

C Oppegaard - PB Ag Soil Contamination Report

Section 1

Client	C Oppegaard
Date/Time	24/08/2023
Property Name	McIntosh Estate
Methodology	Mid Regional Council have requested that a preliminary contamination investigation is conducted on the area around existing building of 521 Ulan Road Eurunderee, Lot 2 DP 618062 2. Compliance with State Environmental Planning Policy (Resilience and Hazards) 2021 The subject site has previously operated as a winery and contains a vineyard which may result in the site being contaminated as a result of the current and historic horticultural practices, as noted within Table 1 of the contaminated land planning guidelines. Pursuant to Clause 4.6(2) of State Environmental Planning Policy (Resilience and Hazards) 2021, Council 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 where there is change of use on land (in this case for residential , commercial purposes) where development for horticulture is being, or is known to have been carried out on the land. The preliminary contamination investigation is to be prepared by a suitably qualified consultant and must include soil testing of the site. Where the report finds that contamination exists on the site, the report is to provided recommendations for remediation works required before the land may be suitable to be used for residential and commercial purposes. Methodology Systematic sampling is a probabilistic strategy that involves selecting points at regular intervals over an area, for example, grid intersections, or time. Systematic sampling does not generate clusters of sampling locations but ensures an even coverage of the site or decision area, which makes this approach ideal for characterising sites or decision areas. Systematic sampling is statistically unbiased as long as the coordinates of the first sampling location are determined randomly. Area was approximately .35 of a hectare. Number of sample site required 8 (EPA Sampling Design Contamination Guidelines) - Samples were taken at set intervals across the pre determined test area. See attached sample grid(Appendix C) - Soil was collected using a soil sample probe which was washed with distilled water and dried prior to collecting soil from this site. Soil was collected at a depth of 20 cm. - Soil was immediately placed into labeled 250 ml glass jars, sealed with lid, 16 sample jars (2 jars per site tested) were supplied by ASL Laboratory Mudgee - Each sample jar was clearly labeled identifying sample site, sample number, date, time sampled by. - Once soil collected the jars were immediately placed in a chilled car fridge and delivered to ALS Mudgee NSW for required testing to be carried out. - All samples were collected by Paul Baguley of PB ag Consulting Pty Ltd - Preliminary investigation soil was tested to a depth of 20 cm The area was tested on the 10th August 2023 and samples delivered to Lab 10th August 2023 Soil was tested for 8 minerals, OC, OP. PCB

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Soil Results and Comments	(See appendix A for full soil Results) (See appendix Table 5-A - Soil Investigation Levels HILs) Summary of Results: Heavy Metals Arsenic falls in within safe guidelines for residential development Cadmium falls within safe guidelines for residential development Chromium falls within safe guidelines for residential development Copper falls within safe guidelines for residential development Lead falls within safe guidelines for residential development Nickel falls within safe guidelines for residential development Zinc falls within safe guidelines for residential development Mercury falls within safe guidelines for residential development OC, OP, PCB Organochlorine Pesticides (OC) falls within safe guidelines for residential development Organophosphorus Pesticides (OP) falls within safe guidelines for residential development Polychlorinated Biphenyls (PCB) falls within safe guidelines for residential development The preliminary contamination investigation has been conducted on the area around existing building of 521 Ulan Road Eurunderee, Lot 2 DP 618062. The results clearly demonstrate that soil contamination is not an issue and in the case of dwelling consent this should be approved inline with Development Application (DA) No Remedial soil works are required or recommended.
Additional Comments	Vineyards, orchards, and market garden soils have a typical background concentration of selected contaminants, and these would be expected to be found in any contaminant soil testing conducted on these sites. Contaminants typical background concentration (mg/kg) Arsenic1 to 50 mg/kg Cadmium1 mg/kg Copper2 to 100 mg/kg Lead2 to 200 mg/kg Zinc10-300 mg/kg Nickle5-200 mg/kg Mercury .03 mg/kg (Reference Table 5 -A Soil Investigation Levels mg/kg) Results from preliminary contamination testing fall within these ranges

C Oppegaard - PB Ag Soil Contamination Report

Photo Gallery



C Oppegaard - PB Ag Soil Contamination Report



C Oppegaard - PB Ag Soil Contamination Report



Sample site 12 cores in 500 mm x 600 mm grid



CERTIFICATE OF ANALYSIS

Work Order : ME2301445
Client : PB AG CONSULTING Pty Ltd
Contact : Paul Baguley
Address : PB AG CONSULTING P/L PO BOX 1197
MUDGEES NSW 2850
Telephone : 0428 404 109
Project : Soil
Order number : ----
C-O-C number : ----
Sampler : Paul Baguley (Client Sampler)
Site : PB Ag Consulting
Quote number : MU/42/18
No. of samples received : 8
No. of samples analysed : 8

Page : 1 of 9
Laboratory : Environmental Division Mudgee
Contact : Mary Monds (ALS Mudgee)
Address : 1/29 Sydney Road Mudgee NSW Australia 2850
Telephone : 02 6372 6735
Date Samples Received : 10-Aug-2023 10:30
Date Analysis Commenced : 15-Aug-2023
Issue Date : 18-Aug-2023 18:22



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Inorganics, Smithfield, NSW
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

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

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H^+ + Al^{3+}).



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				PBAG - OPP 1	PBAG - OPP 2	PBAG - OPP 3	PBAG - OPP 4	PBAG - OPP 5
Sampling date / time				10-Aug-2023 10:00	10-Aug-2023 10:00	10-Aug-2023 10:00	10-Aug-2023 10:00	10-Aug-2023 10:00
Compound	CAS Number	LOR	Unit	ME2301445-001	ME2301445-002	ME2301445-003	ME2301445-004	ME2301445-005
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	8.2	8.3	7.6	8.4	6.7
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	11.9	8.8	8.6	11.5	9.2
ED006: Exchangeable Cations on Alkaline Soils								
Ø Exchangeable Calcium	----	0.2	meq/100g	5.0	3.8	0.7	1.5	----
Ø Exchangeable Magnesium	----	0.2	meq/100g	<0.2	<0.2	<0.2	<0.2	----
Ø Exchangeable Potassium	----	0.2	meq/100g	0.4	0.6	<0.2	<0.2	----
Ø Exchangeable Sodium	----	0.2	meq/100g	<0.2	<0.2	<0.2	<0.2	----
Ø Cation Exchange Capacity	----	0.2	meq/100g	5.4	4.4	0.7	1.5	----
Ø Exchangeable Calcium Percent	----	0.2	%	93.2	85.9	100	100	----
Ø Exchangeable Magnesium Percent	----	0.2	%	<0.2	<0.2	<0.2	<0.2	----
Ø Exchangeable Potassium Percent	----	0.2	%	6.8	14.1	<0.2	<0.2	----
Ø Exchangeable Sodium Percent	----	0.2	%	<0.2	<0.2	<0.2	<0.2	----
Ø Calcium/Magnesium Ratio	----	0.2	-	<0.2	<0.2	<0.2	<0.2	----
Ø Magnesium/Potassium Ratio	----	0.2	-	----	----	<0.2	<0.2	----
Ø Magnesium/Potassium Ratio	----	0.2	-	<0.2	<0.2	----	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	2.0
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	0.4
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	0.3
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	<0.1
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	2.7
Exchangeable Aluminium	----	0.1	meq/100g	----	----	----	----	<0.1
Exchangeable Sodium Percent	----	0.1	%	----	----	----	----	0.5
Exchangeable Magnesium Percent	----	0.1	%	----	----	----	----	14.0
Exchangeable Potassium Percent	----	0.1	%	----	----	----	----	11.3
Exchangeable Calcium Percent	----	0.1	%	----	----	----	----	74.1
Calcium/Magnesium Ratio	----	0.1	-	----	----	----	----	5.0
Magnesium/Potassium Ratio	----	0.1	-	----	----	----	----	1.2
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	12	14	19	16	15
Copper	7440-50-8	5	mg/kg	15	18	7	6	<5



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				PBAG - OPP 1	PBAG - OPP 2	PBAG - OPP 3	PBAG - OPP 4	PBAG - OPP 5
Sampling date / time				10-Aug-2023 10:00	10-Aug-2023 10:00	10-Aug-2023 10:00	10-Aug-2023 10:00	10-Aug-2023 10:00
Compound	CAS Number	LOR	Unit	ME2301445-001	ME2301445-002	ME2301445-003	ME2301445-004	ME2301445-005
				Result	Result	Result	Result	Result
EG005(ED093)T: Total Metals by ICP-AES - Continued								
Lead	7439-92-1	5	mg/kg	16	13	12	7	6
Nickel	7440-02-0	2	mg/kg	4	4	3	5	3
Zinc	7440-66-6	5	mg/kg	51	57	24	7	5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				PBAG - OPP 1	PBAG - OPP 2	PBAG - OPP 3	PBAG - OPP 4	PBAG - OPP 5
Sampling date / time				10-Aug-2023 10:00	10-Aug-2023 10:00	10-Aug-2023 10:00	10-Aug-2023 10:00	10-Aug-2023 10:00
Compound	CAS Number	LOR	Unit	ME2301445-001	ME2301445-002	ME2301445-003	ME2301445-004	ME2301445-005
				Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	80.9	73.0	87.0	73.2	70.2
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	80.8	84.9	103	85.1	75.9
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	96.5	77.2	94.3	80.6	88.2



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	PBAG - OPP 6	PBAG - OPP 7	PBAG - OPP 8	----	----
Sampling date / time					10-Aug-2023 10:00	10-Aug-2023 10:00	10-Aug-2023 10:00	----	----
Compound	CAS Number	LOR	Unit		ME2301445-006	ME2301445-007	ME2301445-008	-----	-----
					Result	Result	Result	----	----
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		7.6	8.0	7.5	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		5.2	7.0	8.0	----	----
ED006: Exchangeable Cations on Alkaline Soils									
∅ Exchangeable Calcium	----	0.2	meq/100g		<0.2	0.4	1.5	----	----
∅ Exchangeable Magnesium	----	0.2	meq/100g		<0.2	<0.2	<0.2	----	----
∅ Exchangeable Potassium	----	0.2	meq/100g		<0.2	<0.2	0.4	----	----
∅ Exchangeable Sodium	----	0.2	meq/100g		<0.2	<0.2	<0.2	----	----
∅ Cation Exchange Capacity	----	0.2	meq/100g		<0.2	0.4	1.9	----	----
∅ Exchangeable Calcium Percent	----	0.2	%		N/A	----	----	----	----
∅ Exchangeable Calcium Percent	----	0.2	%		----	100	78.2	----	----
∅ Exchangeable Magnesium Percent	----	0.2	%		<0.2	----	----	----	----
∅ Exchangeable Magnesium Percent	----	0.2	%		----	<0.2	<0.2	----	----
∅ Exchangeable Potassium Percent	----	0.2	%		<0.2	----	----	----	----
∅ Exchangeable Potassium Percent	----	0.2	%		----	<0.2	21.7	----	----
∅ Exchangeable Sodium Percent	----	0.2	%		<0.2	----	----	----	----
∅ Exchangeable Sodium Percent	----	0.2	%		----	<0.2	<0.2	----	----
∅ Calcium/Magnesium Ratio	----	0.2	-		<0.2	<0.2	<0.2	----	----
∅ Magnesium/Potassium Ratio	----	0.2	-		<0.2	<0.2	----	----	----
∅ Magnesium/Potassium Ratio	----	0.2	-		----	----	<0.2	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg		22	19	11	----	----
Copper	7440-50-8	5	mg/kg		5	<5	<5	----	----
Lead	7439-92-1	5	mg/kg		5	<5	<5	----	----
Nickel	7440-02-0	2	mg/kg		3	<2	3	----	----
Zinc	7440-66-6	5	mg/kg		<5	<5	<5	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				PBAG - OPP 6	PBAG - OPP 7	PBAG - OPP 8	----	----
Sampling date / time				10-Aug-2023 10:00	10-Aug-2023 10:00	10-Aug-2023 10:00	----	----
Compound	CAS Number	LOR	Unit	ME2301445-006	ME2301445-007	ME2301445-008	-----	-----
				Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
^ Total Chlordane (sum)	-----	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				PBAG - OPP 6	PBAG - OPP 7	PBAG - OPP 8	----	----
Sampling date / time				10-Aug-2023 10:00	10-Aug-2023 10:00	10-Aug-2023 10:00	----	----
Compound	CAS Number	LOR	Unit	ME2301445-006	ME2301445-007	ME2301445-008	-----	-----
				Result	Result	Result	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued								
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	84.2	75.2	80.5	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	102	87.3	96.2	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	96.4	83.9	88.3	----	----



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EG005(ED093)T: Total Metals by ICP-AES

(SOIL) EG035T: Total Recoverable Mercury by FIMS

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

(SOIL) EP066: Polychlorinated Biphenyls (PCB)

(SOIL) EP066S: PCB Surrogate

(SOIL) EP068A: Organochlorine Pesticides (OC)

(SOIL) EP068B: Organophosphorus Pesticides (OP)

(SOIL) EP068T: Organophosphorus Pesticide Surrogate

(SOIL) EP068S: Organochlorine Pesticide Surrogate

(SOIL) EA002: pH 1:5 (Soils)

(SOIL) ED006: Exchangeable Cations on Alkaline Soils

(SOIL) ED007: Exchangeable Cations

Table 5-A - Soil Investigation Levels (mg/kg)

Substances	Health Investigation Levels (HILs)						Ecological Investigation Levels (EILs)		Background Ranges ⁶
	A ¹	B ²	C ³	D	E	F	REIL ⁴	Interim Urban ⁵	
METALS/METALLOIDS									
Arsenic (total)	100			400	200	500		20	1 - 50
Barium								300	100 - 3000
Beryllium	20			80	40	100			
Cadmium	20			80	40	100		3	1
Chromium (III)	12%			48%	24%	60%		400	
Chromium (VI)	100			400	200	500		1	
Chromium (Total) ^{*7}									5 - 1000
Cobalt	100			400	200	500			1 - 40
Copper	1000			4000	2000	5000		100	2 - 100
Lead	300			1200	600	1500		600	2 - 200
Manganese	1500			6000	3000	7500		500	850
Methyl mercury	10			40	20	50			
Mercury (inorganic)	15			60	30	75		1	0.03
Nickel	600			2400	600	3000		60	5 - 500
Vanadium								50	20 - 500
Zinc	7000			28000	14000	35000		200	10 - 300
ORGANICS									
Aldrin + Dieldrin	10			40	20	50			
Chlordane	50			200	100	250			
DDT + DDD + DDE	200			800	400	1000			
Heptachlor	10			40	20	50			
Polycyclic aromatic hydrocarbons (PAHs)	20			80	40	100			
Benzo(a)pyrene	1			4	2	5			
Phenol	8500			34000	17000	42500			
PCBs (Total)	10			40	20	50			
Petroleum Hydrocarbon Components (constituents):									
• >C16 - C35 Aromatics ⁸	90			360	180	450			
• >C16 - C35 Aliphatics	5600			22400	11200	28000			
• >C35 Aliphatics	56000			224000	112000	280000			
OTHER									
Boron	3000			12000	6000	15000			
Cyanides (Complexed)	500			2000	1000	2500			
Cyanides (free)	250			1000	500	1250			
Phosphorus								2000	
Sulfur								600	
Sulfate ⁹								2000	

¹ Human exposure settings based on land use have been established for HILs (see Taylor and Langley 1998). These are:

- A. 'Standard' residential with garden/accessible soil (home-grown produce contributing less than 10% of vegetable and fruit intake; no poultry): this category includes children's day-care centres, kindergartens, preschools and primary schools.
- B. Residential with substantial vegetable garden (contributing 10% or more of vegetable and fruit intake) and/or poultry providing any egg or poultry meat dietary intake.
- C. Residential with substantial vegetable garden (contributing 10% or more of vegetable and fruit intake); poultry excluded.
- D. Residential with minimal opportunities for soil access: includes dwellings with fully and permanently paved yard space such as high-rise apartments and flats.
- E. Parks, recreational open space and playing fields: includes secondary schools.
- F. Commercial/Industrial: includes premises such as shops and offices as well as factories and industrial sites.

² Site and contaminant specific: on site sampling is the preferred approach for estimating poultry and plant uptake. Exposure estimates may then be compared to the relevant ADIs, PTWIs and GDs.

³ Site and contaminant specific: on site sampling is the preferred approach for estimating plant uptake. Exposure estimates may then be compared to the relevant ADIs, PTWIs and GDs.

⁴ These will be developed for regional areas by jurisdictions as required.

⁵ Interim EILs for the urban setting are based on considerations of phytotoxicity, ANZECC B levels, and soil survey data from urban residential properties in four Australian capital cities.

⁶ Background ranges, where HILs or EILs are set, are taken from the Field Geologist's Manual, compiled by D A Berkman, Third Edition 1989. Publisher - The Australasian Institute of Mining & Metallurgy. This publication contains information on a more extensive list of soil elements than is included in this Table. Another source of information is Contaminated Sites Monograph No. 4: Trace Element Concentrations in Soils from Rural & Urban Areas of Australia, 1995. South Australian Health Commission.

⁷ Valence state not distinguished - expected as Cr (III).

⁸ The carbon number is an 'equivalent carbon number' based on a method that standardises according to boiling point. It is a method used by some analytical laboratories to report carbon numbers for chemicals evaluated on a boiling point GC column.

⁹ For protection of built structures.

Table 5-B
Groundwater Investigation Levels

SETTING ¹⁰	Aquatic Ecosystems ¹¹		Drinking Water	Agricultural ⁹	
	Marine Waters µg/L	Fresh Waters µg/L	Health ¹⁰ / Aesthetic ¹¹ mg/L	Irrigation (mg/L)	Livestock (mg/L)
METALS/METALLOIDS					
Aluminium		<5 (if pH <6.5) <100 (if pH >6.5)	(0.2)	5.0	5.0
Antimony		30	0.003		
Arsenic (total)	50.0	50	0.007	0.1	0.5
Barium			0.7		
Beryllium		4		0.1	0.1
Boron			0.3	0.5-6.0	5.0
Cadmium	2.0	0.2-2.0	0.002	0.01	0.01
Chromium (Total)	50.0	10		1.0	
Chromium (VI)			0.05	0.1	1.0
Cobalt				0.05	1.0
Copper	5.0	2.0-5.0	2.0 (1.0)	0.2	0.5
Iron		1000	(0.3)	1.0	
Lead	5.0	1.0-5.0	0.01	0.2	0.1
Lithium				2.5	
Manganese			0.5 (0.1)	2.0	
Mercury (total)	0.1	0.1	0.001	0.002	0.002
Molybdenum			0.05	0.01	0.01
Nickel	15.0	15.0-150.0	0.02	0.02	1.0
Selenium	70.0	5.0	0.01	0.02	0.02
Silver	1.0	0.1	0.1		
Thallium	20.0	4.0			
Tin (tributyltin)	0.002	0.008			
Vanadium				0.1	0.1
Zinc	50.0	5.0-50.0	(3.0)	2.0	20.0
ORGANICS					
1,2-dichloroethane			0.003		
Benzo(a)pyrene			0.00001		
Carbon tetrachloride			0.003		
Chlorobenzene			0.3 (0.01)		
Dichloromethane (methylene chloride)			0.004		
Ethylbenzene			0.3 (0.003)		
Ethylenediamine tetracetic acid (EDTA)			0.25		
Hexachlorobutadiene	0.3	0.1	0.0007		

¹⁰ Levels for recreational and industrial uses have not been set. For guidance on Recreational levels, see NHMRC/ARMCANZ, 1996. For recreational uses, toxic substances should, in general, not exceed the concentrations given for drinking water. For guidance on Industrial levels, see ANZECC, 1992. Industrial settings include: generic processes, hydro-electric power generation, textiles, chemical and allied industries, food and beverage, iron and steel, tanning and leather, pulp and paper, petroleum.

¹¹ Taken from Australian Water Quality Guidelines for Fresh and Marine Waters (AWQG) (ANZECC 1992)

SETTING ¹⁰	Aquatic Ecosystems ¹¹		Drinking Water	Agricultural ⁹	
	Marine Waters µg/L	Fresh Waters µg/L	Health ¹⁰ / Aesthetic ¹¹ mg/L	Irrigation (mg/L)	Livestock (mg/L)
ORGANICS (cont.)					
Monocyclic aromatic compounds					
Benzene	300.0	300.0	0.001		
Chlorinated benzenes		0.007-15.0 ¹²			
Chlorinated phenols	0.2-8.0	0.05-18.0 ¹³	0.04-1.5		
Phenol	50.0	50.0			
Toluene		300.0	0.8 (0.025)		
Xylene			0.6 (0.02)		
Pesticides	Footnote ¹⁴	Footnote ¹⁵	Footnote ¹⁶		See guidelines for raw water for drinking water supply (AWQG, ANZECC 1992)
Aldrin	10.0 ng/L	10.0 ng/L	0.0003		
Chlordane	4.0 ng/L	4.0 ng/L	0.001		
DDT	1.0 ng/L	1.0 ng/L	0.02		
Dieldrin	2.0 ng/L	2.0 ng/L	0.0003		
Heptachlor	10.0 ng/L	10.0 ng/L	0.0003		
Phthalate esters					
di-n-butylphthalate		4.0			
di(2-ethylhexyl)phthalate		0.6			
other phthalate esters		0.2			
Polyaromatic hydrocarbons					
Polychlorinated biphenyls	0.004	0.001			
Polycyclic aromatic hydrocarbons	3.0	3.0			
Styrene (vinylbenzene)			0.03 (0.004)		
Tetrachloroethene			0.05		
Trichlorobenzenes (total)			0.03 (0.005)		
Vinyl chloride			0.0003		
OTHER					
Calcium					1,000.0
Chloride			(250.0)	30.0 700.0 ¹⁷	
Cyanide	5	0.005	0.08		
Fluoride			1.5	1.0	2.0
Nitrate-N			50.0		30.0
Nitrite-N			3.0		10.0
AESTHETIC PARAMETERS					
Colour and clarity	< 10% change in euphotic depth	< 10% change in euphotic depth			

¹² See table 2.8, p.2-49 AWQG (ANZECC 1992) for further information¹³ see table 2.9, p.2-50 AWQG (ANZECC 1992) for further information¹⁴ see table 2.10 also, p.2-55 (ANZECC 1992) for further information¹⁵ see table 2.10 also, p.2-55 (ANZECC 1992) for further information¹⁶ see table on p32 (Guidelines for Pesticides), p32 (NHMRC/ARMCANZ 1996)¹⁷ Maximum chloride concentration should be set according to the sensitivity of the crop. For further information. (See Tables 5.1, 5.2, 5.3, 5.4, ANZECC 1992)

Site Testing Pattern (not to Scale)

