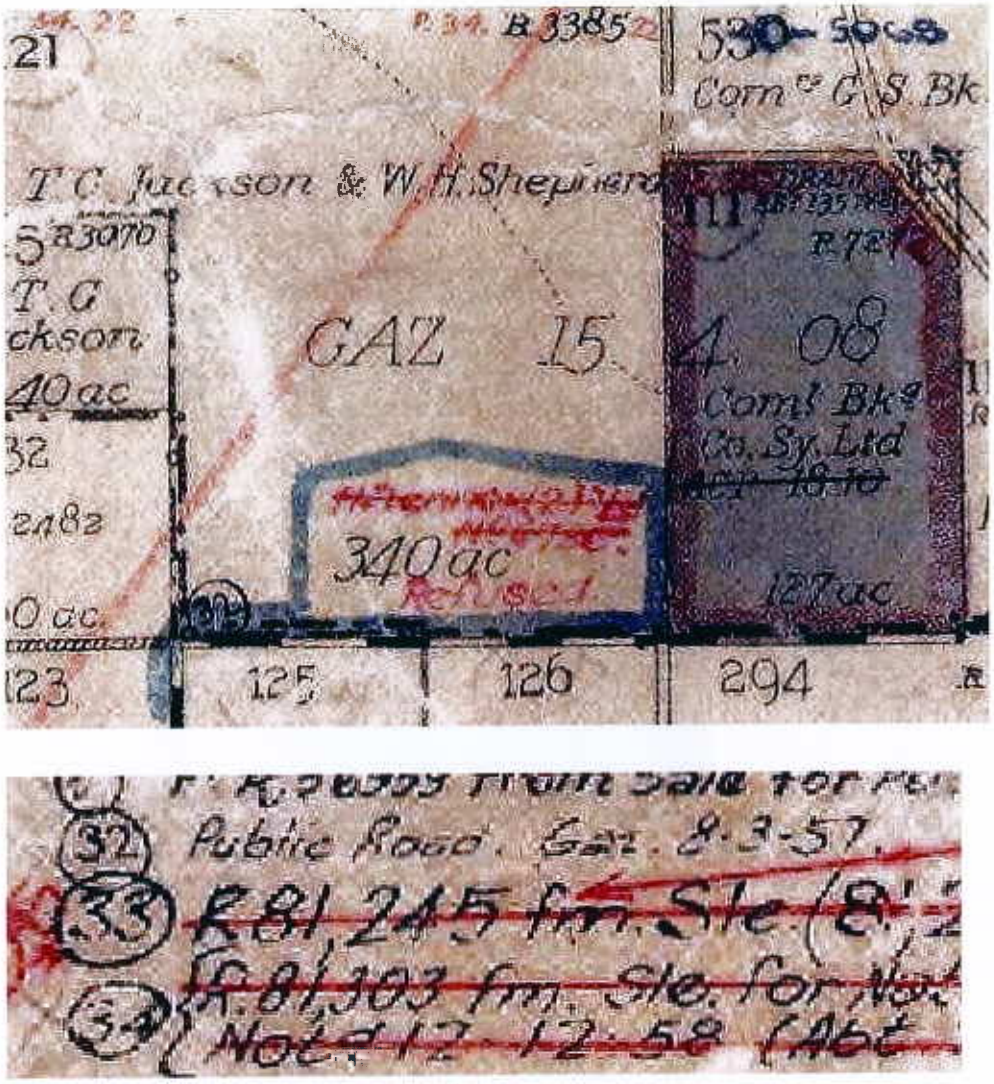
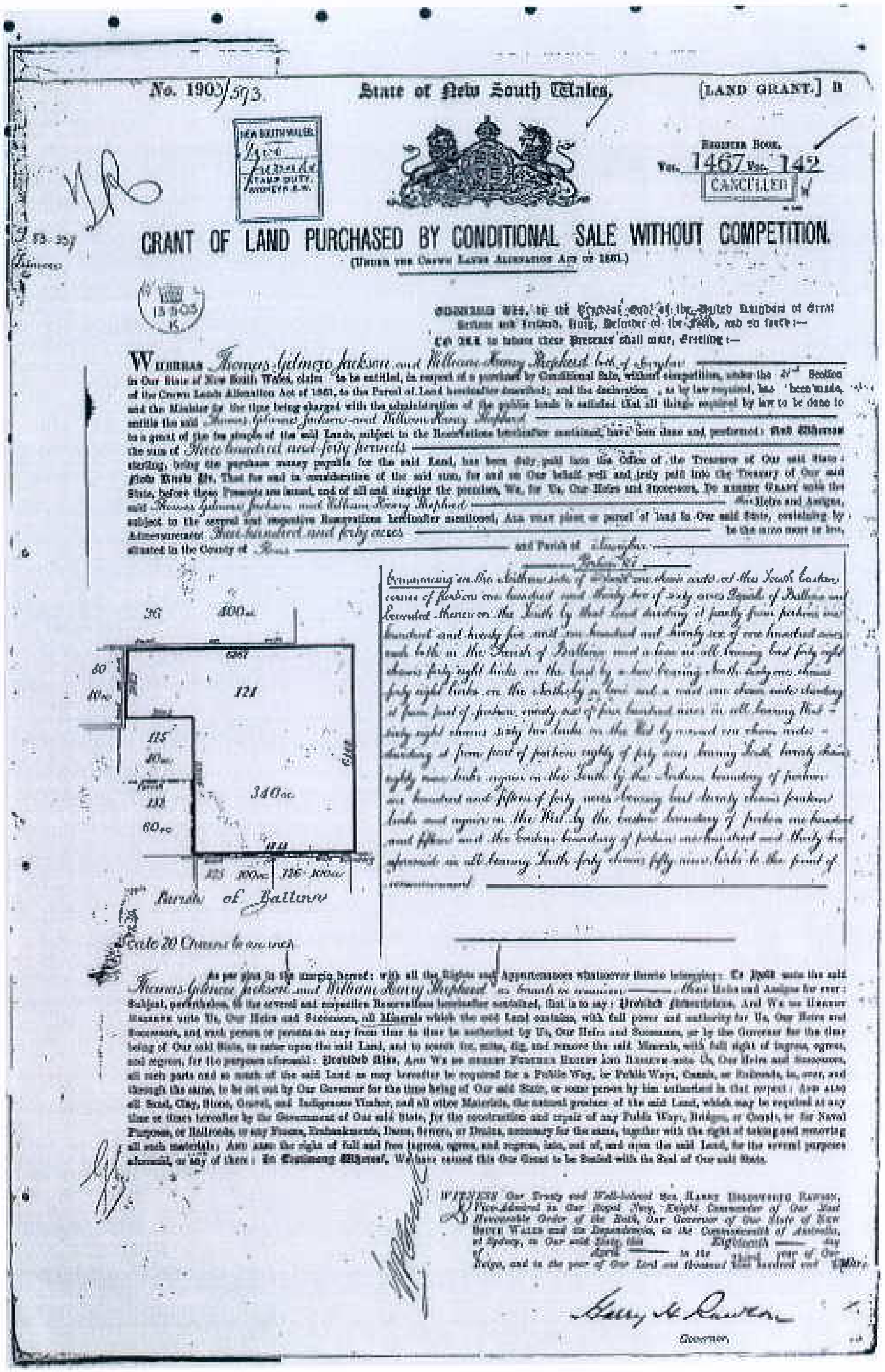


Figure 12: Newrybar Parish Map 1937

The historic Torrens Title search reveals the history since 1903, a copy of which is provided at **Figure 13,** reveals a part residue of the land was transferred from Thomas Gilmore Jackson & William Henry Shepherd to Samuel Gibson in 1903.


No. 1903/593.

State of New South Wales.

[LAND GRANT.] B

Register Book, Vol. 1467 Fol. 142

CANCELLED

GRANT OF LAND PURCHASED BY CONDITIONAL SALE WITHOUT COMPETITION.

(Under the Crown Lands Alienation Act of 1861.)

Whereas Thomas Gilmore Jackson and William Henry Shepherd ... in Our State of New South Wales, claim to be entitled, in respect of a purchase by Conditional Sale, without competition, under the 21st Section of the Crown Lands Alienation Act of 1861, to the Parcel of Land hereinafter described; ...

the sum of Three hundred and forty pounds sterling, being the purchase money payable for the said Land, has been duly paid into the Office of the Treasurer of Our said State ...

containing by Admeasurement Three hundred and forty acres ... situated in the County of Rous ... and Parish of ...

Parish of Ballina

Scale 20 Chains to an inch

... Provided Always, And We do hereby Reserve unto Us, Our Heirs and Successors, all Minerals which the said Land contains ... In Testimony Whereof, We have caused this Our Grant to be Sealed with the Seal of Our said State.

WITNESS Our Trusty and Well-beloved Sir Harry Holdsworth Rawson, Vice-Admiral in Our Royal Navy, Knight Commander of Our Most Honourable Order of the Bath, Our Governor of Our State of New South Wales and its Dependencies, in the Commonwealth of Australia, at Sydney, in Our said State, this Eighteenth day of April in the third year of Our Reign, and in the year of Our Lord one thousand nine hundred and three.

Harry H. Rawson

Governor

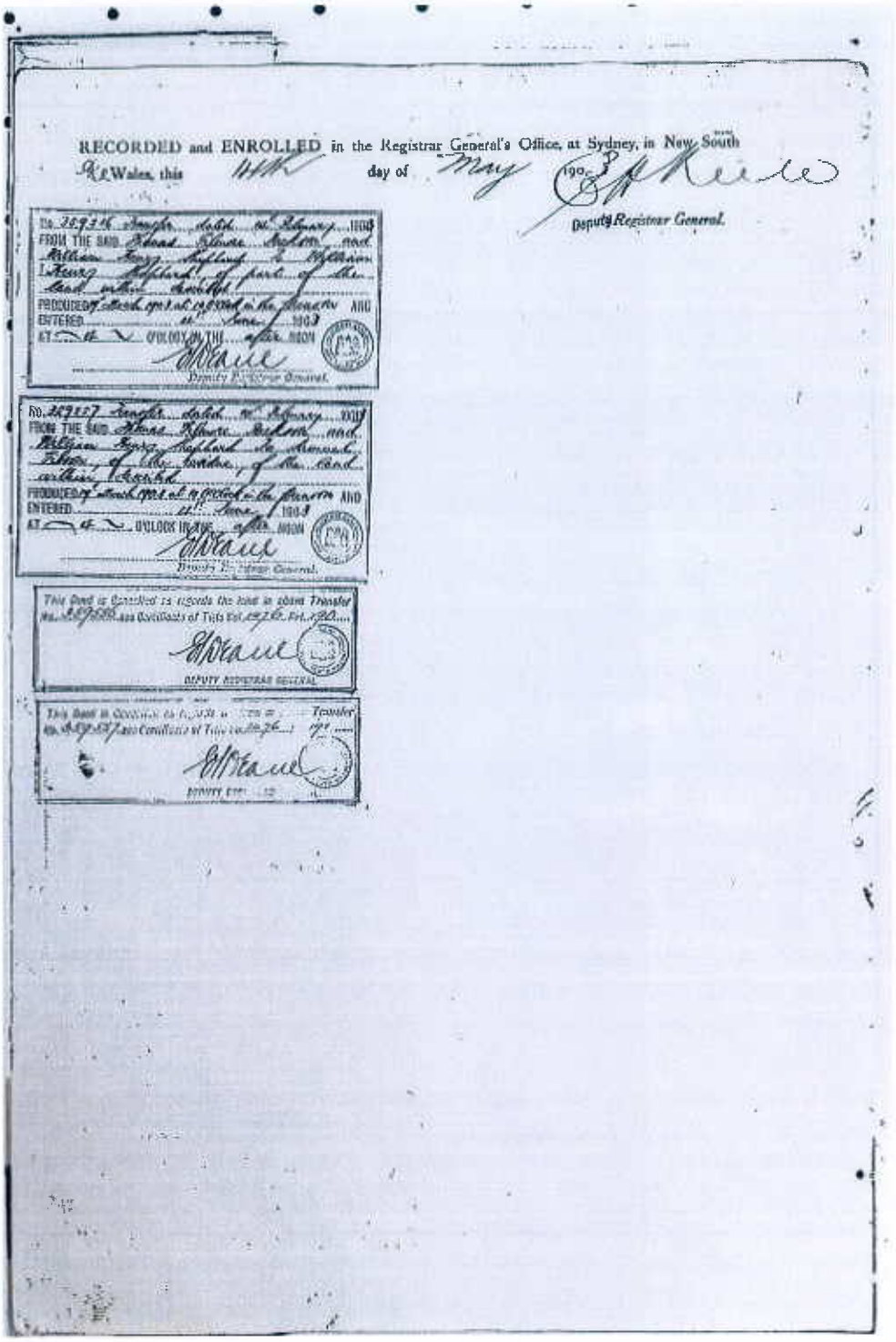


Figure 13: Historic Title Deed

7.4 POEO Act Public Register Search

The OEH's POEO Act Public Register was searched for the area surrounding the site and only one licence was identified which relates to the subject site. Three surrendered licences were identified in the near vicinity.

Table 3: POEO Act Public Register Search

Number	Name	Location	Type	Issued Date
12710	Ballina Sands Pty Ltd	Newrybar Swamp Road, Lennox Head	POEO Licence	S56 Licence Variation 11 April 2012
13332	McGeary Brothers (AMA Quarry)	Newrybar Swamp Road, Newrybar	POEO licence	S80 Surrender Licence 14 Feb 2012
13331	McGeary Brothers (Pick's Quarry)	Newrybar Swamp Road, Newrybar	POEO Licence	S80 Surrender Licence 14 Feb 2012
11897	Gradex Civil Contractors Pty Ltd	Newrybar Swamp Road, Lennox Head	POEO Licence	S80 Surrender Licence 11 May 2005

Source: POEO Act Public Register (Date Accessed: 18/05/2012)

7.5 Contaminated Land – Record of Notices Search

The OEH's Contaminated Land – Record of Notices was searched (accessed on the 22nd May 2012) for the area surrounding the site and the only record identified for the site or surrounding area is a dip site in Figtree Hill Drive Lennox Head as per **Figure 14.** It is believed that this dip has subsequently been remediated.

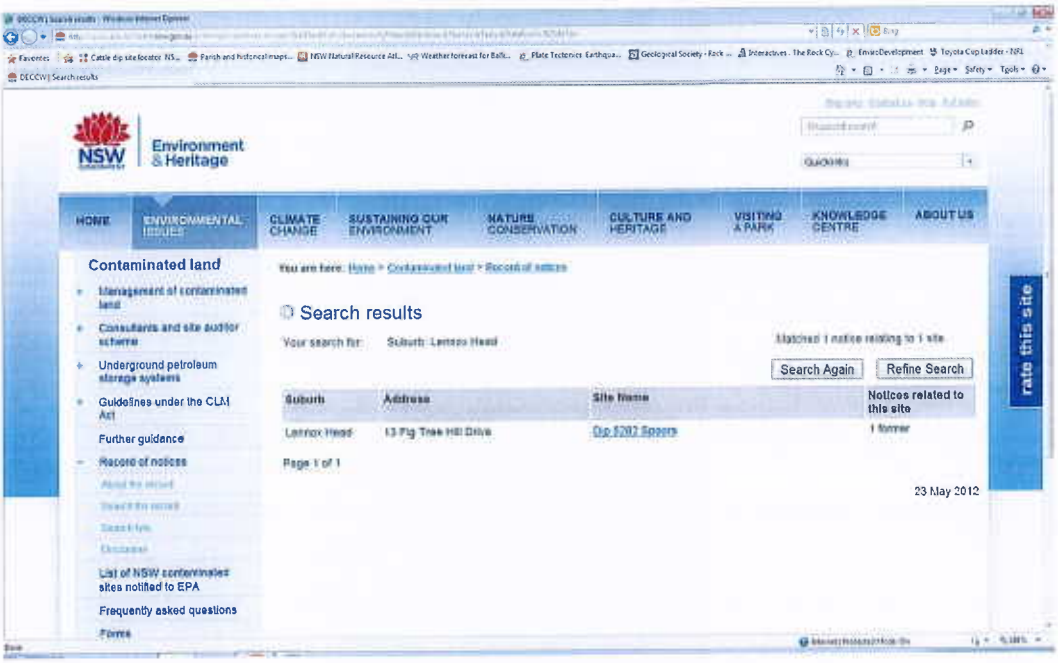


Figure 14: OEH Contaminated Land Register

7.6 NSW Primary Industries: Cattle dip site locator

The NSW Primary Industries Science and Research: Cattle Tick Dip Site locator indicates that two cattle dips are located in the vicinity, one of which is adjacent to the site. The location of the dip sites is shown in **Figure 15**.

Dip site location

Dipname	NEWRYBAR	*Note: Map references are for 25,000 series topographic and co-ordinates are in AGD66 AMG zone 56.*	
Road	PACIFIC HIGHWAY	**Mapsheet**	9640-III-N
Town/Locality	NEWRYBAR	**Easting**	55192
Shire Council	BALLINA	**Northing**	82110
Parish	NEWRYBAR	**County**	ROUS

Chemical Details

IMPORTANT NOTE: *Chemical history has been retrieved from a copied laboratory log. In some cases it may be confirmed by entries in the hard copy lease folder but generally the chemical record is based on this single lab document. It is possible that there are inaccuracies as well as errors made.*

Chemicals used in dip bath	Date first used
ARSENIC	3/51
DDT	11/60
COUMAPHOS	10/62

Current Details

Current Chemical	NONE
Dip bath status/contents	COVER

Dip site location

Dipname	SPOORS	*Note: Map references are for 25,000 series topographic and co-ordinates are in AGD66 AMG zone 56.*	
Road	FIG TREE HILL DRIVE	**Mapsheet**	9640-III-N
Town/Locality	NEWRYBAR	**Easting**	55604
Shire Council	BALLINA	**Northing**	81577
Parish	NEWRYBAR	**County**	ROUS

Dip site status

IMPORTANT NOTE: *Cattle dip site information provided by NSW DPI is based on our own hard copy files representing currently known data. NSW DPI is not a public consent authority for the development of land containing cattle dip sites. It is possible that the physical conditions of a cattle dip site - including soil, structures, access and usage - may have been changed due to extreme natural events or landowner and developer actions that NSW DPI cannot be aware of. For more specific and accurate status information a physical inspection should be made and enquiries should always be directed to the appropriate Shire Council.*

Dip Status	DECOMMISSION	**Licence/Lease Status**	LAPSED
Land type	LEASE	**Licence/Lease Expiry Date**	07/11/1988

Explanation of status terms

Chemical Details

IMPORTANT NOTE: *Chemical history has been retrieved from a copied laboratory log. In some cases it may be confirmed by entries in the hard copy lease folder but generally the chemical record is based on this single lab document. It is possible that there are inaccuracies as well as errors made.*

Chemicals used in dip bath	Date first used
ARSENIC	3/52
DDT	1/61
DIOXATHION	10/62
ETHION	11/65
ETHION CHLORDIMEFORM	10/73
AMITRAZ	1/85

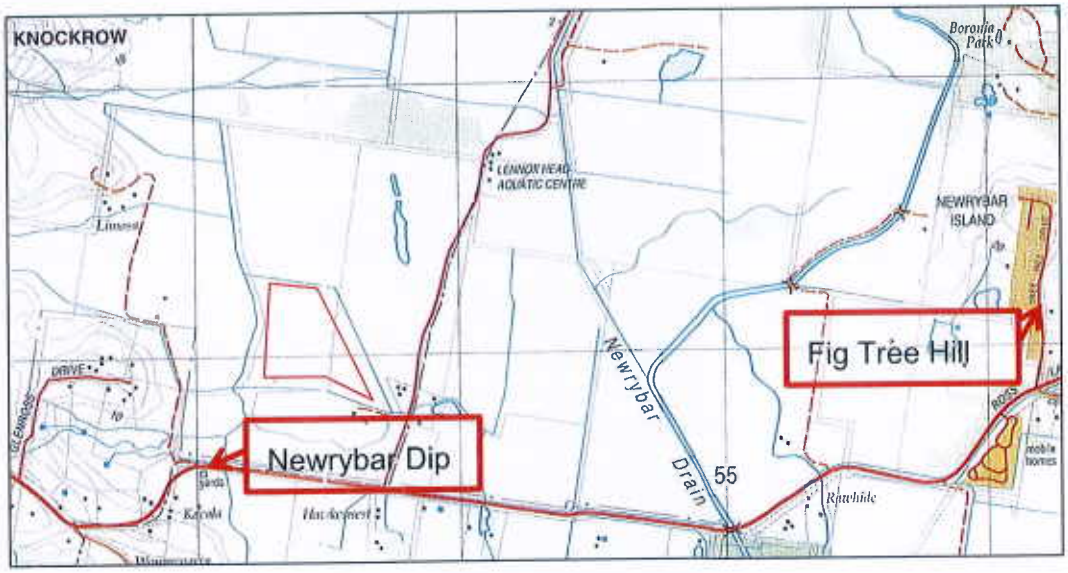


Figure 15: Location of Dip Sites

A 200m radius investigation zone is recommended around cattle tick dip sites (DIPMAC 1995). As the property is approximately 350m from the Newrybar dip site no further investigation is warranted.

7.7 Areas of Environmental Concern

Based on the desk-top site history assessment, one Area of Environmental Concern (AEC), considered to be a source of potential contaminants of concern may have occurred in or within the vicinity of the site, being:

- agricultural use including sugar cane farming and cattle.

Section 3.3.2 of the *Managing Land Contamination – Planning Guidelines SEPP 55 – Remediation of Land* (DUAP & EPA, 1998) states that *"further information is required when a subject site is in the vicinity of or associated with an activity listed in Table 1 but it is unknown whether contamination exists"*. The following activities (or related activities) from Table 1 were conducted on the site or in the vicinity of the site:

- Agricultural/horticultural activities.

Given the above, an inspection of the site was conducted to obtain further information about the AECs.

8 Site Inspection

8.1 Site Inspection Overview

James Foster (Environmental Engineer) undertook a site inspection on the 16th May 2012. The purpose of the site inspection was to obtain further information about the AECs identified during the desk-top site history assessment and to identify any additional AECs on the site. A summary of the site inspection is provided below.

8.2 Agricultural/Horticultural Activities

Based on the site history and the aerial imagery, the site has been primarily used for producing sugar cane. Cattle and horses have also been grazed.

Figure 16 – Photo showing site area being slashed with hills behind.

8.2.1 NSW Department of Primary Industries (DPI)

Kevin Quinlan of the DPI Wollongbar Institute was contacted regarding historical sugar cane cultivation. He advised the following with respect to sugar cane:

- Prior to the 1960's each State maintained a register of chemicals used as pesticides on agricultural crops;
- The Australian Pesticides and Veterinary Medicine Authority (APVMA) keep a record of currently approved (not historically used) pesticides;
- Typically four persistent organochlorine pesticides (OCPs) were applied to cane crops since the 1960's, which the laboratory regularly detected in samples. Those pesticides include dieldrin, heptachlor, chlordane and aldrin was used to a lesser extent. Dieldrin was preferred over aldrin as it was considered more effective.

8.2.2 NSW Sugar Milling Co-operative (SMC)

Peter McGuire, the Sugar Industry Officer for the Ballina branch of the SMC, was contacted regarding historical pesticide application to sugar cane crops from the 1970's onwards. Mr McGuire advised that sugar cane growers did not use much organchlorine pesticides (OCPs), but those that were used were aldrin, dieldrin, Lindane (BHC) and hexochlorobenzene (HCB).

Cane cuttings were often dipped in small quantities of Shirtan (methoxy ethyl mercuric chloride – a mercurial fungicide) before replanting, once every 6 years. Established cane crops were sprayed or dosed with diluted pesticide mixtures or powders and wire worm infested crops were treated with fertilisers mixed with aldrin.

8.2.3 Site History Since 1989

Based on the site history given by Mr Robert Watson, since 1989 the following herbicides have been used on the property:

Table 4: Herbicide Data

Herbicide	Active Ingredient	½ Life
Round-up	Glyphosphate	2-174 Days
Paraquat	1,1' dimethyl – 4,4' bipyridinium dichloride (Quaternary)	~1000 Days
Diuron	DCMU (3-(3,4-dichlorophenyl)-1,1-dimethylurea) (Anilides/Anilines)	~90 Days

Given the reasonably short half-life of glyphosphate pesticides, and the fact the site has not been used for growing cane since 2006, it is highly unlikely that they will be found in any ground contamination. Therefore, the more persistent organo-chlorines were targeted in our investigation.

The use of Diruon was suspended from use in Australia from November 2011.

8.3 Summary of Site Inspection

Based on the site inspection, it is considered that one AEC requires further investigation:

- Agricultural use including sugar cane and grazing (horses and cattle).

Agricultural activities have been conducted in the majority of the site.

From the information provided, the persistent Potential Contaminants of Concern (PCOC's) from sugar cane production and grazing are a range of organochlorine pesticides and heavy metals.

The proposed change of use will affect an area of approximately 15 ha within the lot. The balance of the site will remain in its current land use.

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

9.1 Sampling Objective

In accordance with *Sampling Design Guidelines* (EPA, 1995), the rationale behind sampling is to gather information concerning the location, nature, level and extent of contamination found within the proposed extraction area. As the type of contamination sought is not circular (hot-spot) but widespread (equal distribution over a paddock), 9 samples were collected from within the development. The laboratory composited these samples into 3 samples to reduce the analysis cost.

9.2 Field Investigations

The field sampling investigation was conducted on the 11th May 2012. This involved the collection of 9 samples. The location of the sampling is shown in **Figure 17**. The samples were collected from below the root zone to 150mm below ground level in accordance with the *Sampling Design Guidelines* (EPA, 1995). Compositing details are shown in **Table 5**.

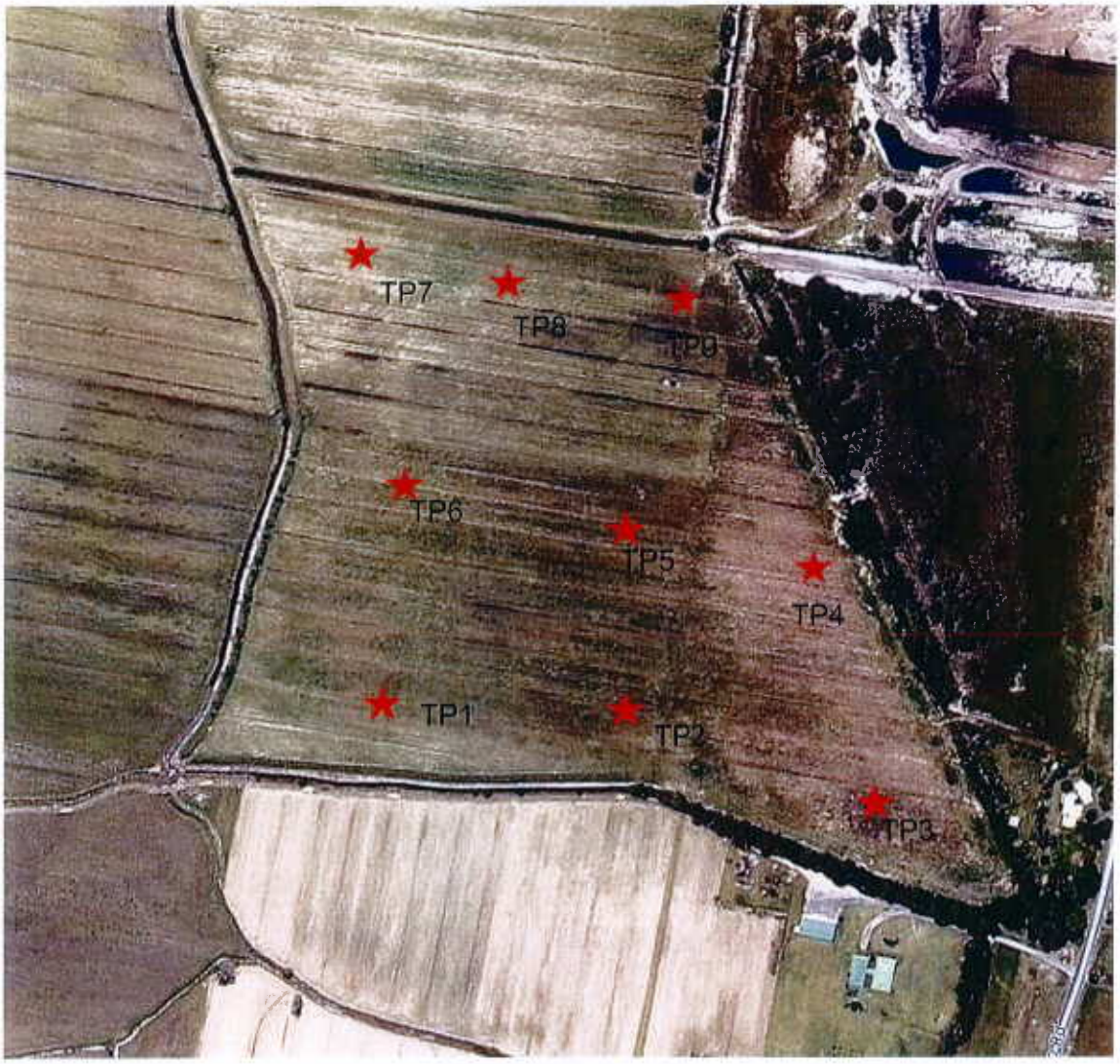


Figure 17: Soil Sample Locations

Table 5: Sampling Details

Sample No.	Depth (mm)	Composite
TP1	0-150	CS1
TP2	0-150	
TP3	0-150	
TP4	0-150	CS2
TP5	0-150	
TP6	0-150	
TP7	0-150	CS3
TP8	0-150	
TP9	0-150	

9.3 Sampling Methodology

Soil samples were collected in the field by suitably qualified and experienced staff members from APP. Soil samples were collected using a fresh glove hand from the shovel as soon as they were removed from the ground. Samples were sealed in plastic bags and chilled prior to dispatch to the Lab.

9.4 Field Quality Assurance/Quality Control (QA/QC)

Sampling equipment was cleaned thoroughly between each sample location by washing in a mixture of water and phosphate-free detergent prior to a thorough rinsing in freshwater and drying with a paper towel.

All samples were placed into their relevant containers and stored in an iced esky and transported to the SCU Environmental Analysis Laboratory for testing.

Chain of Custody (COC) documents and Lab Results were recorded for each sample and are provided at **Attachment 4**. The COC indicates the sample number, time sampled, sampler and analytical requirements.

9.5 Potential Contaminants of Concern

Based on the outcomes of the desk-top site history assessment and the site

inspection, two potential contaminants of concern have been identified for the site, being:

- Pesticides/herbicides; and
- Metals.

Pesticides/Herbicides

Herbicides and pesticides are used during agricultural and horticultural activities to kill organisms that are deemed to be harmful.

Some pesticides contain heavy metals and organocholorines. Pesticides may cause acute and delayed health effects in those who are exposed to such. Pesticide exposure can cause a variety of adverse health effects. These effects can range from simple irritation of the skin and eyes to more severe effects such as affecting the nervous system, mimicking hormones causing reproductive problems, or causing cancer.

Metals

Metals occur naturally in the ecosystem with large variations in concentration. Anthropogenic sources of metals, from pollution, fertilisers, pesticides/herbicides and combustion products of fossil fuels can be introduced to an ecosystem.

Table 6: Analytes Requested for Laboratory Analysis

Analytes Tested	Potential Contamination Source
Metals	Agricultural chemicals, pesticides, herbicides and fertilisers.
Organo-chlorine Pesticides	Agricultural pesticide/herbicides.

10 Assessment Criteria

The *Contaminated Land Management Act 1997* (CLM Act) allows the OEH to approve guidelines for purposes associated with the CLM Act, such as contaminated land assessments.

For the purpose of assessing site contamination of soil at the site, investigation levels from OEH's approved guidelines have been selected for the protection of human health and ecological impacts via exposure to contaminants.

10.1 Soils Assessment Criteria

OEH recommends using the National Environment Protection Measure (NEPM) for assessing soil contamination, which includes a range of investigation levels for various land uses that are designed to be used for guidance purposes to determine if further investigation is needed (NEPM, 1999). For the purpose of this investigation the following soil assessment criteria from *Schedule B1 Guideline on the Investigation Levels for Soil and Groundwater* (NEPM, 1999) has been adopted:

- NEPM Health Investigation Levels exposure setting A (HIL F) for Commercial/Industrial land use; and
- NEPM Health Investigation Levels exposure setting A (HIL A) for Residential land use.

The function of the NEPM HILs is to be an indicator for contamination, and they are not to be used as maximum permissible levels that would preclude the intended land use. The NEPM guidelines recommend further investigation and health risk assessments are undertaken where soil exceeds the HILs.

10.2 Assumptions and Limitations of Criteria

The selected criteria have been sourced from various documents which are currently accepted by the OEH. The threshold and background levels contained in these documents have been established through toxicity tests and field and laboratory experiments. In some cases, insufficient data currently exists to provide thresholds. In these cases, the data is simply used as an indicator of the presence and extent of contamination.

The NEPM HILs have been derived considering all exposure routes including ingestion, dermal exposure and inhalation, however most HILs have been derived and are based on oral ingestion exposure pathways. These investigation levels are used as a guide for further investigation if investigation levels are exceeded.

Table 7: Health Investigation Levels for Metals and Organochlorine Pesticides

Analyte	Health Investigation Level (HIL) - A (Residential)	Health Investigation Level (HIL) - F (Industrial)
Silver (mg/kg DW)	*Na*	*Na*
Arsenic (mg/kg DW)	*<100*[1]	*<500*[1]
Lead (mg/kg DW)	*<300*[1]	*<1500*[1]
Cadmium (mg/kg DW)	*<20*[1]	*<100*[1]
Chromium (mg/kg DW)	*<100*[1]	*<500*[1]
Copper (mg/kg DW)	*<1,000*[1]	*<5,000*[1]
Manganese (mg/kg DW)	*<1,500*[1]	*<7,500*[1]
Nickel (mg/kg DW)	*<600*[1]	*<3000*[1]
Selenium (mg/kg DW)	*100*[2]	*Na*
Zinc (mg/kg DW)	*<7,000*[1]	*<35,000*[1]
Mercury (mg/kg DW)	*<15*[1]	*<75*[1]
Iron (% DW)	*na*	*na*
Aluminium (% DW)	*na*	*na*
PESTICIDE ANALYSIS SCREEN		
4, 4 DDT (mg/kg)	*<2.5*[1]	*<1000*[1]
Methoxychlor (mg/kg)	*<2.5*[1]	*<50*[1]
Other Organochlorine Pesticides (mg/kg)	*<2.5*[1]	*<50*[1]

11 Laboratory Analysis Results

The soil sample laboratory analysis results for the site and relevant assessment criteria are presented in **Table 8**.

The assessment criteria presented in **Table 7** have been divided by 3 due to the composting of samples.

Table 8: Soil Sample Laboratory Analysis Results

Analyte	Composite Health Investigation Level (HIL) – A (Residential)	Composite Health Investigation Level (HIL) – F (Industrial)	CS1 TP 1, 2 and 3	CS2 TP 4, 5 and 6	CS3 TP 7, 8 and 9
Silver (mg/kg DW)	*na*	*na*	<0.5	<0.5	<0.5
Arsenic (mg/kg DW)	*33.3*[1]	*166.7*[1]	<1	<1	<1
Lead (mg/kg DW)	*100*[1]	*500*[1]	1	1	2
Cadmium (mg/kg DW)	*6.7*[1]	*33.3*[1]	<0.5	<0.5	<0.5
Chromium (mg/kg DW)	*33.3*[1]	*166.7*[1]	1	1	3
Copper (mg/kg DW)	*333.3*[1]	*1666.7*[1]	2	3	5
Manganese (mg/kg DW)	*500*[1]	*2500*[1]	4	2	13
Nickel (mg/kg DW)	*200*[1]	*1000*[1]	1	1	4
Selenium (mg/kg DW)	*33.3*[2]	*na*	<1	<1	<1
Zinc (mg/kg DW)	*2333.3*[1]	*11666.7*[1]	3	1	4
Mercury (mg/kg DW)	*5.0*[1]	*25.0*[1]	<0.05	<0.05	<0.05
Iron (% DW)	*na*	*na*	0.05	0.04	0.10
Aluminium (% DW)	*na*	*na*	0.15	0.09	0.55
PESTICIDE ANALYSIS SCREEN					
4, 4 DDT (mg/kg)	*0.8*[1]	*333.3*[1]	<0.1	<0.1	<0.1
Methoxychlor (mg/kg)	*0.8*[1]	*16.7*[1]	<0.1	<0.1	<0.1
Other Organochlorine Pesticides (mg/kg)	*0.8*[1]	*16.7*[1]	<0.1	<0.1	<0.1

1 NEPM (1999) HIL-A. Note: mg/kg = milligrams per kilogram mg/kg DW = milligrams per kilogram dry weight % DW = percentage dry weight.

2 Risk-based Assessment of Soil and Groundwater Quality in the Netherlands: Standards and Remediation Urgency (Swartjes,1999).

11.1 Results

None of the samples submitted resulted in levels reaching or exceeding the relevant assessment criteria and were consistent with natural background levels (NEPM, 1999).

12 Conclusions

APP has undertaken a Stage 1 – Preliminary Investigation for the Project in accordance with the *Managing Land Contamination Planning Guidelines* (DUAP and EPA, 1998).

This investigation is to inform and support a development application and EIS for the proposed extractive industry (sand quarry).

This Stage 1 – Preliminary Investigation has:

- Described the site condition and surrounding environment;
- Provided a summary of the site history;
- Identified past and present potentially contaminating activities and potential contaminant types;
- Provided a preliminary assessment of the site contamination;
- Assessed the need for further investigations;
- Assessed soil sample analysis results against relevant criteria; and
- Assessed the suitability of the site for the proposed use.

A desk-top site history assessment and a site inspection have been conducted as part of the Stage 1 – Preliminary Investigation. The desk-top site history assessment encompassed the site and adjacent areas. Information used to assist in the site history was also collected and collated from the following sources:

- Review of available site history details including a site history statement;
- LPI – Historic Title Search;
- Historical aerial photographs;
- OEH's POEO Act Public Register;

- OEH's Contaminated Land – Record of Notices; and,
- NSW Primary Industries Cattle Dip Site Locator.

The site inspection included:

- An inspection of the site to identify potential areas of contamination; and
- Preliminary soil sampling at areas identified as potentially contaminated during the site inspection.

Based on the desk-top site history assessment and the site inspection, it was considered that one AEC required further investigation:

- Agricultural use including sugar cane and cattle grazing.

Two potential contaminants of concern were identified for the site:

- Pesticides/herbicides; and,
- Metals.

Given the above, a Preliminary sampling and analysis plan was undertaken. A total of 9 samples were analysed for the potential contaminants of concern from within the proposed development area.

None of the samples submitted resulted in levels reaching or exceeding the relevant assessment criteria and were consistent with natural background levels (ANZECC, 1992).

Based on the above assessment it is assessed that further investigation is **not required** and that the **site is suitable** for the proposed extractive industry.

13 General Notes

General

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

Soil and Rock Description

Soil and rock descriptions are based on AS1726-1993 using visual and tactile assessment except at discrete locations where field and/or laboratory tests have been carried out. Refer to the terms and symbols sheet for definitions.

Groundwater

The water levels indicated are taken at the time of measurement and depending on material permeability may not reflect the actual groundwater level at those specified locations. Also groundwater levels can vary with time due to seasonal or tidal fluctuation, construction activities and other external factors.

Interpretation of Results

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

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

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

Change in Conditions

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

14 References

1. *Australian and New Zealand Environment Conservation Council ANZECC, 1992. Environmental Soil Quality Guidelines.*
2. *Department of Urban Affairs and Planning and the Environment Protection Authority (1998). Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land.*
3. *Environment Protection Authority (1995) Sampling Design Guidelines.*
4. *Environment Protection Authority (2000) Guidelines for Consultants Reporting on Contaminated Sites*
5. *Office of Environment and Heritage Contaminated Land: POEO Public Register -* <http://www.environment.nsw.gov.au/prpoeoapp/searchregister.aspx>
6. *Office of Environment and Heritage Contaminated Land: Record of Notices -* *<http://www.environment.nsw.gov.au/prclmapp/searchregister.aspx>*
7. *Swartjes, F.A. (1999) Risk-based Assessment of Soil and Groundwater Quality in the Netherlands: Standards and Remediation Urgency. Risk Analysis 19(6): 1235-1249*
8. *National Environment Protection Council (1999) National Environment Protection (Assessment of Site Contamination) Measure.*
9. *Agency for Toxic Substances and Disease Registry (2005) Division of Toxicology ToxFAQs*
10. *National Environment Protection Council (1999) National Environment Protection (Assessment of Site Contamination) Measure Schedule B1 Guideline on the Investigation Levels for Soil and Groundwater*

15 Glossary

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

AEC – Areas of Environmental Concern

APP – Ardill Payne and Partners

COC – Chain of Custody

DPI – Department of Primary Industries

EPA – Environment Protection Authority (now known as Office of Environment Heritage)

HILs – Health Investigation Levels (for soil)

NEPM – National Environment Protection Measure

OEH – Office of Environment & Heritage

QA/QC – Quality Assurance and Quality Control

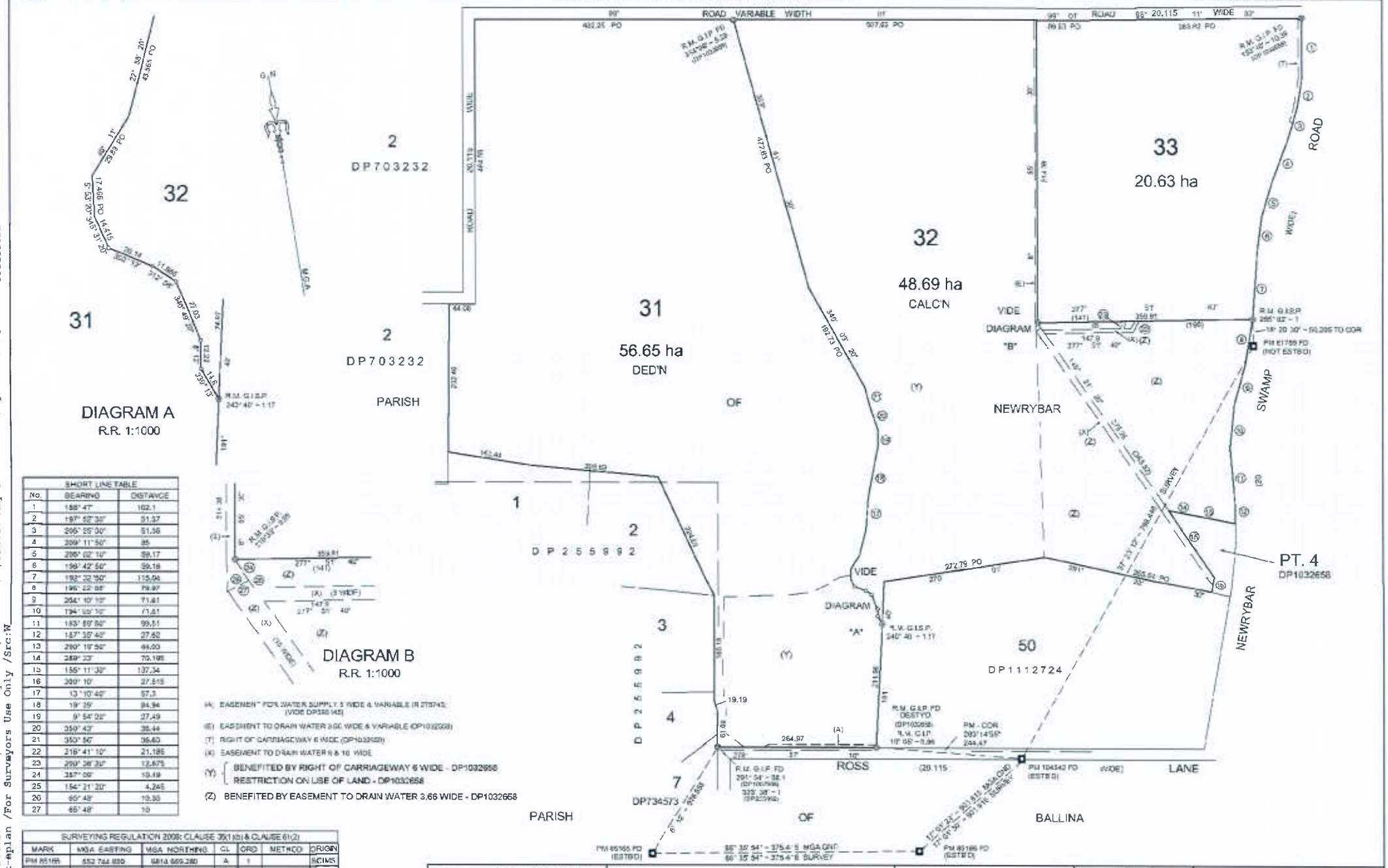
16 Attachments

Attachment 1	Plan of subject property
Attachment 2	Proposed extractive area
Attachment 3	Signed site history statement
Attachment 4	Chain of custody documents and laboratory results

ATTACHMENT 1

Attachment 1
Plan of subject property

PLAN FORM 2 (A2) WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION ePlan Sheet 1 of 1 sheets



SHORT LINE TABLE		
No.	BEARING	DISTANCE
1	158° 47'	102.1
2	197° 52' 30"	51.37
3	295° 25' 00"	51.36
4	209° 11' 50"	85
5	295° 02' 10"	59.17
6	198° 42' 50"	59.18
7	192° 22' 50"	115.04
8	196° 22' 05"	79.97
9	264° 10' 10"	71.61
10	194° 55' 10"	71.61
11	183° 55' 50"	99.51
12	187° 35' 40"	27.62
13	290° 15' 50"	49.00
14	289° 23'	70.105
15	155° 11' 30"	137.34
16	300° 10'	27.515
17	13° 10' 40"	57.3
18	19° 39'	94.94
19	9° 54' 02"	27.49
20	350° 43'	35.44
21	350° 56'	35.60
22	216° 41' 10"	21.185
23	290° 26' 30"	12.675
24	287° 09'	10.49
25	154° 21' 20"	4.245
26	65° 48'	10.35
27	65° 48'	10

(A) EASEMENT FOR WATER SUPPLY 5 WIDE & VARIABLE (R 275743) (VIDE DP255145)
(E) EASEMENT TO DRAIN WATER 3.66 WIDE & VARIABLE (DP1032658)
(T) RIGHT OF CARRIAGEWAY 6 WIDE (DP1032658)
(X) EASEMENT TO DRAIN WATER 6 & 10 WIDE
(Y) BENEFITED BY RIGHT OF CARRIAGEWAY 6 WIDE - DP1032658
RESTRICTION ON USE OF LAND - DP1032658
(Z) BENEFITED BY EASEMENT TO DRAIN WATER 3.66 WIDE - DP1032658

SURVEYING REGULATION 2008: CLAUSE 35(1)(b) & CLAUSE 61(2)						
MARK	MGA: EASTING	MGA: NORTHING	CL	ORD	METHOD	ORIGIN
PM 85165	553 744.850	6814 669.280	A	1		SCIMS
PM 85166	553 119.919	6814 868.450	A	1		SCIMS
PM 104342	553 383.656	6815 540.258	C	3		SCIMS
COMBINED SEA LEVEL AND SCALE FACTOR 0.999636 ZONE 56						
SOURCE: MGA COORDINATES ADOPTED FROM SCIMS ON 05-11-2009						

Surveyor:	GRAEME GEOFFREY CALNAN ARDILL PAYNE & PARTNERS P.O. BOX 20, BALLINA 2478
Date of Survey:	15 SEPTEMBER 2009
Surveyors Ref:	6710DP

PLAN OF SUBDIVISION OF
LOTS 1 & 2 IN DP1032658 & LOT 30 IN DP1102964

LGA:	BALLINA
Locality:	TINTENBAR
Subdivision No:	016/2009
Lengths are in metres.	Reduction Ratio 1:4000

Registered 14-5-2010

DP1151612

Req:R567072 /Doc:DP 1151612 P /Rev:17-May-2010 /Sts:SC.OK /Prt:17-May-2010 20:30 /Pgs:ALL /Seq:1 of 3 DP1151612
Ref:lands:ict-eplan /For Surveyors Use Only /Src:W

DEPOSITED PLAN ADMINISTRATION SHEET

Sheet 1 of 2 sheet(s)

SIGNATURES, SEALS and STATEMENTS of intention to dedicate public roads, to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants.

PURSUANT TO SECTION 88B OF THE CONVEYANCING ACT 1919 AS AMENDED

IT IS INTENDED TO CREATE

1. EASEMENT TO DRAIN WATER 6 & 10 WIDE

Use PLAN FORM 6A for additional certificates, signatures, seals and statements

Crown Lands NSW/Western Lands Office Approval

I .... in approving this plan certify (Authorised Officer) that all necessary approvals in regard to the allocation of the land shown herein have been given.

Signature: ....
Date: ....
File Number: ....
Office: ....

Subdivision Certificate

I certify that the provisions of s.109J of the Environmental Planning and Assessment Act 1979 have been satisfied in relation to:

the proposed ....SUBDIVISION.......... set out herein (insert 'subdivision' or 'new road')

....
* Authorised Person/~~General Manager/Accredited Certifier~~

Consent Authority: .... BALLINA SHIRE COUNCIL ....
Date of Endorsement: 19 AUGUST 2009
Accreditation no: ....
Subdivision Certificate no: 016/2009
File no: 2008/677

* Delete whichever is inapplicable.

* OFFICE USE ONLY

DP1151612

Registered: 14-5-2010
Title System: TORRENS
Purpose: SUBDIVISION

PLAN OF SUBDIVISION OF LOTS 1 & 2 IN DP1032658 & LOT 30 IN DP1102964

LGA: BALLINA
Locality: TINTENBAR
Parish: NEWRYBAR & BALLINA
County: ROUS

Surveying Regulation, 2006

I, GRAEME GEOFFREY CALNAN
of ARDILL PAYNE & PARTNERS
P.O. BOX 20 BALLINA, NSW 2478

a surveyor registered under the *Surveying Act, 2002*, certify that the survey represented in this plan is accurate, has been made in accordance with the *Surveying Regulation, 2006* and was completed on: .... 15 SEPTEMBER 2008 ....

The survey relates to .... PARTS 31, 32 & 33 ....

(specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey)

Signature: .... Dated: 15/92008
Surveyor registered under the Surveying Act, 2002

Datum Line: .... PM85165 – PM85166 ....
Type: Rural

Plans used in the preparation of survey/compilation

DP255992 DP1032658 DP1102964
DP1117294

(if insufficient space use Plan Form 6A annexure sheet)

SURVEYOR'S REFERENCE: 6710DP

DEPOSITED PLAN ADMINISTRATION SHEET Sheet 2 of 2 sheet(s)

PLAN OF SUBDIVISION OF LOTS 1 & 2 IN DP1032658 & LOT 30 IN DP1102964

DP1151612

Registered: 14-5-2010

* OFFICE USE ONLY

Subdivision Certificate No: **016/2009** Date of Endorsement: **19 AUGUST 2009**

Certified correct for the purposes of the Real Property Act 1900 by the Mortgagee
SIGNED by Raymond Timms as attorney for Westpac Banking Corporation under power of attorney Book 4299 no. 332

(Signature) Tier Three Attorney
By executing this instrument the attorney states that the attorney has received no notice of the revocation of the power of attorney.

I certify that the attorney for the Mortgagee with whom I am personally acquainted or as to whose identity I am otherwise satisfied, signed this instrument in my presence.

Signature of witness:

Name of witness: DWI MURDOCK

Address of witness: 1 King Street
Concord West NSW

SURVEYOR'S REFERENCE: **6710DP**

ATTACHMENT 2

Attachment 2
Proposed extractive area

Legend

- Existing Test borehole locations
- Borehole for ASS testing
- Peizometer installation
- Bench Mark (BM)

Project:	Lot 32 DP 1151612 Newrybar Swamp rd Lennox Head
Client:	Ballina Sands
Title:	Borehole Locations

ARDILL PAYNE & PARTNERS
Consulting Civil & Structural Engineers Project Managers
Town Planners & Surveyors
79 Tamar Street
P.O. Box 20
BALLINA NSW 2478
Telephone: 02 6686 3280
Facsimile: 02 6686 7820
Email: info@ardillpayne.com.au
Website: www.ardillpayne.com.au

Design: JF		Scale at A3: 1:2500	
Drawn: RMcG		Datum: AHD	
Date: 18.05.12		Filename: 6542w-Borehole Locations	
Checked:		Approved:	
Job No.: 6542w	Dwg. No.: ASS.1	Issue:	

ATTACHMENT 3

Attachment 3

Signed site history statement

Recd 14/5

ARDILL PAYNE AND PARTNERS

SITE HISTORY ASSESSMENT

Name: R & C WATSON
Site Address: Lot 32 DP 115 1612

Land Use

- Chronological list of past and present land uses with associated time periods. For agricultural land uses please include crop types.
- Location of any cattle dip sites on or off-site.
- Attach additional sheets as necessary and any supporting documents, photographs, etc.

LAND PURCHASED JAN. 1989. PREVIOUS OWNER HAD RECENTLY CLEARED THE LAND. WE FENCED THE BLOCK AND GRAZED CATTLE UNTIL 1997. IT WAS THEN PLANTED TO CANE. BECAUSE OF POOR QUALITY CANE AND POOR PRICES THE LAND WAS PUT BACK TO PASTURE FROM 2006.
NO CATTLE ON SITE. NEAREST OLD SITE > 1 Km away.
DIP DIP

Permits/Licences

- Provide details of any permits, licences, approvals etc for past site uses.

NIL

Historical Use of Adjacent Land

- Brief overview of historical use of adjacent land, if known.

Fallow, GRAZING CATTLE, CANE

Chemicals

- Provide list of any chemicals (herbicides, insecticides, fuels, oils etc) used on site. State the purpose of chemical use, application (e.g. directly on crop or dipped inside sheds) and the time periods used.
- List storage, waste disposal areas, spills, and possible contaminant sources – on and off site.

ROUND UP, PARAQUAT DIURON – all used according to recommendations.

NIL STORAGE ON SITE

Tanks

- Provide details and locations of any former or existing underground/above ground tanks.

NIL

ARDILL PAYNE AND PARTNERS

Manufacturing/Industrial

- Description of any manufacturing/industrial processes on the site, including locations and dates.

NIL

Asbestos

- Provide details of any asbestos used in past or present buildings.

NIL

Water Use

- Describe any usage of ground/surface waters and bore/pump locations.

Sewerage Disposal

- Describe any sewerage disposal areas.

NIL

Indicators of Contamination

- Describe any areas of soil discolouration, bare soil patches, poor plant growth or stress, odours, complaints from neighbours etc.

NIL

Any other pertinent information

NIL

Name Robert Watson

Date 9/5/12

Signature

ATTACHMENT 4

Attachment 4
Chain of Custody &
Lab Results

9 x soil

CHAIN OF CUSTODY

B9915

Environmental Analysis Laboratory	Client Details	EAL Quote No:	Project Ref:6542w–Contamination
Despatch Samples To:	Company Name: Ardill Payne & Partners		
EAL - Southern Cross University P O Box 157 / Military Road LISMORE NSW 2480	Contact Person: James Foster		Phone: 6686 3280
	Mobile:		Fax:
Phone: 02 6620 3678 Fax: 02 6620 3957 Mobile: 0419 984 088 Email: eal@scu.edu.au	Email Address: jamesf@ardillpayne.com.au		
	Postal Address:	79 Tamar Street Ballina	

Payment Method: (please tick ☐) (circle type of c/card)	☐ Credit Card	☐ Cheque	★ **Invoice (prior approval required)**	☐ Purchase Order
	Bankcard / Mastercard / Visa	No: _____/_____/_____/_____		Exp. Date:
	Name on Card:		Signature:	
Billing Address: (if different from above)				

Relinquished By: J Foster	Date: 11/5/12	Time: 13:29	Signed:
Sample Preservation: None / Warm / Cool / **On Ice** / Frozen / Acidified / Filtered / Other:			
Received By: M.Hamilton-Tate	Date: 11/5/12	Time: 4pm	Signed:
Sample Condition on receipt:			

Sample No.	Sample ID	Sample Depth	Sampling Date	Your Client	Crop ID	Container (size and type)	Sample Type (e.g. water, leaf, soil)	Sample Analysis Request – Price List Code (e.g. SW-PACK-06): Composite	SS-PACK-08								
1	TP1	0-150	11/05/12	WATSON		Snap Lock	SOIL										
2	TP2	0-150	11/05/12	WATSON		Snap Lock	SOIL	x	x								
3	TP3	0-150	11/05/12	WATSON		Snap Lock	SOIL										
4	TP4	0-150	11/05/12	WATSON		Snap Lock	SOIL										
5	TP5	0-150	11/05/12	WATSON		Snap Lock	SOIL	x	x								
6	TP6	0-150	11/05/12	WATSON		Snap Lock	SOIL										

CHAIN OF CUSTODY

7	TP7	0-150	11/05/12	WATSON		Snap Lock	SOIL	x	x								
8	TP8	0-150	11/05/12	WATSON		Snap Lock	SOIL										
9	TP9	0-150	11/05/12	WATSON		Snap Lock	SOIL										

Report Date/Time: 14 May 2012 8:44:32AM

Sample Receipt Notification (SRN)

Project:	EAL/B9915
Customer:	**Ardill Payne & Partners**
Contact:	James Foster
Client Job ID:	6542w-Contamination > Soil
No. of Samples:	9 samples; 3 composites
Date Received:	11/05/2012 3:51:14PM
Comments:	Standard Request
Biller:	**Ardill Payne & Partners** - James Foster - 02 6686 3280

Environmental Analysis Laboratory

Environmental Analysis Laboratory
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Test Request

Sample Text ID	Client Sample ID	Contaminated Site Assessment 3	Soil Compositing
		SS-PACK-08	SS-PREP-04
EAL/B9915/(C)001	Samples(1,2,3)	1	0
EAL/B9915/(C)002	Samples(4,5,6)	1	0
EAL/B9915/(C)003	Samples(7,8,9)	1	0
EAL/B9915/001	TP1	0	1
EAL/B9915/002	TP2	0	1
EAL/B9915/003	TP3	0	1
EAL/B9915/004	TP4	0	1
EAL/B9915/005	TP5	0	1
EAL/B9915/006	TP6	0	1
EAL/B9915/007	TP7	0	1
EAL/B9915/008	TP8	0	1
EAL/B9915/009	TP9	0	1
Total		3	9

RESULTS OF SOIL ANALYSIS

5 soil samples supplied by Ardill Payne & Partners on the 11th May, 2012 - Lab Job No. 89915
Soil samples supplied were composited by EAL into 3 composite samples for analysis
Analysis requested by James Foster. Your Job: 6542w
(PO Box 20, BALLINA NSW 2478).

ANALYTE	METHOD REFERENCE	Composite Sample 1 TP1, 2 & 3	Composite Sample 2 TP4, 5 & 6	Composite Sample 3 TP7, 8 & 9	RESIDENTIAL Guideline Limit Composite - Column 1	RESIDENTIAL Guideline Limit Individual - Column 1	COMMERCIAL Guideline Limit Composite - Column 4	COMMERCIAL Guideline Limit Individual - Column 4	Background Range
	Job No.	89915/C1	89915/C2	89915/C3	See note 1a,b	See note 1a,b	See note 1a,b	See note 1a,b	See note 2
MOISTURE %	c	19	20	19	--	--	--	--	--
SILVER (mg/Kg DW)	a	<0.5	<0.5	<0.5	na	na	na	na	na
ARSENIC (mg/Kg DW)	a	<1	<1	<1	<25	<100	<125	<500	<2-30
LEAD (mg/Kg DW)	a	1	1	2	<75	<300	<375	<1500	<2-200
CADMIUM (mg/Kg DW)	a	<0.5	<0.5	<0.5	<5	<20	<25	<100	0.04-2.0
CHROMIUM (mg/Kg DW)	a	1	1	3	<25	<100	<125	<500	0.5-110
COPPER (mg/Kg DW)	a	2	3	5	<250	<1000	<1250	<5000	1-190
MANGANESE (mg/Kg DW)	a	4	2	13	<375	<1500	<1875	<7500	4 - 12,600
NICKEL (mg/Kg DW)	a	1	1	4	<150	<600	<750	<3000	2-400
SELENIUM (mg/Kg DW)	a	<1	<1	<1	na	na	na	na	na
ZINC (mg/Kg DW)	a	3	1	4	<1750	<7000	<8750	<35000	2-180
MERCURY (mg/Kg DW)	a	<0.05	<0.05	<0.05	<3.75	<15	<18.75	<75	0.001-0.1
IRON (% DW)	a	0.05	0.04	0.10	na	na	na	na	na
ALUMINIUM (% DW)	a	0.15	0.09	0.55	na	na	na	na	na
PESTICIDE ANALYSIS SCREEN									
4.4' - DDT (mg/Kg)	c	<0.1	<0.1	<0.1	<2.5	<10	<250	<1000	--
Methoxychlor (mg/Kg)	c	<0.1	<0.1	<0.1	<2.5	<10	<12.5	<50	--
Other Organochlorine Pesticides (mg/Kg)	c	<0.1	<0.1	<0.1	<2.5	<10	<12.5	<50	<0.05

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. 73348

NOTES
1a. Column 1 ' Residential with gardens and accessible soil including childrens daycare centres, preschools, primary schools, town houses or villas' (NSW EPA 1998)
1b. Column 4 ' Commercial and Industrial' (NSW EPA 1998)
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)

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