

Lot 8, 175 Cranebrook Road, Cranebrook

Contaminated Land Assessment

Client : Peter & Charlene Adcock
Prepared by : Australian Wetlands Consulting Pty Ltd
Project # : 3-16778_3a
Date : November 2016

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Lot 8, 175 Cranebrook Road, Cranebrook

Contaminated Land Assessment

Project control

Project name: **Lot 8, 75 Cranebrook Road, Cranebrook**

Contaminated Land Assessment

Job number: 3-16778_3a

Client: Peter & Charlene Adcock

Contact: Peter Adcock

Prepared by: Australian Wetlands Consulting Pty Ltd

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07.12.2016	A	Jesse Munro	Damian McCann	Peter Adcock

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AWC's management system has been certified to ISO 9001

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1 Introduction and Background

AWC was engaged by Peter Adcock to undertake a Contaminated Land Assessment for a proposed new dwelling in the north of the allotment. A Development Application will be submitted to Penrith City Council.

The subject site is 175 Cranebrook Road, Cranebrook, Lot 8, DP 31820 and has an area of approximately 2 hectares. The property currently houses a wholesale nursery and an existing dwelling used as office space.

1.1 Legislation

The aim of this assessment is to identify potential contamination to the land to satisfy the provisions of State Environmental Planning Policy No.55 – Remediation of Land (SEPP55) under the Environmental Planning and Assessment Act 1979.

In accordance with the *Guidelines for Consultants Reporting on Contaminated Sites* (OEH, 2011) this assessment fulfills the requirements of:

- Stage 1 - Preliminary site investigation

As there was no contamination detected, and the site is now considered uncontaminated, completion of further stages (Stage 2 Detailed Site investigation, Stage 3 Remediation and Stage 4 Validation) are not required.

The key documents guiding this assessment are:

- *Guidelines for Consultants Reporting on Contaminated Sites* (OEH, 2011)
- *Contaminated Sites – Guidelines for the NSW Site Auditor Scheme (2nd Ed.)* (DEC, 2006)
- *Contaminated Sites – Sampling Design Guidelines*. (EPA, 1995)

1.2 The proposal

The development proposal is for a new five bedroom dwelling and detached self-contained two bedroom unit to be constructed in the north of the site. The existing dwelling which is used for offices and administration for the wholesale nursery will be retained. A new On-site Sewage Management System (OSMS) will be installed for the new dwellings.

2 Study Area

As part of the contaminated Land Assessment, the site was investigated, focusing on the northern portion of the property, where the proposed dwellings will be constructed. This area is approximately 1500m².

2.1 History and Land Use

Beyond the northern boundary is a horse training property with general rural residential land use on the east and west boundaries. The southern boundary is Cranebrook Road.

The site has been used for nursery production for approximately 40 years, including a retail nursery which was situated on the southern side of the existing dwelling, close to the Cranebrook Road access. Land use prior to the nurseries is unconfirmed though is thought to be general grazing and informal timber collection.

The wholesale production nursery is located on the southern majority of the property including a dam just south of the proposed dwelling site. An existing dwelling structure located in the south of the property is used for administration of the nursery. Car parking areas, gravel access, general storage, igloos and hard stand areas are also part of the existing nursery.

Additionally, as an extension to the nursery, a landscaping business was administered from the site. There were areas where equipment and machinery were stored, though not in the location of the proposed dwellings. The location of the proposed dwellings has been used as a stockpile area for imported soils, mulches and other landscape related supplies; green waste was stockpiled and intermittently burned in that location (refer Photo 2-1). The area has accumulated a layer of approximately 0.5m depth of fill material (refer Photo 2-2).

There are existing trees and patches of regrowth vegetation generally located along the boundary fences.



Photo 2-1: Landscape material holding area and stockpile areas



Photo 2-2: Landscape material stockpile area (disused) note fill material

2.2 Soils

The soil landscape of the property is classified as Birkshire Park. The Birkshire Park soils landscape covers a wide area between the lower terraces of the Hawkesbury/Nepean River system and west of South Creek. The soil of this landscape includes weakly pedal orange heavy clays and clayey sands (Bannerman and Hazelton, 1990).

Soil bore logs were taken as part of the OSMS assessment which showed consistently sandy loam with high organic matter to approximate depth of 200mm with the sandy loam continuing to 400mm. At approximately 60mm depth soil changed to orange mottled dense clay.

3 Soil Sampling and Analysis

As the site is potentially contaminated from the production nursery and landscape stockpile/fill area, land use soil sampling and analysis to determine contamination levels has been undertaken. Additionally, land use prior to the nursery is uncertain, thus sampling will determine if any contamination has occurred historically.

This contaminated land assessment focusses on the location of the proposed new dwellings, which is generally north of the existing dam on the site. The area of proposed disturbance and potential contact resulting from the proposed dwellings is approximately 1500m².

3.1 Sampling methodology

Sampling was undertaken by Damian McCann of AWC on 2nd November 2016. Samples were collected from just below the soil surface layer (approximately 100mm depth) and placed in zip lock plastic bags with the sample name and date. The samples were couriered to the analysis laboratory (Environmental Analysis Laboratory (EAL) at Southern Cross University (SCU), Lismore).

3.1.1 Sampling pattern

In accordance with the *Contaminated Sites - Sampling Design Guidelines* (EPA, 1995) a judgmental sampling pattern was used.

The number of samples taken exceeded the requirement of Table A of the *Sampling Design Guidelines* (pg.8, EPA, 1995). Based on the approximate area of the proposed dwellings and surrounds being 1500m², a minimum of seven samples is required, however as composite sampling was undertaken a total of eight point samples were collected to form two composite samples for analysis.

Samples were generally in a grid pattern through the area of the proposed dwelling. Table 3-1 provides detail and comment on the locations of the samples and the plan in Appendix A shows the sample locations in landscape context.

Soils taken from the fill material (A1, 2, 3, & 4 and B1 & 2) were a mix of clays and aggregate while the two samples collected from the existing site soil (B3 & 4) was sandy loam topsoil.

3.1.2 Sample analysis

The primary concern with regard to contamination is from the production nursery and the landscape material stockpile and burning that has taken place generally in the location of the proposed dwellings. In the nursery, use of residual pesticides and other pesticide with heavy metals as ingredients may be evident. Other heavy metal contaminants may be present in the stockpile/burn areas.

The composite samples were analysed for metals (including Copper, Lead, Cadmium, Zinc, Arsenic, Selenium, Iron, Manganese, Silver, Chromium, Nickel, Aluminum, and Mercury) and Pesticides (Organochlorine and Organophosphates). This suite of analytes is adequate to detect the

majority of potential contaminants.

Methods of analysis are shown on the laboratory results sheets that are provided in Appendix B. Chain of Custody forms are provided in Appendix C.

Table 3-1 Sample location and information

	Sample	Comment
Mixed to form Composite 3	A1	Taken from fill material, approximately at the south east corner of the proposed dwelling.
	A2	Taken in fill material at approximately the southern façade of the proposed dwelling.
	A3	Fill material at approximately the south western corner of the proposed dwelling.
	A4	Fill material. Collected from approximately the northwestern corner of the proposed dwelling.
Mixed to form Composite 4	B1	Fill material. Taken from approximately the center of the northern façade of the proposed dwelling.
	B2	Fill material. Taken from approximately the north eastern corner of the proposed dwelling.
	B3	Existing site soils. Sample collected from the approximate location of the self-contained unit.
	B4	Existing site soils. Taken from the open area north of the proposed dwelling and west of the proposed self-contained unit.

3.2 Soil Sample Results

The results of the composite sample analysis are compared with the Health Based Investigation Levels (HBIL) found in *Column 1 – Residential with gardens and accessible soil (home-grown produce contributing < 10% fruit and vegetable intake; no poultry), including children’s day-care centres, preschools, primary schools, townhouses, villas*, Appendix II of *Contaminated Sites – Guidelines for the NSW Site Auditor Scheme* (pg.52, DEC, 2006).

As the sampling has been undertaken using composite sampling the concentration triggers are adjusted accordingly; the adjusted trigger level is the HBIL divided by the number of samples within the composite sample (in this case four). This method will detect an exceeded contaminant concentration in one sample of the composite when the concentrations in all other samples within the composite are zero. Should the results of the composite sample analysis exceed an adjusted trigger value, all samples within the composite will be analysed for that particular contaminant.

Table 3-2 below shows typical background ranges for potential contaminants. Table 3-3, below, shows the results of the composite sample analysis compared with the HBIL and adjusted trigger concentration. The analysis results sheet as provided by the laboratory is held in Appendix B.

3.3 Interpretation of results

Both composite samples recorded chromium values above the adjusted HBIL of 25mg/kg; Composite Sample 3 with 47mg/kg and Composite Sample 4 showing a concentration of 56mg/kg. The results are for total chromium of which only the hexavalent Chromium (Cr(VI)) is of concern. Refer Section 3.3.1 for more detail.

All other results were below the respective adjusted HBIL. All pesticide values, organochlorines and organophosphates, were below detection limits.

The low concentration of contaminants tested, suggest that the site is not contaminated, and is suitable for the construction of a residential dwelling. Despite the proximity to a long running production nursery and the proposed building site being used as a landscape materials stockpiling area.

3.3.1 Chromium

Total chromium concentrations in both composite samples were slightly above the adjusted HBIL of 25mg/kg. Chromium exists in a number of oxidation states with Cr(VI) being of most concern. Generally, total chromium exists in soils principally as Cr(III), with only very low concentrations of Cr(VI). As such there is no contamination at the site from Cr(VI). As shown in Table 3-2 below, background ranges for Cr(VI) can range from 0.5-110mg/Kg and may be an underestimate, the total chromium values detected are within the typical background range.

Additionally, the chromium result values from the Composite Samples show the concentrations detected to be below the adjusted HBIL for trivalent chromium (Cr(III)) value of 12% (ie 120mg/Kg), thus not constituting contamination.

Elevated total chromium values may be attributable to other metals, treated wood, photographic chemicals or naturally occurring. Most naturally occurring chromium is trivalent chromium (Cr(III)).

As a result, the potential for contamination of the site from Cr(VI) is very low based on the justifications above and the site can be considered as not contaminated by Chromium.

Table 3-2. Background ranges for potential contaminants

Contaminant	Background Range (mg/kg)
Arsenic	0.2 – 30
Cadmium	0.04 – 2
Chromium (VI)	0.5 – 110 (possible underestimate)
Copper	1 – 190
Lead	<2 – 200
Manganese	4 – 12,600
Nickel	2 – 400
Zinc	2 – 180

(Source: ANZECC and NHMRC (1992) found in Lancaster (2006))

Table 3-3. Composite sample analysis results compared with HBIL and adjusted trigger values

Substance	HBIL (mg/kg) #	Adjusted HBIL (mg/kg)*	Composite Sample	
			3	4
Metals				
Silver	N/A		<1	<1
Arsenic	100	25	9	7
Cadmium	20	5	<0.5	<0.5
Chromium	[<100]	[<25]	47	56
Copper	1000	250	27	22
Lead	300	75	24	23
Mercury	15	3.75	<0.05	<0.05
Nickel	600	150	30	37
Zinc	7000	1750	68	50
Selenium	50	200	1	1
Manganese	950	3,800	330	343
Boron	1,125	4,500	2	2
Cobalt	25	100	10	12
Pesticides				
Aldrin + Dieldrin	10	2.5	<0.1	<0.1
Chlordane	50	12.5	<0.1	<0.1
DDT + DDD + DDE	200	50	<0.1	<0.1
Heptachlor	10	2.5	<0.1	<0.1
Other Organochlorine Pesticides				
Organophosphate Pesticides				
# - Taken from Column 1 – Residential... (DEC, 2006)				
* - Adjusted trigger level based on 4 samples within each composite sample.				
Note: Chromium results values are for total chromium				

4 Conclusion

A Preliminary Contaminated Land Assessment has been undertaken for two proposed detached dwellings at 175 Cranebrook Road, Cranebrook, Lot 8 DP 31820. The assessment was undertaken in accordance with EPA (1995) and OEH (2011).

The proposal is to construct a main dwelling with detached self-contained unit in the far north of the site. The property is approximately two hectares in total, however the new dwellings will only take up approximately 1500m² and as such the assessment focused on that area only. The remainder of the property is an existing wholesale nursery with an existing dwelling structure used for administration.

Soil sampling was undertaken within the subject area as the long term history was unknown and was potentially contaminated from the wholesale nursery and use as a landscape material stockpile area. A total of eight samples were taken and mixed to form two composite samples. Samples were analysed for heavy metals and pesticide concentrations with results compared to limits determined by DEC (2006).

Results showed all potential contaminants were below the relevant trigger values except for Chromium. Chromium is found in two forms hexavalent Chromium (Cr(VI)) and trivalent Chromium (Cr(III)). Cr(VI) is of most concern however is rarely detected with the vast majority of detectable, naturally occurring Chromium being Cr(III). The Chromium detected is within naturally occurring back ground ranges and is therefore considered to be low risk. As such the site is not deemed contaminated and is suitable for the construction of the proposed dwellings.

5 References

Bannerman S.M and Hazelton P.A. (1990) *Soil Landscapes of the Penrith 1:100,000 Sheet* map and report, Soil Conservation Service of NSW, Sydney

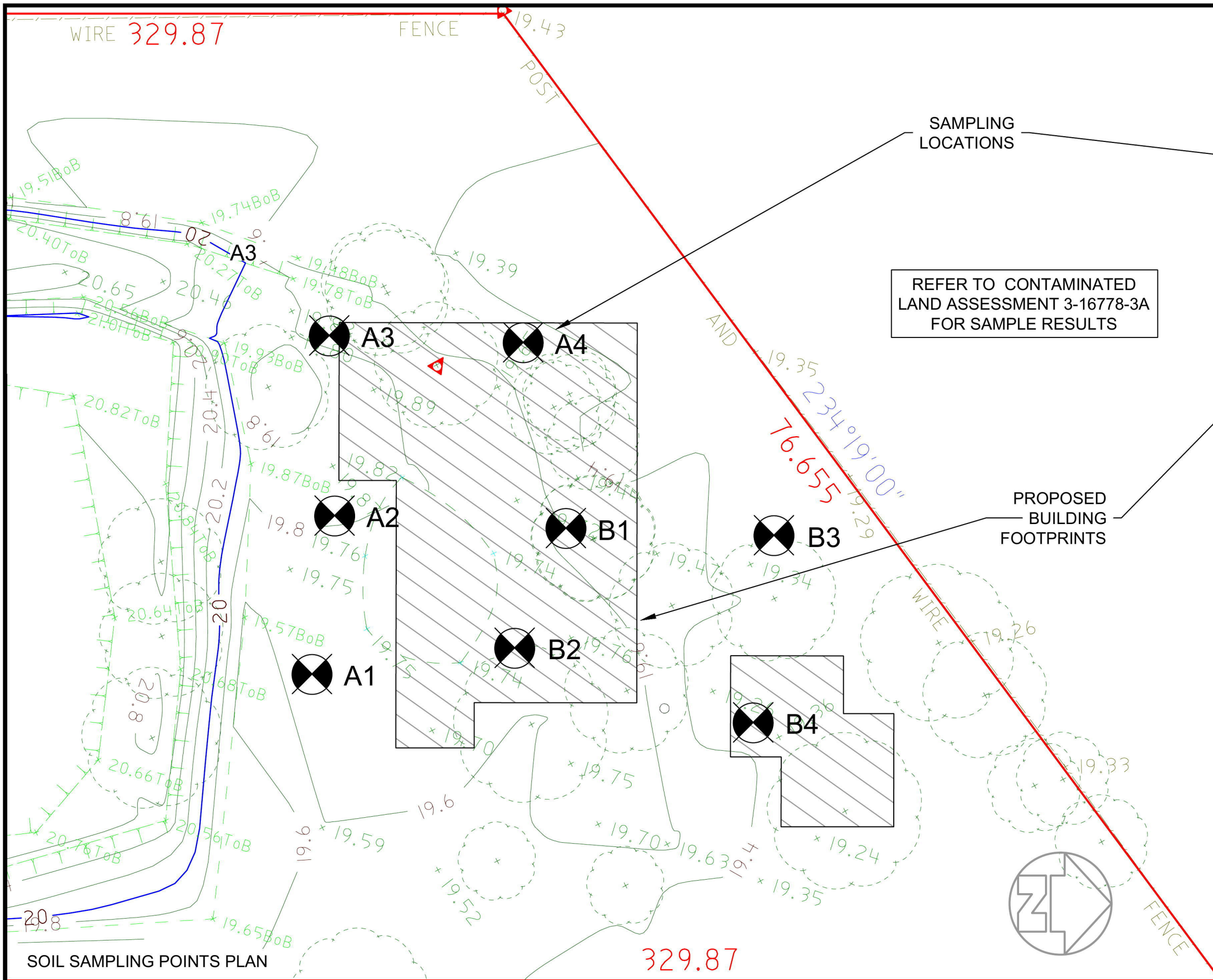
Department of Environment and Conservation (DEC) (2006) *Contaminated Sites – Guidelines for the NSW Site Auditor Scheme (2nd Ed.)* NSW Department of Environment and Conservation, Sydney.

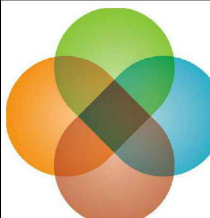

EPA (1995) *Contaminated Sites – Sampling Design Guidelines*. NSW Environment Protection Agency, Sydney

Office of Environment and Heritage (OEH) (2011) *Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites*. Office of Environment and Heritage, Sydney

Appendix A

Soil Sample Locations



 <div>AWC Australian Wetlands Consulting Pty Ltd PO Box 2605 / 70 Butler Street Byron Bay NSW 2481 P (02) 6685 5466 | F (02) 6680 9406 www.awconsult.com.au</div>	CLIENT PETER ADCOCK	DO NOT SCALE FROM PLANS. TO BE ADAPTED ON SITE BY CONTRACTOR & CONFIRMED BY PROJECT SUPERVISOR, SIZING, CALCULATIONS, STRUCTURES, & COMPACTION TO BE CONFIRMED BY ENGINEER OR SUITABLY QUALIFIED PERSONS. ENGINEERS CERTIFICATE BY OTHERS.	REV.	ISSUE / AMENDMENTS	DATE	DESIGNED	PROJECT LOT 8 DP 31820 170 CRANEBROOK ROAD CONTAMINATED LAND ASSESSMENT	DRAWING APPENDIX A SOIL SAMPLE LOCATIONS AND CONTEXT PLAN	DWG No. AWC_3-16778_01
			A		30.11.16	DRAWN SS			CAD FILE No. 3-16778_SOIL01.dwg
						CHECKED JM/DMc			REV. A
						SCALE 1:400 @ A3		DRAWING CREATED 30/11/2016	

Appendix B

Laboratory Result Sheets

RESULTS OF SOIL ANALYSIS

16 soil samples supplied by Australian Wetlands Consulting Pty Ltd on 8th November, 2016 - Lab Job No. F4565
 Soil samples supplied were composited by EAL into 4 composite samples for analysis
 Analysis requested by Damian McCann. Your Job: 3-16778
 (70 Butler Street BYRON BAY NSW 2481).

ANALYTE	METHOD	Composite Sample 1	Composite Sample 2	Composite Sample 3	Composite Sample 4	RESIDENTIAL A Guideline Limit		COMMERCIAL/ INDUSTRIAL D Guideline Limit		Background	
		REFERENCE	C1 (C1-C4)	C2 (D1-D4)	C3 (A1-A4)	C4 (B1-B4)	Composite - Column A	Individual - Column A	Composite - Column D	Individual - Column D	Range
		Job No.	F4565/1	F4565/2	F4565/3	F4565/4	See note 1a	See note 1a	See note 1d	See note 1d	See note 2
TEXTURE (SAND, CLAY, SILT)	** inhouse	Silt	Silt	Silt	Silt	..	..	..	..	..
MOISTURE %	** C	2	2	2	1	..	..	..	..	..
SILVER (mg/Kg DW)	a	<1	<1	<1	<1	na	na	na	na	na	
ARSENIC (mg/Kg DW)	a	19	23	9	7	25	100	750	3,000	0.2-30	
LEAD (mg/Kg DW)	a	34	32	24	23	75	300	375	1,500	<2-200	
CADMIUM (mg/Kg DW)	a	<0.5	<0.5	<0.5	<0.5	5	20	225	900	0.04-2.0	
CHROMIUM (mg/Kg DW)	a	76	77	47	56	(<25)	(<100)	(<900)	(<3,600)	0.5-110	
COPPER (mg/Kg DW)	a	15	16	27	22	1,500	6,000	60,000	240,000	1-190	
MANGANESE (mg/Kg DW)	a	175	123	330	343	950	3,800	15,000	60,000	4 - 12,600	
NICKEL (mg/Kg DW)	a	6	6	30	37	100	400	1,500	6,000	2-400	
SELENIUM (mg/Kg DW)	a	1	1	1	1	50	200	2,500	10,000	na	
ZINC (mg/Kg DW)	a	54	42	68	50	1,850	7,400	100,000	400,000	2-180	
MERCURY (mg/Kg DW)	a	<0.05	<0.05	<0.05	<0.05	10	40	183	730	0.001-0.1	
IRON (% DW)	a	8.20	9.62	4.87	5.04	na	na	na	na	na	
ALUMINIUM (% DW)	a	1.16	1.27	1.65	1.51	na	na	na	na	na	
BERYLLIUM (mg/Kg DW)	a	<1	1	1	1	15	60	125	500	na	
BORON (mg/Kg DW)	a	2	2	2	2	1,125	4,500	75,000	300,000	na	
COBALT (mg/Kg DW)	a	5	4	10	12	25	100	1,000	4,000	na	
PESTICIDE ANALYSIS SCREEN											
DDT+DDE+DDD (mg/Kg)	c	<0.1	<0.1	<0.1	<0.1	60	240	900	3,600	<0.1	
Aldrin + Dieldrin (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	2	6	11	45	<0.1	
Chlordane (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	13	50	133	530	<0.1	
Endosulfan (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	68	270	500	2,000	<0.1	
Endrin (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	3	10	25	100	<0.1	
Heptachlor (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	2	6	13	50	<0.1	
HCB (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	3	10	20	80	<0.1	
Methoxychlor (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	75	300	625	2,500	<0.1	
Other Organochlorine Pesticides (mg/Kg)	c	<0.1	<0.1	<0.1	<0.1	..	..	..	..	<0.1
Chlorpyrifos (mg/kg)	c	<0.1	<0.1	<0.1	<0.1	40	160	500	2,000	<0.1	
Other Organophosphate Pesticides (mg/Kg)	c	<0.1	<0.1	<0.1	<0.1	..	..	..	..	<0.1

METHODS REFERENCE

- a. ¹⁵Nitric/HCl digest - APHA 3125 ICPMS
 b. ¹⁵Nitric/HCl digest - APHA 3120 ICPOES
 c. Analysis sub-contracted - Envirolab report no. 157338

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

NOTES

- 1a. HIL A - Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.
 1b. HIL B - Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.
 1c. HIL C - Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space.
 1d. HIL D - Commercial/industrial, includes premises such as shops, offices, factories and industrial sites.

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

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

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:

(Azinphos-methyl (Guthion), Bromophos-ethyl, Chlorpyrifos, Chlorpyrifos-methyl, Diazinon, Dichlorvos, Dimethoate, Ethion, Fenitrothion, Malathion, Parathion, Ronnel)

PCB's = Polychlorinated Biphenyls

(Arochlor 1016, 1232, 1242, 1248, 1254, 1260)



Appendix C

Chain of Custody forms

CHAIN OF CUSTODY

Submitting Client Details

Quote Id:
 Job Ref: 3-16778
 Company Name: AWC
 Contact Person: DAMIAN
 Phone:
 Mobile: 0408 471 077
 Fax:
 Email: damian@awconsult.com.au
 Postal Address: 70 BUTLER ST
 BYRON BAY, 2481

Billing Client Details

ABN:
 Company Name: AWC
 Contact Person: DAMIAN
 Phone:
 Mobile:
 Fax:
 Email:
 Postal Address:



PO Box 157 (Military Road)
 LISMORE NSW 2480
 P| 02 6620 3678 F| 02 6620 3957
 eal@scu.edu.au, www.scu.edu.au/eal

This section will be destroyed after being processed. Do NOT provide your CVV number, you will be contacted by phone or email when this is required.

Date 2/11 Signed DM

Payment Method:

- ☐ Purchase Order
☐ Cheque
☒ Invoice (prior approval required)
☐ Credit Card Mastercard / Visa No: ____/____/____/____

Exp. Date: Name on Card: CVV: by phone

Relinquished By:

Preservation: None / Ice / Ice bricks / Acidified / Filtered / Other:

Received By:

Condition on receipt: Ambient / Cool / Frozen / Other:

Comments:

Marketing Survey – where did you find us?

- ☐ Word of mouth ☐ Magazine ☐ Google search ☐ Other

Sample Analysis Request

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

Lab Sample No.	Sample ID	Sample Depth	Sampling Date	Your Client	Crop ID	Sample Type (e.g. water, leaf, soil)										
9	SITE A1	200mm	3/11/16	P. Adcock		SOIL	✓ SW-PACK-005									
10	A2															
11	A3															
12	A4															
13	B1															

CHAIN OF CUSTODY

Comments:

Marketing Survey – where did you find us?

☐ Word of mouth ☐ Magazine ☐ Google search ☐ Other

Sample Analysis Request

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

[illegible]



Leading environmental solutions...



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