Soil Contamination Assessment (SEPP 55)

Kooyong Park
Sustainable Development - Stage 2
Local Environment Plan Rezoning

(LEP amendment under the "gateway system" of DoP)

Holmes Street,
Moama
NSW

Prepared for

Perpetual Green Developments Pty Ltd

November 2011

Advanced Environmental Systems

Creating a Sustainable Future

FIRE ENERGY SOILS WATER

433 High Street Echuca VIC 3564

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CONSULTANT DETAILS	
Name of Company	Advanced Environmental Systems Pty Ltd
Nominated Individual	Mr. Peter Clinnick (B. Ag. Sci. Hons. RPF)
Dates of Assessment	1st Jan 2010, 3rd and 10th October 2011
Phone Number	(03) 5482 5882

OWNER-SITE DETAILS	
Name of Site	Kooyong Park
Address of Site	Moama Street, Moama, NSW 2731
Name of land owner:	Ulamba Pty Ltd
Project Manager	Mr. Matthew O'Farrell (Perpetual Green Developments Pty Ltd)
Phone Number	0407 347 768
County	Cadell
Parish	Moama
Title details	Lot 1 DP 1098204; Lots 1& 2 DP1078090
Planning Instrument	LEP Gateway Application

Soil Contamination Assessment (SEPP 55)

Kooyong Park Sustainable Development - Stage 2

Moama Street, Moama NSW

Soil Contamination Report (SEPP 55)
Kooyong Park Sustainable Development - Stage 2
Moama Street, Moama NSW

Executive Summary

This report has been provided as an addendum to a Local Environment Study (LES) provided by Coombe's Consulting in 2008 and forms part of the Department of Planning "Gateway Planning Process" for a rezoning of cleared agricultural land (~47 ha) bordered by Moama Street, Holmes Street and parts of Old Deniliquin Road, approximately 1.5 km east of central Moama. While the rezoning encompasses the entire property (47 ha) the proposed development area would exclude the 6.68 ha "home block" at the present time.

State Environmental Planning Policy No.55: Remediation of Land (SEPP 55) requires consent authorities to consider contaminated site matters when rezoning land or assessing development applications. In this instance a rezoning from Farming Zone to Residential land use is being sought.

The report provides information on soil contamination issues at the site (~47 ha, Lots 1 DP 1098204, 17.79 ha and Lot 2 DP1078090, ~29.4 ha), as well as Lot 1DP 1078090of the proposed Kooyong Park Sustainable Development Stage 2 located 1.5 km east of the Moama township centre. A similar contaminated site investigation covered Stage 1 (15 Lots 4.63 ha) on Part of Lot 1 DP 1098204 in 2010.

The soil contamination assessment is principally based on concerns relating to contaminants from past and current agricultural practices, in particular herbicide and pesticide usage. The analyses did not reveal any agricultural pesticide or herbicide contaminants in concentrations exceeding either Health (HIL) or Ecological Investigation Levels (EIL's).

The absence of potential agricultural contaminates should allow a change in intensity of land use to proceed and there should be no impediment to approval of the proposed development in relation to the requirements of SEPP 55 and related NSW government contaminated site policies.

Soil Contamination Report (SEPP 55)
Kooyong Park Sustainable Development - Stage 2
Moama Street, Moama NSW

Introduction

Background

This report has been provided as an addendum to a Local Environment Study (LES) provided by Coombe's Consulting in 2008 and forms part of the Department of Planning "Gateway Planning Process" for a rezoning of cleared agricultural land (~47 ha) bordered by Moama Street, Holmes Street and parts of Old Deniliquin Road, approximately 1.5 km east of central Moama. While the rezoning encompasses the entire property (47 ha) the proposed development area would exclude the 6.68 ha "home block" at the present time.

The report provides information on soil contamination issues at the site (~47 ha, Lots 1 DP 1098204, 17.79 ha and Lot 2 DP1078090, ~29.4 ha), as well as Lot 1DP 1078090of the proposed Kooyong Park Sustainable Development Stage 2 located 1.5 km east of the Moama township centre. A similar contaminated site investigation covered Stage 1 (15 Lots 4.63 ha) on Part of Lot 1 DP 1098204 in 2010.

The area where development is to be concentrated is a 35.89 ha area surrounded by Old Deniliquin Road, Holmes Road and Moama Street, approximately 1.5 km north east of central Moama (Figures 1 and 3).

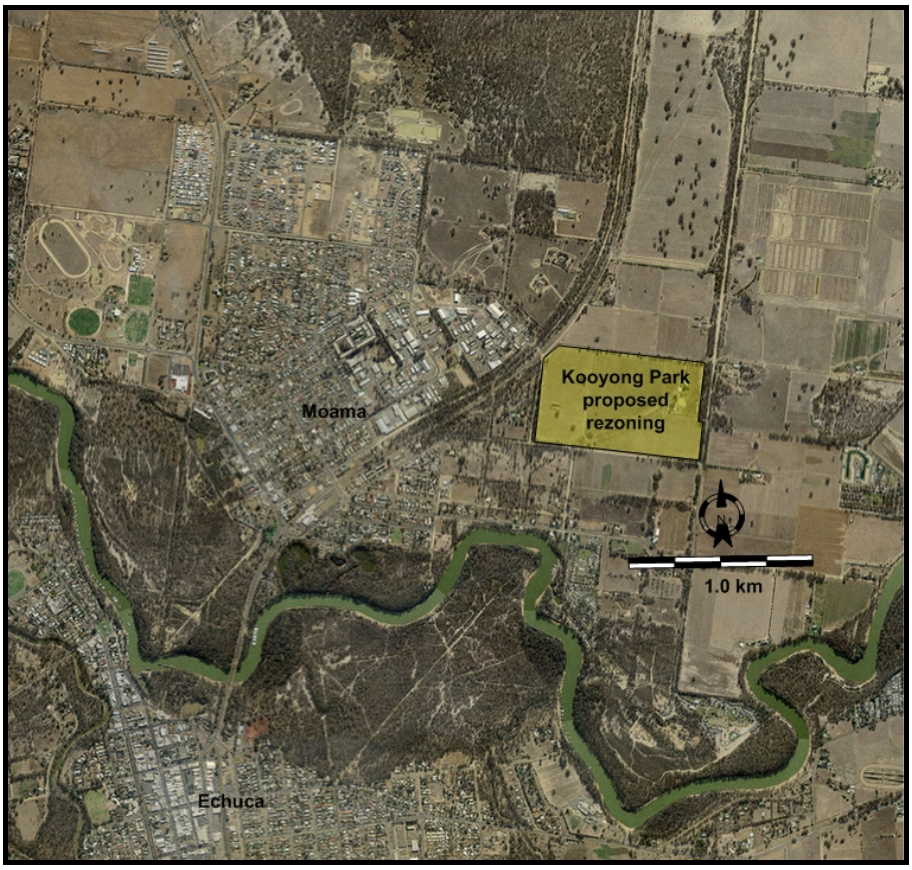

Figure 1. Location of rezoning / development site

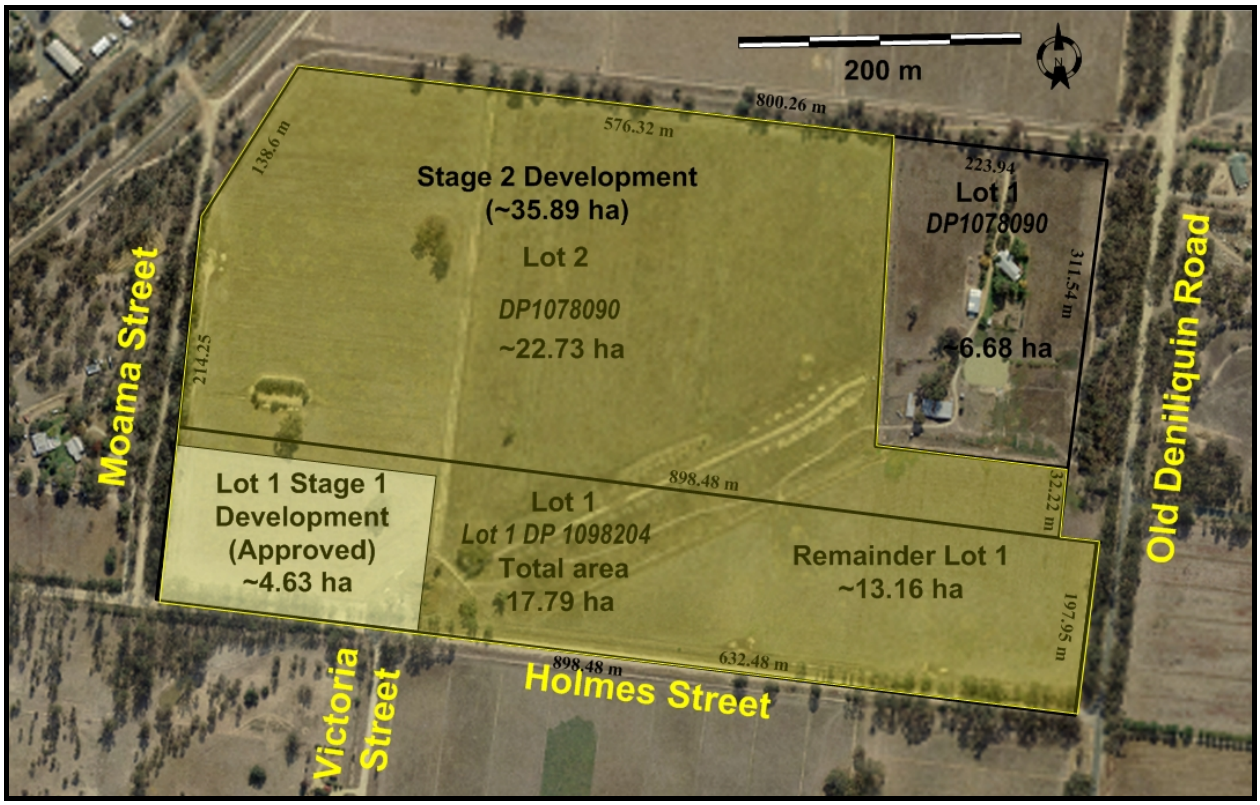

Figure 2. Development site

State Environmental Planning Policy No.55 Remediation of Land (SEPP 55) requires consent authorities to consider contaminated sites matters when assessing developments. In particular land used for agriculture, industry, mining or the storage of chemicals, gas, wastes and liquid fuel, responsible authorities require applicants to provide adequate information on the potential for contamination. The current arrangements stipulated in the Planning Guidelines provide an effective framework for responding to contamination of sites, where they are identified.

Advanced Environmental Systems were requested to undertake site assessment, soil testing and screening for potential chemical contamination near Moama township NSW. The area is defined as Lot 1 (~6.68 ha) and Lot 2 (~22.73 ha) DP1078090 and Lot 1 DP1098204; surrounded by Moama Street, Holmes Street and Old Deniliquin Road Moama, NSW. Specifically, this report provides an assessment of the results of an investigation in relation to any potential land contamination from past and present practices and activities on Lot 1 DP1078090 and the Stage 2 development area marked in yellow (Figure 2).

The purpose of the investigation is to identify potential contamination and limit future exposure to harmful contaminants in the course of redevelopment and future use of the land. The report follows the requirements of the Department of Environment, Conservation, Climate Change and Water (DECCW - which includes the Environment Protection Authority - EPA) for a preliminary site investigation.

In this case the future intended use is rural residential housing with a total of approximately 198 lots. The National Environment Protection Council Guidelines (1999) indicate that residential land use is the "most

sensitive" of landuse categories in terms of Health Based Investigation Levels (HILs).

Before deciding on a development application Council must also consider any significant effects which the existing and future use may have on the environment or the environment may have on the future use or development.

The preliminary site assessment provides information in relation to soil sampling and analysis conducted at the Kooyong Park site. Depending on the results of the site assessment, Council decides if a detailed contaminated site investigation is required (Figure 2).

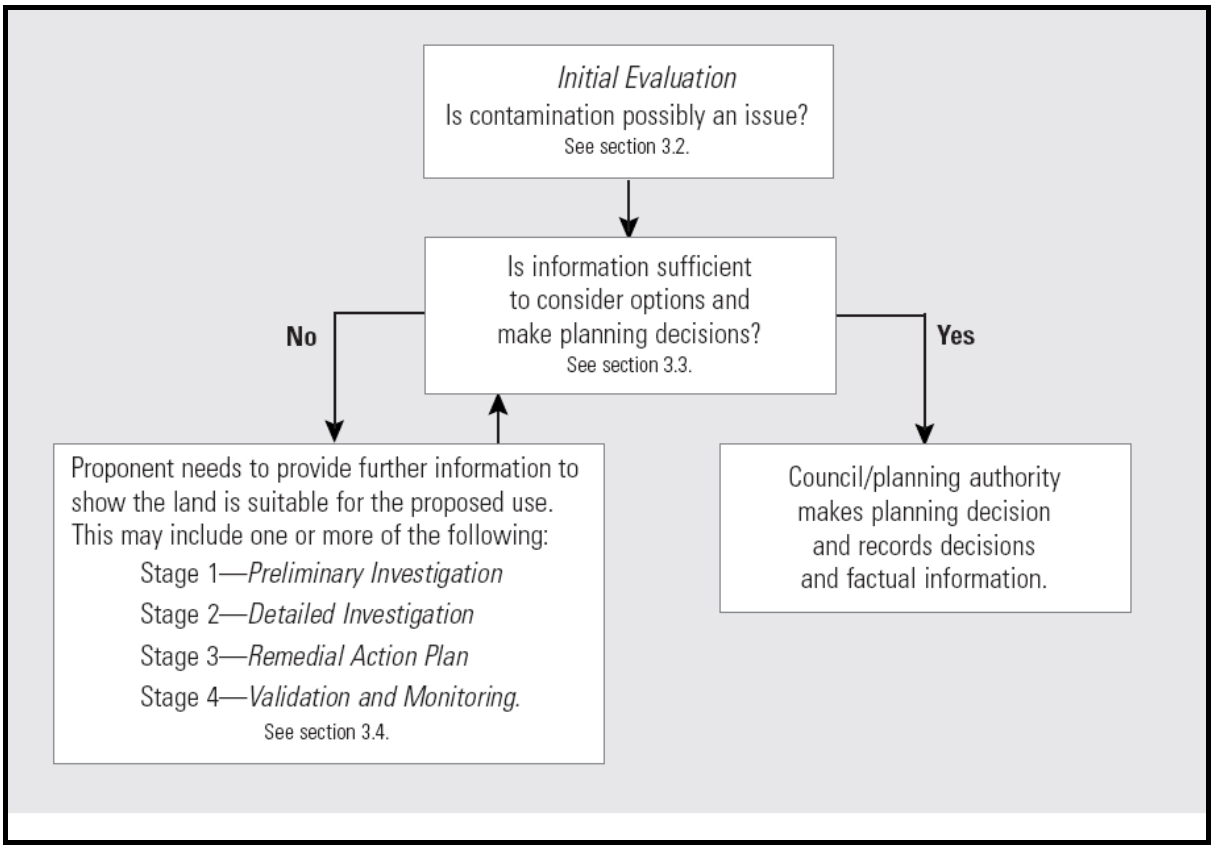

Figure 3. Decision process for changes in land use

1. Site Information

1.1 Site details

Planning overlays of potential relevance to the development include the Murray Shire Local Environment Plan 1989 and the Development Control Plan (DCP) 2005 which reinforces the aims and objectives of the Murray Regional Environmental Plan No 2, other planning instruments include Murray Shire's Strategic Land Use Plan (SLUP) and Biocertification overlay.

The land forms part of the Riverina Plains and is within 1 km of the Murray River. The topography is flat to gently sloping (0-1%) which is consistent with the general locality. The site is situated on the alluvial plain of the Murray River. Soils are generally red duplex, with clay loam topsoils and mottled brown clay subsoils. In more recent classifications (McKenzie *et. al.* 2004) the soils are considered to be Hypocalcic Sodosols.

Since having been cleared in the 1880's the land has been used for dryland cereal cropping and irrigated pasture. The property is surrounded by well vegetated road reserves. Surrounding land use includes hobby farming with grazing and some cropping on larger holdings.

Where there is a grass cover the soil has moderate infiltration characteristics, but can be prone to dispersion and surface sealing where vegetation is bared off and the surface is exposed to the elements. Surface sealing increases runoff and the potential for the spread of any soil contaminants.

Drainage of the subject site and surrounding areas links directly to the Murray River, 5-600 m to the south. When runoff does occur, some dispersed clays may be present in the water. The land is protected from inundation by a rural licenced levee in a 1:100 Annual Return Interval event.

Watertable depths in the vicinity are at 8-10 m. Within the aquifer system water quality varies, but is generally saline (E.C. >10,000 US/cm) with the regional sub-surface flows to the north-west.

Local habitat areas include the Murray and its surrounds, which comprises several Ecological Vegetation Classes (EVC's).

1.2 Land Use and Site History

Following clearing, which occurred in the 1870-1880's. The land was used for dryland grazing and cropping. Irrigation development occurred in the area after 1950 and developed from thereon. In more recent times site enterprises have included irrigated pasture, beef and hay production. Agricultural activity has been severely limited by the drought. The land has a licenced flood levee that precludes the area from flooding.

The study area was originally intended to be the site for the Moama township, with some blocks owned by James Maiden. There was some consolidation of titles and closed roads in 1932. These were referred to as "Suburban Lands, Town of Moama" on plans of that time. The land was purchased by R. and J. O'Farrell in 1982. The owners indicated that some herbicides have been applied to control broad-leafed weeds, but their use has been infrequent and selective.

1.3 Site Observations

The soil contamination assessment is principally based on concerns relating to contaminants from past and current agricultural practices, in particular herbicide and pesticide usage. In conducting the assessment the risk of contamination from other hazardous site facilities and associated substances is considered (e.g. Oil leakage from power transformers).

The property is predominantly cleared land with a few old remnant and younger regenerating eucalypts (Figure 4). There are also a few dams on the property, which were dry during the drought years and have recently filled with runoff.

Degradation of vegetation and loss of canopy cover has been observed in some tree species in the area over the past 10 years. Indigenous ground cover, crops and grasses cover most of the ground on the site with 90 per cent coverage during winter and 65 per cent coverage during summer thus minimising the risk of erosion and reducing the potential for runoff. There are no areas that appear to have been used for refuse, oil or waste disposal.

Figure 4. Development and sampling area (view to south east)

There was some evidence of prior settlement and occupation with a white cedar (*Melia azadarach*) and remains of bricks in the south west corner of the property.

2. Soil Testing

2.1 Sampling Methodology

Soil sampling was conducted on the 19th February, 2010 (Stage 1), 3rd and 10th October 2011. Sampling was conducted generally as indicated by the National Environmental Protection's (1999), Schedule B (2) Guideline on Data Collection. Materials, despatch procedures are outlined in ***Appendix 2***. Sampling was conducted within the three large lots of the subject land depicted in Figure 1. Sampling was aimed at identifying any potential contaminants.

Within the farm 10 randomly distributed soil samples were collected from the surface horizon (0-100mm) around the house paddocks Lot 1 (~6.68 ha), including the wash down bay near the sheds; DP1078090, Lot 2 (~22.73 ha) DP1078090 and Lot 1 DP1098204 (Part of Lot 1 and a control area on the roadside in Moama Street were sampled in 2010 (Stage1).

Sampling depth was limited to the surface horizon, since if there is contamination, it will most likely be concentrated at the point of application. Sampling at levels deeper than 100 mm was not conducted, because the purpose of the preliminary assessment was to determine the presence or absence of contaminants, not the extent of their distribution. Establishing the extent of any contaminant, including depth, would be part of a second detailed assessment. Each sub-sample location was referenced and recorded using a GPS system. Site specific samples (five composite samples from 0-100 mm at each site) were taken to identify risk factors based on particular identifiable site activities. This ensures that all known on-site risks have been addressed.

Given the low intensity of land use and absence of any evidence suggesting contamination it is unlikely that further sampling would reveal any contamination. However, it should be noted that although all care during site observation and sampling has been taken, there is potential for 'hotspots' to remain undiscovered. Where a preliminary investigation indicates that soil contaminants are present a detailed site investigation may be sought by the planning authority at a later stage. In order to compare soil samples from the site with local background levels a control sample was collected from the road reserve in Moama Street. The control samples bore chemical similarities to other control samples from the Moama area (Appendix 1).

2.2 Analysis and Assessment Plan

Advice from the site owner (Mr Matthew O'Farrell) indicated that there was no known history of hazardous (S7) pesticide use. Representative samples would indicate if contaminants were present from pesticide application. For example, under previous ownership DDT or Lindane could have been used. The National Environmental Protection Measure (Assessment of Site Contamination) was the key reference document for this report. The assessment criteria of results followed Health-based Investigation Levels (HILs) and Ecological-based Investigation Levels (EILs). Health-based guidelines have been established by NEPC 1999, for a range of land uses including the proposed future use, which is residential housing.

All samples were forwarded to MGT Environmental Consulting Pty Ltd, a NATA certified laboratory. A range of

contaminants were investigated including agricultural chemical residues, organochlorines, carbamates and organophosphates.

2.3 Results and Discussion

Soil sampling conducted across the proposed development area and samples were collected from the roadside reserve (2010). Based on previous land use for irrigated pasture, the soils were specifically analysed for Dieldrin, the by-product of pesticide Aldrin. Despite the fact that it has not been used in agriculture since 1992 residues can remain. Low levels of exposure can cause spinal deformities in aquatic animals. The substance was not at detectable levels (Appendix 1) in any of the soil samples submitted to the laboratory.

Sampling was also conducted for heavy metals and other potential agricultural contaminants listed in the previous section and detailed in Appendix 1. The analyses did not reveal any agricultural pesticide or herbicide contaminants in concentrations exceeding either Health (HIL) or Ecological Investigation Levels (EIL's). Interestingly, the roadside reserve sample (control) indicated that lead levels were over five times higher than the background level for the area and the study site.

Other potential contaminates, including pesticides, were well below the Limit of Reporting (LOR) and were recorded as a "less than" (<) value (Appendix 1) indicating that there is no cause for soil contamination concerns in relation to the proposed development site.

Conclusion

The purpose of this investigation was to ascertain if any site contamination was present within the study area and if further investigations would be required prior to Council considering development approval of the site for rural residential use. The results of site sampling and laboratory testing indicate that for all the likely agricultural contaminates, none were above Health Investigation Levels for the most sensitive land use (residential) and most were at levels undetectable by the recommended laboratory methods.

The detectable absence of potential agricultural contaminates should allow a change in intensity of land use to proceed and there should be no impediment to approval of the proposed development in relation to the requirements of SEPP 55 and related NSW government contaminated site policies.

Bibliography

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National Environmental Protection Council (2004). NEPC Report on the implementation of the- Assessment of site contamination NEPM, Annual Report, Australia

McKenzie, N.J Jacquier, D.W Maschmedt, D.J Griffin, E.A Brough, D.M (2004). "Technical specifications," The Australian Soil Resource Information System, Australian collaborative Land Evaluation program.

DECC (2009). Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997.

Appendices

Appendix 1. Laboratory Results (Stage 2)

mgt LabMark
ENVIRONMENTAL LABORATORIES

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Advanced Environmental Systems Pty Ltd
433 High Street
Echuca
VIC 3564

Attention: AES-Peter Clinnick

Report 314099-S
Client Reference
Received Date Oct 04, 2011

Client Sample ID			HOUSE PADDOCK8	HAY PADDOCK8
Sample Matrix			Soil	Soil
mgt-LabMark Sample No.			M11-Oc00896	M11-Oc00897
Date Sampled			Oct 03, 2011	Oct 03, 2011
Test/Reference	LOR	Unit		
Organochlorine Pesticides				
4,4'-DDD	0.05	mg/kg	< 0.05	< 0.05
4,4'-DDE	0.05	mg/kg	< 0.05	< 0.05
4,4'-DDT	0.05	mg/kg	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05
Chlordane	0.1	mg/kg	< 0.1	< 0.1
d-BHC	0.05	mg/kg	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05
Toxaphene	0.1	mg/kg	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	110	114
Tetrachloro-m-xylene (surr.)	1	%	130	134
Organophosphorous Pesticides				
Bolstar	0.2	mg/kg	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2

Client Sample ID			HOUSE PADDOCKS	HAY PADDOCKS
Sample Matrix			Soil	Soil
mgt-LabMark Sample No.			M11-Oc00896	M11-Oc00897
Date Sampled			Oct 03, 2011	Oct 03, 2011
Test/Reference	LOR	Unit		
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2
Naled	0.5	mg/kg	< 0.5	< 0.5
Phorate	0.2	mg/kg	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	138	119
Carbamate Pesticides				
Aldicarb	2	mg/kg	< 2	< 2
Bendiocarb	2	mg/kg	< 2	< 2
Carbaryl	2	mg/kg	< 2	< 2
Carbofuran	2	mg/kg	< 2	< 2
Methomyl	2	mg/kg	< 2	< 2
Oxamyl	2	mg/kg	< 2	< 2
Thiobencarb	2	mg/kg	< 2	< 2
Acid Herbicides				
2,4-D	0.5	mg/kg	< 0.5	< 0.5
2,4-DB	0.5	mg/kg	< 0.5	< 0.5
2,4,5-T	0.5	mg/kg	< 0.5	< 0.5
2,4,5-TP	0.5	mg/kg	< 0.5	< 0.5
Actril (loxynil)	0.5	mg/kg	< 0.5	< 0.5
Dicamba	0.5	mg/kg	< 0.5	< 0.5
Dichlorprop	0.5	mg/kg	< 0.5	< 0.5
Dinitro-o-cresol	0.5	mg/kg	< 0.5	< 0.5
Dinoseb	0.5	mg/kg	< 0.5	< 0.5
MCPA	0.5	mg/kg	< 0.5	< 0.5
MCPB	0.5	mg/kg	< 0.5	< 0.5
Mecoprop	0.5	mg/kg	< 0.5	< 0.5
Warfarin (surr.)	1	%	77	80
Heavy Metals				
Arsenic	2	mg/kg	4.6	4.8
Cadmium	0.4	mg/kg	< 0.4	< 0.4
Chromium	5	mg/kg	19	20
Copper	5	mg/kg	13	13
Lead	5	mg/kg	12	12
Mercury	0.1	mg/kg	< 0.1	< 0.1
Nickel	5	mg/kg	12	12
Zinc	5	mg/kg	30	30
% Moisture	0.1	%	18	19

mgt LabMark ENVIRONMENTAL LABORATORIES

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian national standards.

Advanced Environmental Systems Pty Ltd
433 High Street
Echuca
VIC 3564

Attention: AES-Peter Clinnick

Report 315008-S
Client Reference
Received Date Oct 11, 2011

Client Sample ID			WASH BAY
Sample Matrix			Soil
mgt-LabMark Sample No.			M11-Oc06222
Date Sampled			Oct 10, 2011
Test/Reference	LOR	Unit	
Organochlorine Pesticides			
4,4'-DDD	0.05	mg/kg	< 0.05
4,4'-DDE	0.05	mg/kg	< 0.05
4,4'-DDT	0.05	mg/kg	< 0.05
a-BHC	0.05	mg/kg	< 0.05
Aldrin	0.05	mg/kg	< 0.05
b-BHC	0.05	mg/kg	< 0.05
Chlordane	0.1	mg/kg	< 0.1
d-BHC	0.05	mg/kg	< 0.05
Dieldrin	0.05	mg/kg	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05
Endrin	0.05	mg/kg	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05
Heptachlor	0.05	mg/kg	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05
Toxaphene	0.1	mg/kg	< 0.1
Dibutylchlorendate (surr.)	1	%	92
Tetrachloro-m-xylene (surr.)	1	%	111
Organophosphorous Pesticides			
Bolstar	0.2	mg/kg	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2
Demeton-O	0.2	mg/kg	< 0.2
Diazinon	0.2	mg/kg	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2
Disulfoton	0.2	mg/kg	< 0.2
Ethion	0.2	mg/kg	< 0.2
Ethoprop	0.2	mg/kg	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2
Fenthion	0.2	mg/kg	< 0.2
Merphos	0.2	mg/kg	< 0.2
Methyl azinphos	0.2	mg/kg	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2

mgt LabMark ENVIRONMENTAL LABORATORIES

Client Sample ID			WASH BAY
Sample Matrix			Soil
mgt-LabMark Sample No.			M11-Oo06222
Date Sampled			Oct 10, 2011
Test/Reference	LOR	Unit	
Mevinphos	0.2	mg/kg	< 0.2
Naled	0.5	mg/kg	< 0.5
Phorate	0.2	mg/kg	< 0.2
Ronnel	0.2	mg/kg	< 0.2
Tokuthion	0.2	mg/kg	< 0.2
Trichloronate	0.2	mg/kg	< 0.2
Triphenylphosphate (surr.)	1	%	146
Carbamate Pesticides			
Aldicarb	2	mg/kg	< 2
Bendiocarb	2	mg/kg	< 2
Carbaryl	2	mg/kg	< 2
Carbofuran	2	mg/kg	< 2
Methomyl	2	mg/kg	< 2
Oxamyl	2	mg/kg	< 2
Thiobencarb	2	mg/kg	< 2
Acid Herbicides			
2,4-D	0.5	mg/kg	< 0.5
2,4-DB	0.5	mg/kg	< 0.5
2,4,5-T	0.5	mg/kg	< 0.5
2,4,5-TP	0.5	mg/kg	< 0.5
Actril (ioxynil)	0.5	mg/kg	< 0.5
Dicamba	0.5	mg/kg	< 0.5
Dichlorprop	0.5	mg/kg	< 0.5
Dinitro-o-cresol	0.5	mg/kg	< 0.5
Dinoseb	0.5	mg/kg	< 0.5
MCPA	0.5	mg/kg	< 0.5
MCPB	0.5	mg/kg	< 0.5
Mecoprop	0.5	mg/kg	< 0.5
Warfarin (surr.)	1	%	82
Heavy Metals			
Arsenic	2	mg/kg	5.3
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	20
Copper	5	mg/kg	12
Lead	5	mg/kg	11
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	11
Zinc	5	mg/kg	46
% Moisture	0.1	%	15

mgt LabMark ENVIRONMENTAL LABORATORIES

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Adrian Tabacchiara Client Services

NATA Signatories:

Mary Makarios Senior Analyst-Metal (VIC)

Orlando Scalzo Senior Analyst-Organic (VIC)

Michael Wright
National Technical Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

Control sample results (Control and 2010 samples, Stage 1)

Parameter/Location	CONTROL Moama St roadside	CONTROL River Reserve	KP BAY North	KP BAY South
% Moisture	1.7	5.8	4.3	3.3
Heavy metals				
Arsenic	4.2	3.5	4.4	5.2
Asbestos				
Beryllium				
Cadmium	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	14	17	19	18
Copper	5.9	8.9	8	7.5
Lead	55	8	10	16
Mercury	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	< 10	< 10	< 10	< 10
Nickel	5.9	11	10	9.7
Selenium	< 2	< 2	< 2	< 2
Silver	< 5	< 5	< 5	< 5
Tin	< 10	< 10	< 10	< 10
TRH C6-C9 Fraction by GC				
Zinc	35	32	27	24
Acid Herbicides				
2.4-D	< 0.5	< 0.5	< 0.5	< 1
2.4-DB	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-T	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-TP	< 0.5	< 0.5	< 0.5	< 0.5
Actril (loxynil)	< 0.5	< 0.5	< 0.5	< 0.5
Dicamba	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorprop	< 0.5	< 0.5	< 0.5	< 0.5
Dinitro-o-cresol	< 0.5	< 0.5	< 0.5	< 0.5
Dinoseb	< 0.5	< 0.5	< 0.5	< 0.5
MCPA	< 0.5	< 0.5	< 0.5	< 0.5
MCPB	< 0.5	< 0.5	< 0.5	< 0.5
Mecoprop	< 0.5	< 0.5	< 0.5	< 0.5
Warfarin (surr)	110	130	120	140
Carbamate Pesticides*				
Aldicarb	< 2	< 2	< 2	< 2
Bendiocarb	< 2	< 2	< 2	< 2
Carbaryl	< 2	< 2	< 2	< 2
Carbofuran	< 2	< 2	< 2	< 2
Methomyl	< 2	< 2	< 2	< 2
Oxamyl	< 2	< 2	< 2	< 2
Thiobencarb	< 2	< 2	< 2	< 2
Organochlorine Pesticides				
4.4'-DDD	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	< 0.05	< 0.05	< 0.05	< 0.05

b-BHC	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	< 0.1	< 0.1	< 0.1	< 0.1
d-BHC	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	< 0.05	< 0.05	< 0.05	< 0.05
Toxophene	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	86	78	72	73
Tetrachloro-m-xylene (surr.)	94	85	94	79
Organophosphorous Pesticides				
Bolstar	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	< 0.2	< 0.2	< 0.2	< 0.2
Methyl azinphos	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	< 0.2	< 0.2	< 0.2	< 0.2
Naled	< 0.5	< 0.5	< 0.5	< 0.5
Phorate	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	115	112	126	120

Appendix 2. Field Quality Assurance and Quality Control

Table 1. Details of the subject site assessment

SITE DETAILS	
Location:	Moama Street, Moama
Date:	3 & 10th Oct 2011
Company undertaking assessment:	Advanced Environmental Systems (AES)
Sampler:	Peter Clinnick
Weather Conditions:	27ºC, sunny, NE wind 5 km/hr

Samples were taken from the site between 9.30 pm and 10.30 pm on the 3th and 10th of October 2011 and dispatched by Australia Post to the laboratory. These were received by the laboratory the next morning. A "control" sample, (Road reserve) and samples relating to land (4.36 ha) in the south west corner of were taken previously (19th February 2010) from an area that was considered to have had a very low density of use (native vegetation) and potential contamination. Subsequent results confirmed that the control site displayed mostly similar levels of the parameters tested to other control sites in the area.

Appendix 3. General process for assessment of contamination

(NEPC Guidelines)