CheckSite Environmental

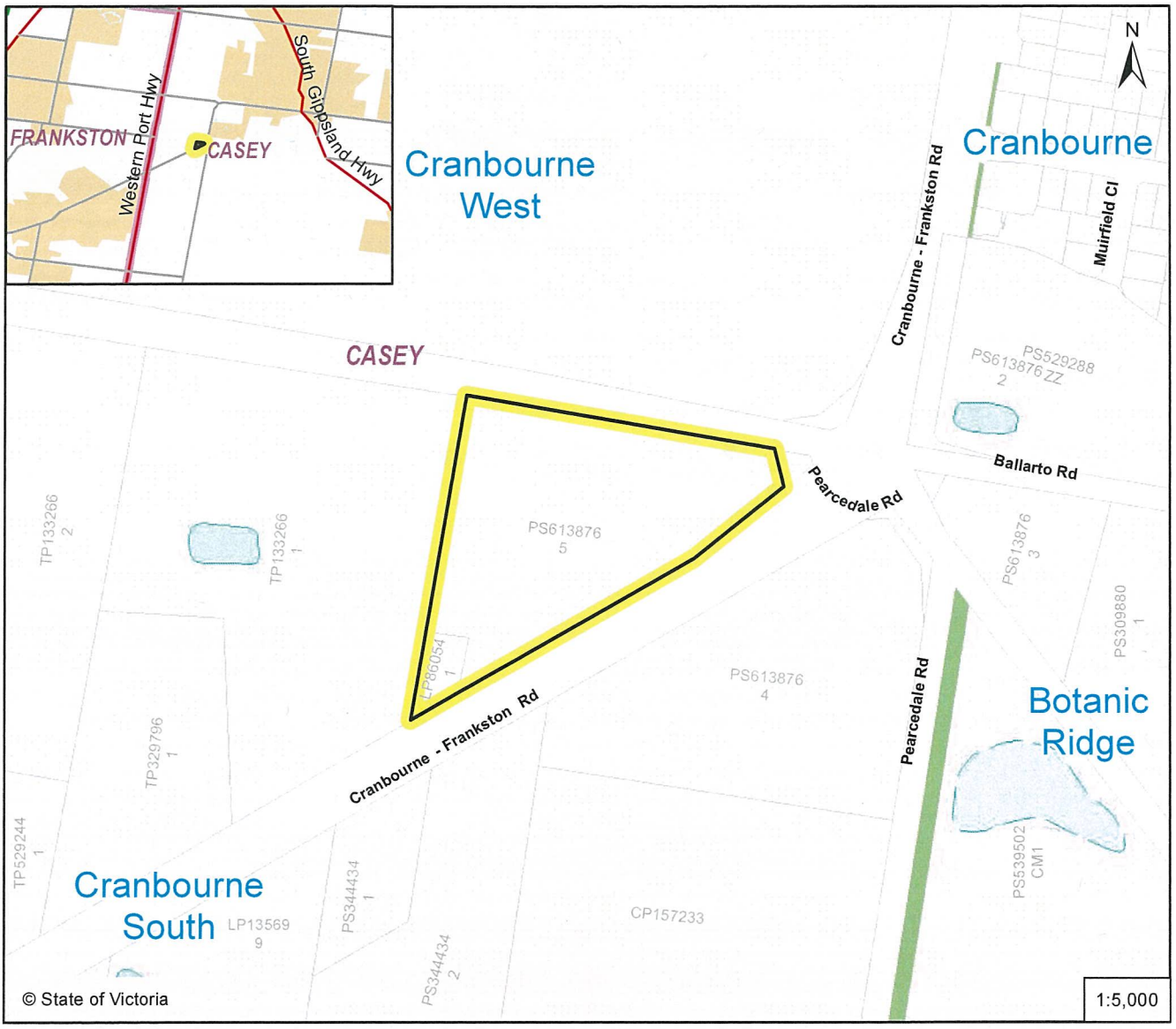
765-785 Cranbourne-Frankston Road , Bangholme, 3175

CS00257

CheckSite Environmental

This report has been produced for the subject site:

765-785 Cranbourne-Frankston Road , Bangholme, 3175



Legend

- Subject Site
- Watercourse
- Waterbody
- Reserves
- LGA Boundary
- LGA NAME
- Locality Name

What is CheckSite?

Gathering information about a particular site to understand its history of use can be a time consuming and frustrating task. As a professional environmental auditor, developer or property consultant, you need access to a variety of information from reliable sources to assess whether the site may be associated with a risk or hazard.

CheckSite draws on information from a wide range of government agencies and authoritative sources to generate reports about a property. CheckSite provides you with complete, professional reports compiled from the best current information, freeing up your resources. All you have to do is provide an address or property description (Lot on Plan), CheckSite will do the rest!

Standard CheckSite reports not what you are looking for? Please contact Spatial Vision with your needs – we would be happy to provide an estimate of a custom solution.

CheckSite reports are produced by:
Spatial Vision Innovations Pty Ltd
Level 4, 575 Bourke Street Melbourne VIC 3000
Contact: ph +61 3 9691 3000 or info@checksite.com.au
www.checksite.com.au

CS00257

Environment Protection Responsibility in Victoria

The Environment Protection Authority's sole role is to regulate pollution and has independent authority to make regulatory decisions under the *Environment Protection Act 1970*.

EPA aspires to create a healthy environment that supports a liveable and prosperous Victoria. By effectively regulating pollution in Victoria, the EPA strives to deliver clean air, healthy waterways, safe land and minimal disturbances from noise and odour for Victorians.

EPA is an administrative office of the Department of Sustainability and Environment.

CheckSite provides you with information regarding three different aspects of the work of the EPA in Victoria. It provides information on

- EPA Priority Sites
- EPA Licensed Sites
- Certificates and Statements of Environmental Audit

Priority Sites and the Priority Sites Register

Priority sites are sites for which EPA has issued a clean-up notice pursuant to section 62A or a pollution abatement notice pursuant to section 31A or 31B (relevant to land and/or groundwater) of the *Environment Protection Act 1970*.

The condition of these sites is not compatible with the current or approved use of the site without active management to reduce the risk to human health and the environment. Such management can include clean-up, monitoring and/or institutional controls.

The Priority Sites Register is not a listing of all contaminated sites in Victoria, nor is it a list of all contaminated sites of which EPA has knowledge.

The Priority Sites Register does not list sites managed by voluntary agreements or sites subject to management by planning controls (for example sites managed in accordance with section 173 agreement under the Planning and Environment Act 1987). Land purchasers should be aware of these limitations and make their own enquiries.

Click here for further information about Priority Sites and the Priority Sites Register.

EPA Licenses

Under the *Environment Protection Act 1970*, premises which have the potential for significant environmental impact are subject to works approvals (for construction or modification of facilities or processes) and/or licences (for operating conditions, discharge limits, monitoring and reporting requirements).

The *Environment Protection (Scheduled Premises and Exemptions) Regulations 2007* prescribe the premises that are subject to works approval and/or licensing by EPA, and provide for exemptions in certain circumstances. They provide a means to effectively manage these premises in a transparent way, which ensures an adequate level of community confidence is maintained.

EPA issues licences for all scheduled premises. Licences contain standard conditions that aim to control the operation of the premises so that there is no adverse effect on the environment. These conditions address areas such as waste acceptance and treatment, air and water discharges, and

noise and odour. The *Environment Protection Act 1970* specifies penalties for breach of licence conditions and for operating a site without a licence.

For further information about EPA Licences visit the Licences section of the EPA Website

Certificates and Statements of Environmental Audit.

An environmental audit is an assessment of the nature and extent of harm (or risk of harm) to the environment posed by an industrial process or activity, waste, substance or noise. An audit must be able to deliver authoritative advice that can be relied upon to make decisions affecting our future.

The *Environment Protection Act 1970* provides for the statutory appointment of environmental auditors and their responsibilities to ensure high quality, rigorous environmental audits are conducted by appropriately qualified professionals.

Appointed environmental auditors may be engaged by anyone from private or public sectors to provide independent, objective environmental advice.

The most extensive use of the system to date has been by planning authorities, government agencies and the private sector to ensure potentially contaminated land is suitable for its intended use, or to advise how to make the land suitable for its intended use.

EPA maintains a searchable list of properties issued either with a certificate or statement of environmental audit under part IXD of the *Environment Protection Act 1970* since the environmental audit system commenced in 1990.`

A certificate of environmental audit is issued for a property where, following an audit, an environmental auditor believes the environmental condition of the land is suitable for any beneficial use.

A statement of environmental audit is issued where, following an audit, an environmental auditor believes the land isn't suitable for all possible beneficial uses, but is suitable for specific uses or developments. It may contain conditions for clean-up or management of contamination. If the land use changes for a property which has been issued an environmental audit, a new audit may be needed.

Further information about Victoria's system of Environmental Auditing may be found here.

Energy Safe Victoria - Cathodic Protection Database Search

Cathodic protection devices protect structures and metalwork from corrosion. They place the metal to be protected by a cathode element in an electric current which encourages corrosion in a less critical or cheaper, anode material.

Cathodic protection systems are often used with structures like building reinforcement, buried metallic pipeline and cables.

The Electricity Safety Act 1998 (the Act) contains provisions relating to Cathodic Protection Systems (CPS), Mitigation Systems and the constitution of the Victorian Electrolysis Committee (VEC). Section 93(1) of the Act prohibits the operation of a Cathodic Protection System unless that system is registered with Energy Safe Victoria (ESV) in accordance with the Regulations.

The VEC maintains the register to Cathodic Protection Systems installed in Victoria. CheckSite requests a search of the Cathodic Protection register to determine whether there is any CPS at the subject site.

The Cathodic Protection search will only identify whether CPS are present at the subject site – it will not identify whether they are present at neighbouring sites.

For further information about Cathodic Protection in Victoria visit the ESV website.

WorkSafe Victoria Dangerous Goods Database Search

Dangerous goods can cause injury and death and can seriously damage property and the environment.

In Victoria WorkSafe Victoria licences certain types of work including the handling and transport of Dangerous Goods. WorkSafe Victoria maintains a database of sites where licences have been issued permitting Dangerous Goods handling and storage. CheckSite requests a search of the Dangerous Goods Database to determine whether there is any record of Dangerous Goods handling and storage at the subject site.

The property owner's permission must be provided before a Dangerous Goods Database Search can be undertaken for a site. The database search will only identify whether Dangerous Goods are managed at the subject site – it will not identify whether they are present at neighbouring sites.

For further information about the management and licensing of Dangerous Goods in Victoria visit the WorkSafe Victoria website.

The following searches have been undertaken for this report.

CONTENT	SOURCES	SEARCH UNDERTAKEN	INFO. PROVIDED	DETAILS
Certificates and Statements of Environmental Audit.	EPA Victoria	(•) Yes ( ) No	(•) Yes ( ) No	Audits within 1km of site Refer to map
EPA Priority Sites Register	EPA Victoria	(•) Yes ( ) No	( ) Yes (•) No	No Priority sites within 1km of site Refer to map
EPA Licence Priority Sites Extract *	Landata	( ) Yes (•) No	(•) Yes ( ) No	Refer to Extract from Priority Sites Register
EPA Licence Register	EPA Victoria	(•) Yes ( ) No	( ) Yes (•) No	No EPA Licenses within 1km of site Refer to map
Petrol Stations/ Garages 1965, 1975, 1985 and 1995	Spatial Vision	(•) Yes ( ) No	( ) Yes (•) No	No Petrol Stations/Garages Within 1km of site Refer to map
Energy Safe Victoria - Cathodic Protection Search	Energy Safe Victoria	(•) Yes ( ) No		No Cathodic Protection on site. ESV response included in this report
WorkSafe Victoria - Dangerous Goods Search	WorkSafe Victoria	( ) Yes (•) No		Awaiting permission letter Not included in this report

***Note that occasionally the information provided on the Priority Sites map will differ from the information in the EPA Priority Sites Extract. The extract is based on an approximate map reference, while CheckSite researches the Priority Sites Register to identify the Priority Sites on and around a property.**

Terms and Conditions

The CheckSite report is accessed at your sole risk and the service is provided on an 'as is' and 'as available' basis. Any information downloaded is entirely at the customer's risk and the customer will be solely responsible for any damage to their computer arising from accessing the site or downloading any information. You must check for and maintain your own protection against computer viruses.

To view Spatial Vision's CheckSite Terms and Conditions, visit www.checksite.com.au.

EPA SEARCH

	Certificates and Statements of Envrionmental Audit	Priority SitesRegister	EPA Licences
On the site	NO	NO	NO
Around the site	YES	NO	NO

Certificates and Statements of Envrionmental Audit

CARMS No	Address	Locality	Link to Further Information
45226-1	MARNEBEK ESTATE 232 PEARCEDALE Road	CRANBOURNE SOUTH	http://apps.epa.vic.gov.au/envaudit/search-environmental-audits.asp?cn=45226%2D1&i=Certificate&m=Casey+City+Council&l=CRANBOURNE+SOUTH&c=3%2F12%2F2002&a=MARNEBEK+ESTATE+232+PEARCEDALE+Road&t=v
67956-1	860 BALLARTO Road	CRANBOURNE SOUTH	http://apps.epa.vic.gov.au/envaudit/search-environmental-audits.asp?cn=67956%2D1&i=Statement&m=Casey+City+Council&l=CRANBOURNE+SOUTH&c=9%2F08%2F2012&a=+860+BALLARTO+Road&t=v

EPA Priority Sites Register

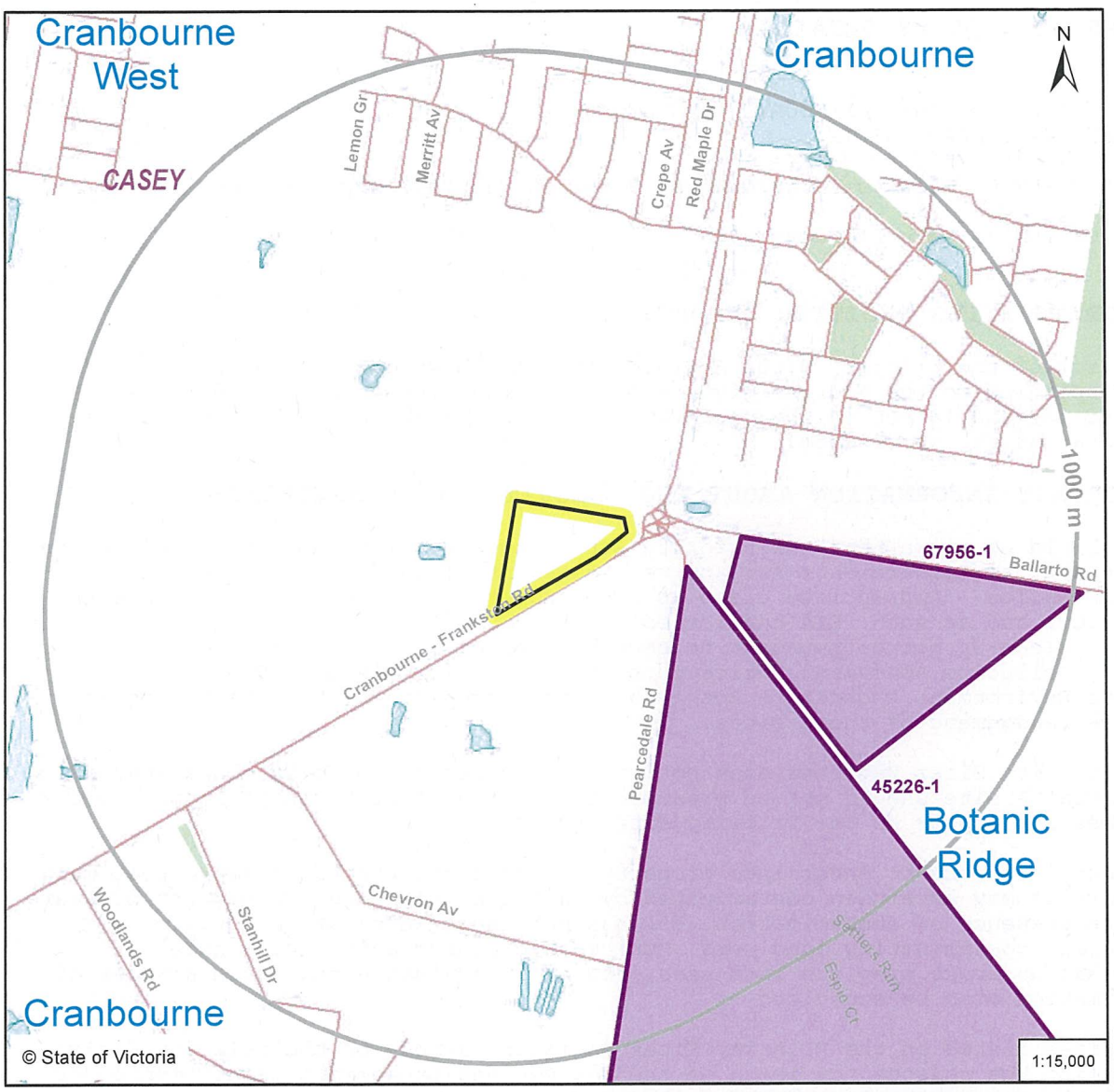
NOTICE Id	Address	Locality	Issue

EPA Licences

Licence Id	Licensee	Premises Address	Link to Further Information

Environmental Information Search

765-785 Cranbourne-Frankston Road , Bangholme, 3175



Legend

- Subject Site
- Road Freeway
- Road Highway
- Road Local Sealed
- Road Local Unsealed
- Road Private Access
- Road Proposed
- Road 2WD
- Road 4WD
- Road Bicycle Track
- Road Walking Track
- Railway
- Railway Station
- Waterbody
- Reserves
- LGA Boundary
- LGA NAME
- Locality Name
- EPA Priority Sites
- Former EPA Priority Sites
- EPA Audits
- EPA Licence Sites
- EPA Corporate Licences

CS00257

Extract of EPA Priority Site Register

EPA VICTORIA

**** Delivered by the LANDATA® System, Department of Transport, Planning and Local Infrastructure ****

PROPERTY INQUIRY DETAILS:

STREET ADDRESS: 765 CRANBOURNE-FRANKSTON ROAD
SUBURB: CRANBOURNE SOUTH
MUNICIPALITY: CITY OF CASEY
MAP REFERENCE: Melways 40th Edition, Street Directory, Map 133 Reference A9

DATE OF SEARCH: 4th February 2015

PRIORITY SITES REGISTER REPORT:

A search of the Priority Sites Register for the above map reference, corresponding to the address given above, has indicated that this site is not listed on, and is not in the vicinity of a site listed on the Priority Sites Register at the above date.

IMPORTANT INFORMATION ABOUT THE PRIORITY SITES REGISTER:

You should be aware that the Priority Sites Register lists only those sites for which EPA has requirements for active management of land and groundwater contamination. Appropriate clean up and management of these sites is an EPA priority, and as such, EPA has issued either a:

Clean Up Notice pursuant to section 62A, or a
Pollution Abatement Notice pursuant to section 31A or 31B

of the Environment Protection Act 1970 on the occupier of the site to require active management of these sites.

The Priority Sites Register does not list all sites known to be contaminated in Victoria. A site should not be presumed to be free of contamination just because it does not appear on the Priority Sites Register.

Persons intending to enter into property transactions should be aware that many properties may have been contaminated by past land uses and EPA may not be aware of the presence of contamination. EPA has published information advising of potential contaminating land uses. Municipal planning authorities hold information about previous land uses, and it is advisable that such sources of information also be consulted.

For sites listed on the Priority Sites Register, a copy of the relevant Notice, detailing the reasons for issue of the Notice, and management requirements, is available on request from EPA for $8 per Notice.

For more information relating to the Priority Sites Register, refer to EPA contaminated site information bulletin: Priority Sites Register & Contaminated Land Audit Site Listing (EPA Publication 735). For a copy of this publication, copies of relevant Notices, or for more information relating to sites listed on the Priority Sites Register, please contact EPA as given below:

EPA Information Centre
Herald & Weekly Times Tower
40 City Road, Southbank 3006
Tel: (03)9695 2700 Fax:(03)9695 2710

[Extract of Priority Sites Register] # 18471677 - 18471677163212 'CS00257 - Coffey'

Petrol Stations and Garages in Metropolitan Melbourne

The location of former petrol stations is of key interest to those investigating the potential for land contamination. CheckSite has developed a geographic database of petrol stations for the Melbourne Metropolitan area for ten year intervals from 1965 to 1995.

The data shows the location of either operational or former operational Garages and Petrol retailers. Each location also has a confidence measure of high, moderate or low. In many cases, the CheckSite team has been able to locate these sites with a high degree of confidence. In other instances the location cannot be determined with absolute accuracy and the position is indicative. Sites with a low degree of confidence should be treated with caution.

Map Data

The maps show 3 different categories of site;

1. Current Petrol Stations/Garages – site currently used for the sale and storage of petrol.
2. Former Petrol Stations/Garages – site not currently used for the sale/storage of petrol, however was likely to be used in the past (in many cases, this has been inferred due to reference between the site and a former retail petroleum company (i.e Golden Fleece, Shell, Esso etc.) or if the past use of a site has been described as 'Service Station'.
3. Mechanical Services Only Garage – site has been identified as a garage or workshop, but there is no evidence that the site sold petrol such as a past or current relationship to a retail petroleum company. Caution should be exercised as some garages may have sold petrol as independent retailers.

Tabular Data

The table below lists the following fields

ID	Site identifier – a single site record to which petrol station or garage "entities" have been linked across multiple years
Year	The year in which a particular entiity related to a site appears in source material.
Name	The name of the entity in a particular year
Address	The address provided for an entity in a particular year.
Current Proprietor	The current proprietor of the site, if known.
Confidence	Provides an estimate of the accuracy of the geocoded location of a site. There are three levels of confidence; 100 (High) Sites are given this confidence level where there is strong evidence that the site has been used as a Petrol Station or Garage (eg it is currently operational). 50 (Medium) This rating was assigned under one of two circumstances; (i) a listing in a historical report exists that could be fully geocoded, or (ii) a listing in a historical report exists that could be only

	partially geocoded, but could be traced to a site where there is sufficient evidence in the current use or site appearance (for example evidence of a building, apron, porch or driveway configuration indicative of the past use). 25 (Low) This value is assigned where there is not a good match between a historical report of an Address of a site and the geocoded address. In particular, where the location is given as 'Corner of X Road and Y Street' and follow up review does not provide enough evidence to determine the exact corner. The location was placed at a "most likely" corner or in some cases in the road between likely corner locations.

Sites for which a location could not be determined

In a relatively small number of instances, the location of a service station could not be determined. Usually these are where the location of the site is described in the manner of"Smithfield Road Newmarket" or in cases where there is a street number provided there may be uncertainty about the suburb or locality. These sites are separately listed in a sheet that can be provided on request.

Sources

- Various Business Directories
- Aerial imagery
- EPA Priority Sites Register

Tell us if we are wrong

CheckSite welcomes any feedback on this data, whether on the location or on the data attributes. Any information that improves the Petrol Station/Garage data would be very welcome.

Contact info@checksite.com.au.

SERVICE STATION SEARCH

	Service Stations
On the site	NO
Around the site	NO

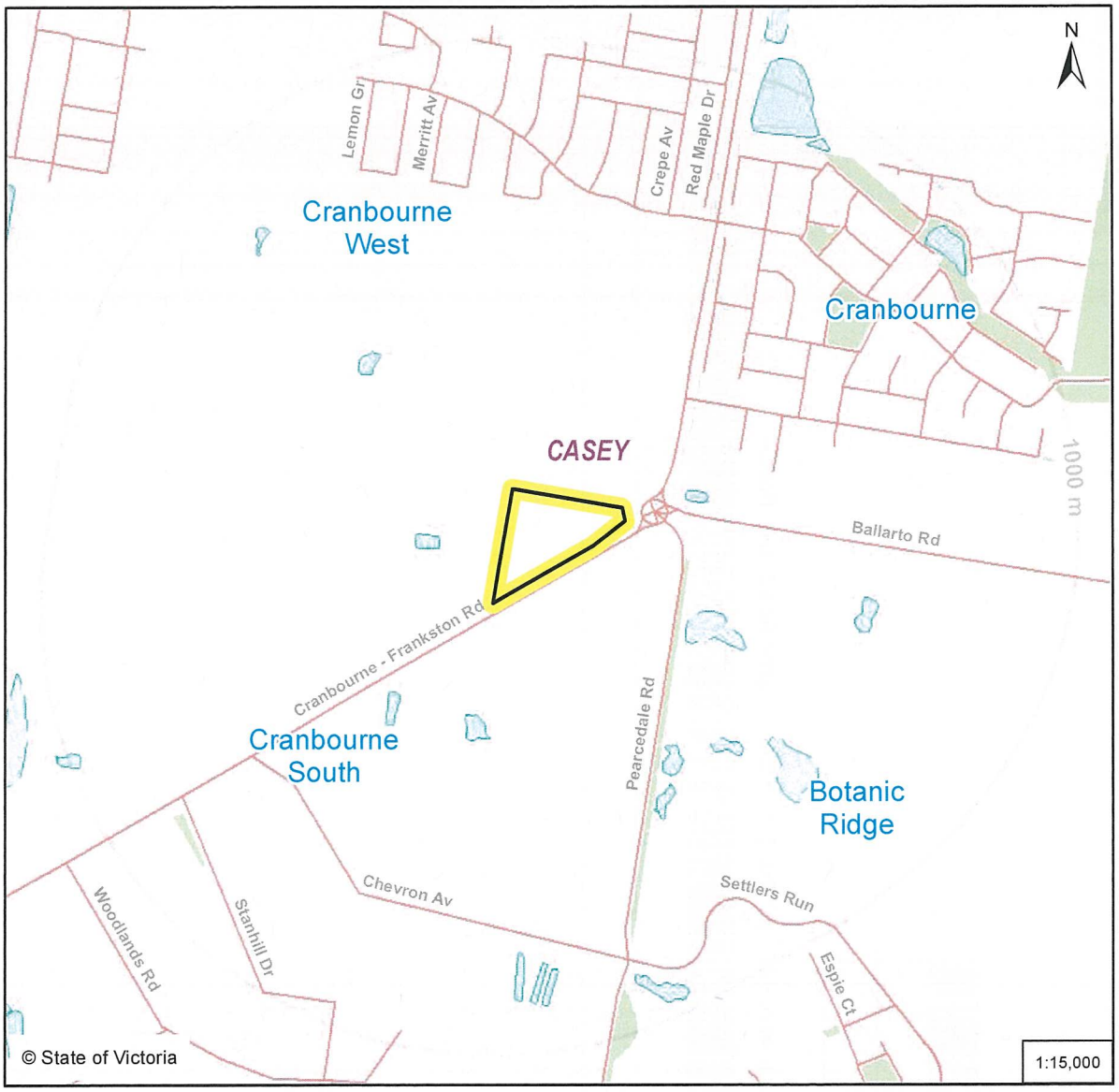
Petrol Stations and Garages within 1km of 765-785 Frankston Cranbourne Road Bangholme

ID	Year	Name	Address	Current Proprietor	Confidence

CheckSite Environmental

Petrol Station Search

765-785 Cranbourne-Frankston Road , Bangholme, 3175



Legend

- Subject Site
- Road Freeway
- Road Highway
- Road Local Sealed
- Road Local Unsealed
- Road Private Access
- Road Proposed
- Road 2WD
- Road 4WD
- Road Bicycle Track
- Road Walking Track
- Railway
- Railway Station
- Waterbody
- Reserves
- LGA Boundary
- LGA NAME
- Locality Name
- Active Petrol Station
- Former Petrol Station
- Garage/Workshop (Active/Inactive)

CS00257

energysafe VICTORIA

Creating a safer state with electricity and gas

6 February, 2015

TO: Jeremy Alcorn
Spatial Vision

Ph: 9691 3000
M: 0438 062 188

SEARCH FOR CATHODIC PROTECTION SYSTEMS

With reference to your email of 05/02/2015, a search of the CP database has failed to identify any cathodic protection systems registered at the following locations:

- ***Address: 765 – 785 Cranbourne-Frankston Road, Cranbourne South 3977***
- ***Lot 1 on LP86054***
- ***Lot 5 on PS613786***

Yours sincerely

Glenn Carrig
MANAGER ELECTROLYSIS MITIGATION

Energy Safe Victoria
ABN 27 462 247 657

Level 5 Building 2
4 Riverside Quay
Southbank VIC 3006

PO Box 262
Collins St West VIC 8007
DX 212569 Melbourne VIC

T (03) 9203 9700
F (03) 9686 2197
www.esv.vic.gov.au

Victoria

What is CheckSite?

Gathering information about a particular site to understand its history of use can be a time consuming and frustrating task. As a professional environmental auditor, developer or property consultant, you need access to a variety of information from reliable sources to assess whether the site may be associated with a risk or hazard.

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Spatial Vision Innovations Pty Ltd

Level 4, 575 Bourke Street Melbourne VIC 3000

Contact: ph +61 3 9691 3000 or info@checksite.com.au

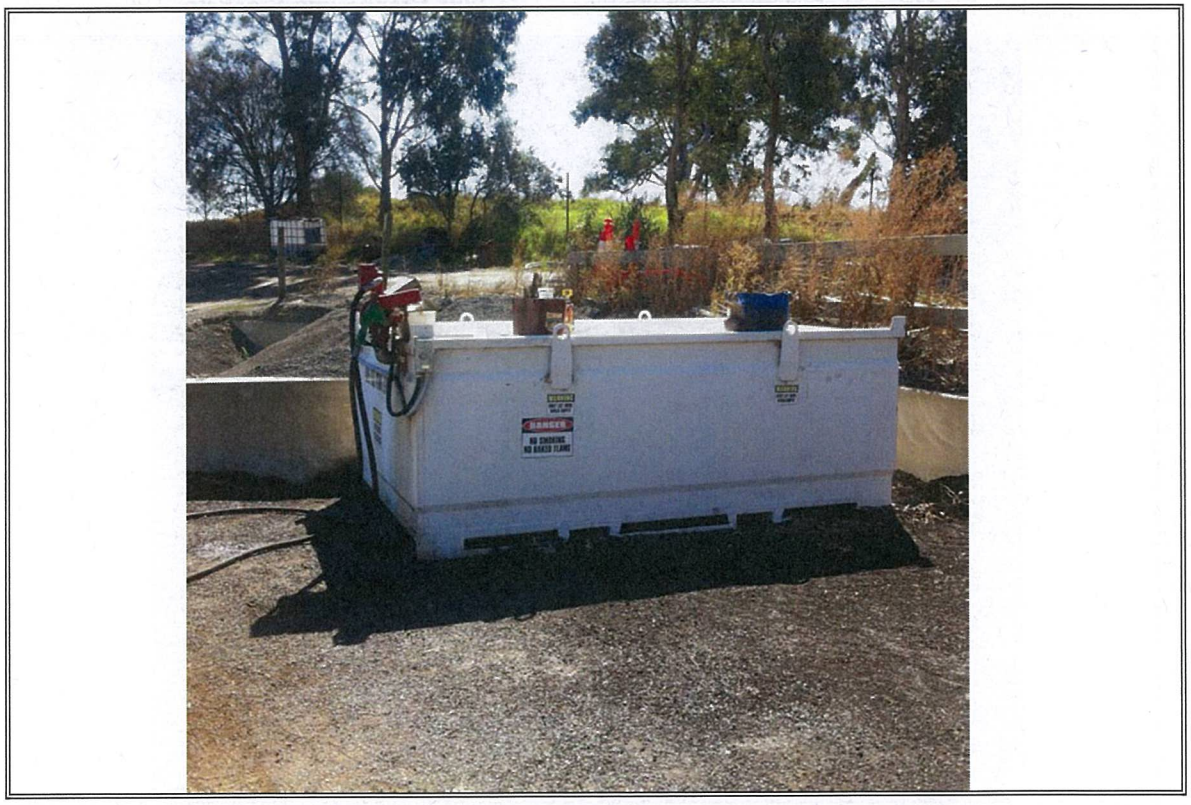
www.checksite.com.au

Appendix E – Site Photographs

Photograph 1. Chemicals storage in the general storage shed (765 Cranbourne-Frankston Rd)

Photograph 2. Chemical storage in the smaller storage shed (765 Cranbourne-Frankston Rd)

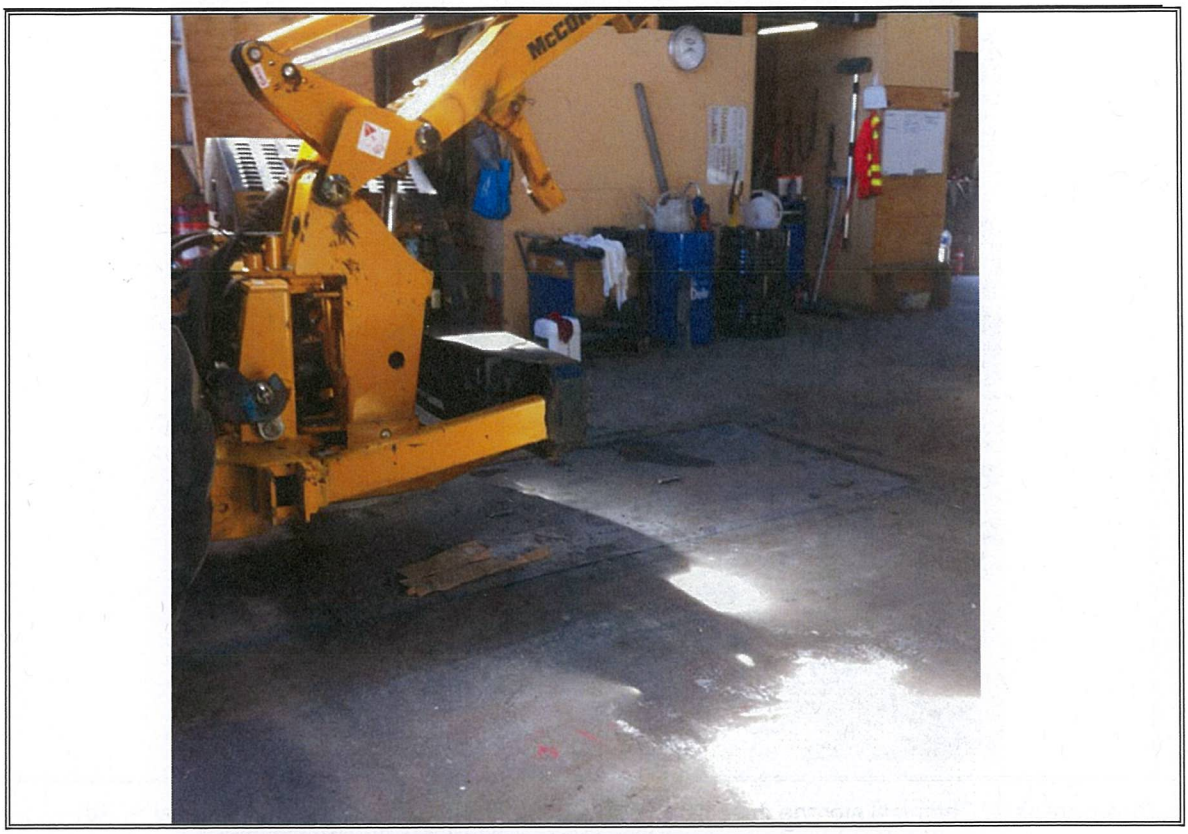
Photograph 3. Hard waste storage of tyres (765 Cranbourne-Frankston Rd)



Photograph 4. Petroleum fuel storage in the diesel AST (785 Cranbourne-Frankston Rd)

Photograph 5. Evidence of staining next to the diesel AST (785 Cranbourne-Frankston Rd)

Photograph 6. Vehicle maintenance workshop (785 Cranbourne-Frankston Rd)



Photograph 7. Inspection pit in the maintenance workshop (785 Cranbourne-Frankston Rd)

Photograph 8. Staining associated with chemical storage of tar/road sealant in IBCs

Photograph 9. Chemical storage associated with a 200L drum (785 Cranbourne-Frankston Rd)

Photograph 10. Hard waste storage of tyres (785 Cranbourne-Frankston Rd)

Appendix F – Surrounding Audit Reports

INFORMATION REGARDING ENVIRONMENTAL AUDIT REPORTS

August 2007

VICTORIA'S AUDIT SYSTEM

An environmental audit system has operated in Victoria since 1989. The *Environment Protection Act 1970* (the Act) provides for the appointment by the Environment Protection Authority (EPA Victoria) of environmental auditors and the conduct of independent, high quality and rigorous environmental audits.

An environmental audit is an assessment of the condition of the environment, or the nature and extent of harm (or risk of harm) posed by an industrial process or activity, waste, substance or noise. Environmental audit reports are prepared by EPA-appointed environmental auditors who are highly qualified and skilled individuals.

Under the Act, the function of an environmental auditor is to conduct environmental audits and prepare environmental audit reports. Where an environmental audit is conducted to determine the condition of a site or its suitability for certain uses, an environmental auditor may issue either a certificate or statement of environmental audit.

A certificate indicates that the auditor is of the opinion that the site is suitable for any beneficial use defined in the Act, whilst a statement indicates that there is some restriction on the use of the site.

Any individual or organisation may engage appointed environmental auditors, who generally operate within the environmental consulting sector, to undertake environmental audits. The EPA administers the environmental audit system and ensures its ongoing integrity by assessing auditor applications and ensuring audits are independent and conducted with regard to guidelines issued by EPA.

AUDIT FILES STRUCTURE

Environmental audit reports are stored digitally by EPA in three parts: the audit report (part A), report appendices (part B) and, where applicable, the certificate or statement of environmental audit and an executive summary (part C). A report may be in colour and black-and-white formats. Generally, only black-and-white documents are text searchable.

Report executive summaries, findings and recommendations should be read and relied upon only in the context of the document as a whole, including any appendices and, where applicable, any certificate or statement of environmental audit.

AUDIT REPORT CURRENCY

Audit reports are based on the conditions encountered and information reviewed at the time of preparation and do not represent any changes that may have occurred since the date of completion. As it is not possible for an audit to present all data that could be of interest to all readers, consideration should be made to any appendices or referenced documentation for further information.

When information regarding the condition of a site changes from that at the time an audit report is issued, or where an administrative or computation error is identified, environmental audit reports, certificates and statements may be withdrawn or amended by an environmental auditor. Users are advised to check EPA's website to ensure the currency of the audit document.

PDF SEARCHABILITY AND PRINTING

EPA Victoria can only certify the accuracy and correctness of the audit report and appendices as presented in the hardcopy format. EPA is not responsible for any issues that arise due to problems with PDF files or printing.

Except where PDF normal format is specified, PDF files are scanned and optical character recognised by machine only. Accordingly, while the images are consistent with the scanned original, the searchable hidden text may contain uncorrected recognition errors that can reduce search reliability. Therefore, keyword searches undertaken within the document may not retrieve all references to the queried text.

This PDF has been created using the Adobe-approved method for generating Print Optimised Output. To assure proper results, proofs must be printed, rather than viewed on the screen.

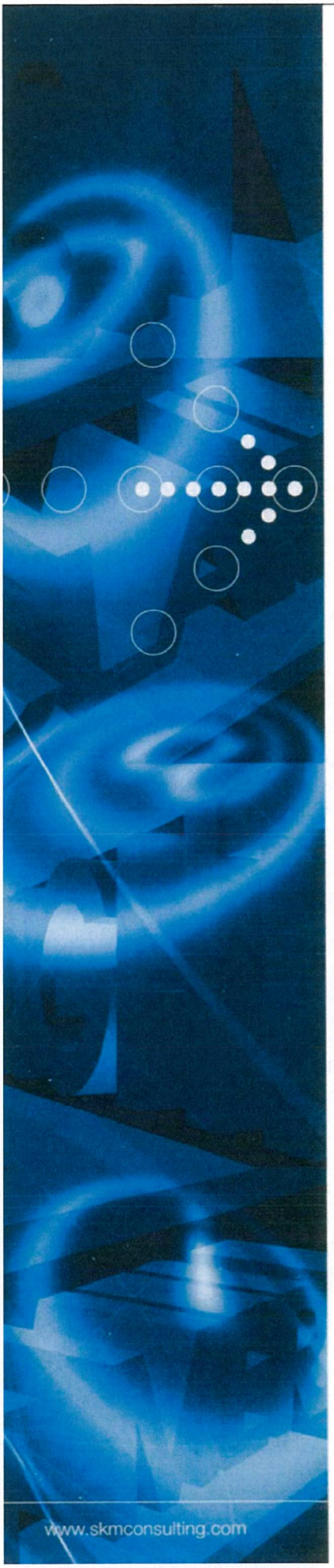
This PDF is compatible with Adobe Acrobat Reader Version 4.0 or any later version which is downloadable free from Adobe's Website, www.adobe.com.

FURTHER INFORMATION

For more information on Victoria's environmental audit system, visit EPA's website or contact EPA's Environmental Audit Unit.

Web: www.epa.vic.gov.au/envaudit

Email: environmental.audit@epa.vic.gov.au



45226-1-A

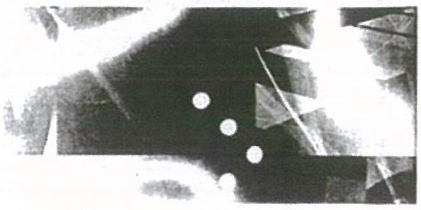
Marnebek Estate, Cranbourne South

Report of Environmental Audit

Leederville Pty Ltd

December 2002

SINCLAIR KNIGHT MERZ



SINCLAIR KNIGHT MERZ

Sinclair Knight Merz Pty Limited
ACN 001 024 095
ABN 37 001 024 095
590 Orrong Road
Armadale VIC 3143
PO Box 2500
Malvern VIC 3144
Australia
Telephone: +61 3 9248 3100
Facsimile: +61 3 9248 3364

Environment Protection Authority
GPO Box 4395QQ
MELBOURNE VIC 3001

3 December, 2002
L02ragepa.Doc
WC01656

Attention: Dr Paul Moritz, Manager - Land and Groundwater

Dear Dr Moritz

Environmental Audit Report and Certificate of Environmental Audit: Marnebek Estate, 232 Pearcedale Road, Cranbourne South

On 12 January 2001, I wrote to advise you of my engagement by Mr Richard Torossi of Leederville Pty Ltd, to conduct an environmental audit and issue a Certificate or Statement of Environmental Audit (as appropriate) for a site known as Marnebek Estate at 232 Pearcedale Road, Cranbourne South, Victoria 3977, in the City of Casey.

The environmental audit of the site has now been completed and I attach the environmental audit report, prepared in accordance with Section 53X of the Environment Protection Act 1970.

On the basis of my evaluation of the site contamination conditions, as described in the audit report, I am of the opinion that the condition of the site is neither detrimental nor potentially detrimental to any beneficial uses of the site. Accordingly, I have decided to issue a Certificate of Environmental Audit for the site and a copy of the Certificate is attached with the audit report. It is my opinion that development and use of the site for the proposed low density residential use or other feasible uses consistent with the site's Residential 1 zoning may proceed without further investigation, risk assessment or remediation.

Should you require further information, please contact me on 9248 3393.

Yours sincerely

Rick Graham
Environmental Auditor – Contaminated Land
Phone: 03 9248 3393
Fax: 03 9248 3364
E-mail: rgraham@skm.com.au

cc. CEO, Casey City Council
Mr Richard Torossi, Leederville Pty Ltd

Marnebek Estate, Cranbourne South

Report of Environmental Audit

Leederville Pty Ltd

December 2002

SINCLAIR KNIGHT MERZ

Sinclair Knight Merz Pty Limited
ACN 001 024 095
ABN 37 001 024 095
590 Orrong Road
Armadale VIC 3143
PO Box 2500
Malvern VIC 3144
Australia
Telephone: +61 3 9248 3100
Facsimile: +61 3 9248 3364

Contents

Summary of Environmental Audit

Background to the Audit

An environmental audit has been completed in accordance with Part IXD of the Environment Protection Act 1970 for an area of about 282.6 hectares of land referred to as the Marnebek Estate development, Cranbourne South.

The audit site is proposed for low density residential development by Leederville Pty Ltd.

Known or likely previous site uses were agricultural and horticultural land uses (which include market gardening and stock grazing), hydrocarbon fuel storage, a sheep dip and minor rubbish or waste disposal activities. These operations had potential to cause contamination of soil or groundwater at the site.

Site Assessment and Remediation Program

A staged site assessment was undertaken by consultants Coffey Geosciences Pty Ltd which complied with good practice and adequately characterised the soil, groundwater, and drainage line sediment quality conditions on the audit site. Furthermore, the design of the site assessment program was considered to be adequate to give confidence that significant unacceptable or undiscovered contamination is not present on the site.

Remediation and validation was undertaken to remove contamination sources or contaminated soils at the locations of three underground fuel storage tanks (USTs), a surface rubbish dump area and an in-ground sheep dip structure.

Findings of the Environmental Audit

Based on a review of all available relevant information about environmental conditions on the audit site and an assessment of the potential health and environmental risks, the auditor concludes that:

a) Final site soil quality complies with acceptance criteria protective of human health or ecological quality under any feasible future site use, including sensitive uses such as low density residential. Localised and minor exceedences of thresholds of potential concern for human health or environmental effects are not considered to present a significant risk of adverse health or ecological effects. Localised soil contamination with arsenic at depth greater than 1.0m adjacent to the former sheep dip exceeded health-based investigation levels. The risk of exposure to future residents at this depth is low. Soil imported onto the audit site to fill excavations was validated as clean and suitable for use on the site.

b) Existing and former land uses on the audit site and vicinity include potential sources of groundwater contamination, such as fuel storage in USTs or an above ground fuel storage tank, the sheep dip, waste disposal, and the use of agricultural chemicals. An investigation of groundwater quality in the shallow Baxter Sandstone Formation was undertaken and did not find significant contamination. At some locations where potential contamination sources were located, the shallow groundwater was not present

An investigation of the quality of the deeper Silurian Melbourne Mudstone aquifer was not undertaken on the basis that the potential for contamination of this aquifer is very low.

The auditor considers that the groundwater quality at the audit site does not present a constraint on any feasible future use of the site or on a decision whether or not to issue a Certificate of Environmental Audit for the site.

c) The aesthetic condition of the site is suitable for the future (sensitive) use. The site does not present a risk to air quality or surface water quality on or in the vicinity of the site.

In conclusion, the auditor is of the opinion that the environmental condition of the site is suitable for any feasible beneficial use, including the proposed development for low density residential subdivision, without further investigation, risk assessment or remediation.

Issue of Certificate of Environmental Audit

After considering the issues described in this audit report and having prepared this audit report in accordance with Section 53X of the Environment Protection Act, the environmental auditor is of the opinion that the site is neither detrimental nor potentially detrimental to any beneficial use of the site. Accordingly, the auditor has issued a Certificate of Environmental Audit for the site subject to this audit, known as Marnebek Estate, Cranbourne South, in accordance with Section 53Y of the Act.

The Certificate of Environmental Audit is attached to this audit report (following Section 7).

1. Audit Details

Name of Environmental Auditor:	Richard Alan Graham Sinclair Knight Merz Pty Ltd
Date of Appointment as an Environmental Auditor (Contaminated Land) under the Environment Protection Act 1970:	7 January 1997 (subsequently renewed and current until 21 April 2003)
Name of Person making the Request for a Certificate of Environmental Audit:	Mr Richard Torossi Director Leederville Pty Ltd 20 Vesper Drive Narre Warren Vic 3805 (the owner of the site)
Relevant Segment of the Environment:	The relevant segment of the environment for the purpose of this environmental audit is the site defined below
Location/Address of the Audited Site:	An area of land of approximately 282.6 ha; with street address 232 Pearcedale Road, Cranbourne South, located at the north-east corner of the intersection of Pearcedale Road and Browns Road, Cranbourne South, Victoria, 3977 Melways Maps 133, B/D-10/12 and 137, B/E-1/3 (refer Figure 1 – Site Location Map)
Certificate of Title or Plan of Subdivision Details:	Lots 1-7 on Plan of Subdivision 212003D; Certificates of Title Vol 9836, Folios 530-536 for Lots 1-7 respectively (refer Appendix B)
Municipality:	City of Casey
Date of Request to Issue a Certificate of Environmental Audit:	10 January 2001
Date Auditor notified EPA of Request:	12 January 2001
Completion date of the Environmental Audit:	2 December 2002
Documentation reviewed during the conduct of this audit:	Refer to Appendix A

2. Introduction

2.1 Background

The site which is subject to this environmental audit ("the audit site") is an irregular area of land of area approximately 282.6ha at the north-east corner of the intersection of Pearcedale Road (the site's western boundary) and Browns Road (southern boundary), Cranbourne South, with Smiths Lane and the Cranbourne Botanic Gardens forming the eastern and north-eastern boundaries.

The location and Certificate of Title and Plan of Subdivision details are provided in Section 1 of this audit report and copies of relevant documents and plans are provided in Appendix B. The location of the audit site is shown in Figure 1 – Site Location Map (adapted from Dames and Moore 1999).

The site is a former farming property (Maintop Farm), now referred to as Marnebek Estate. Leederville Pty Ltd proposes to subdivide the land for large lot-size (about 1000m^2) residential allotments. Information on the site history is provided in Section 3.

It is understood that the land has been largely rezoned from Rural to Residential 1. The land is subject to an Environmental Audit Overlay under the Cranbourne Planning Scheme – May 1999 (Section 153A Potentially Contaminated Land).

It is a requirement of the planning process that the Environmental Audit Overlay be removed prior to development for sensitive uses such as residential. For this purpose, a statutory environmental audit is required to be undertaken under Part IXD of the Environment Protection Act 1970 (the Act), with the outcome being the issue of either:

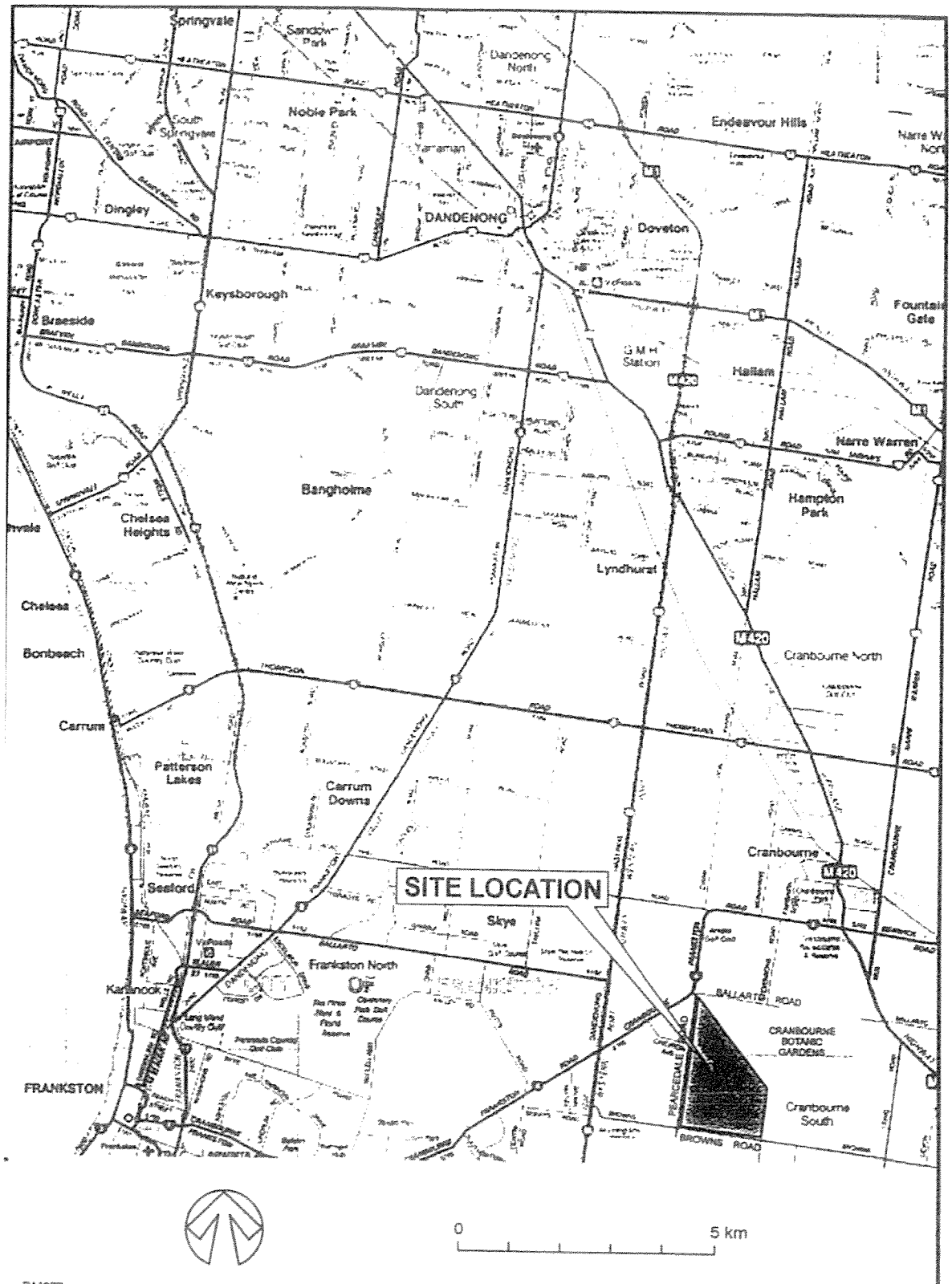
- a Certificate of Environment Audit; or
- a Statement of Environmental Audit to the effect that the environmental conditions of the site are suitable for the proposed (residential) use.

The former owners, Station Creek Pastoral Co Pty Ltd and Kerona Pty Ltd, commissioned a preliminary environmental site assessment (Dames and Moore 1999). After acquiring the site, the current site owner/developer, Leederville Pty Ltd, commissioned a staged site contamination investigation, remediation and validation program, which has been undertaken by consultants Coffey Geosciences Pty Ltd (Coffey 2002).

Consistent with Environment Protection Authority (EPA) guidelines at the time (EPA 1992a), an environmental auditor who is independent of the assessment consultants was engaged to undertake the audit. On 10 January 2001, Leederville engaged Mr Richard Alan Graham of Sinclair Knight Merz, consulting engineers, under (then) Section 57AA of the Act to conduct an environmental audit of the site. Mr Graham notified the EPA of this engagement on 12 January 2001.

The EPA has not issued a clean up notice or exercised any other formal control over the site. The site is not listed on the EPA Priority Sites Register.

Figure 1 – Site Location Map



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Job No.	43318-001		STATION CREEK PASTORAL CO PTY LTD & KERONA PTY LTD	DAMES & MOORE
Prep. By	M. R.	26-5-99	PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT MAINTOP, PEARCEDALE RD, CRANBOURNE, VIC. SITE LOCATION MAP	Figure 1
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Rev. No				

2.2 Objectives of the Environmental Audit

The statutory environmental audit process for contaminated land is described in Part IXD of the Act (Section 57AA prior to 1 July 2001), in EPA guidelines (EPA 2001 and, prior to 1 July 2001, EPA 1992a, 1992b) and the Minister's Direction No. 1 (Department of Planning and Housing, 1992). The audit process is intended to be applied to land formerly used for industrial or other potentially contaminating uses which is proposed to be redeveloped for a sensitive use such as residential.

The environmental assessment and audit process for the site subject to this audit was generally consistent with EPA guidelines. The environmental auditor was not engaged until after the preliminary site assessment (Dames and Moore 1999) was completed, but before the more detailed environmental site assessment program (Coffey 2002) was undertaken. The auditor was consulted on the scope of the main assessment program prior to the assessment consultants undertaking that work.

The overall objective of the audit process is to facilitate a change in land use of a contaminated or potentially contaminated site in a controlled manner, while protecting human health and environmental quality. The specific objectives of this audit were:

- to audit the environmental status of the site in accordance with Part IXD of the Act and EPA guidelines for auditors;
- to evaluate the environmental quality of the audit site (being the relevant segment of the environment for the purposes of the audit);
- to provide an independent evaluation of the site conditions, potential risks to human health or the environment and the suitability of the site for a range of future uses;
- to assess whether any clean-up is required for the site and, if so, make recommendations for clean-up;
- to prepare an environmental audit report and issue a Certificate (or Statement) of Environmental Audit as appropriate, depending on the contamination status of the land; and
- through the audit report and Certificate (or Statement) of Environmental Audit, to provide assurances to the site owner, planning authority, prospective purchasers and occupants and the nearby community that redevelopment and use of the site may proceed without unacceptable risk to human health or environmental quality.

2.3 Activities of the Environmental Auditor

During the environmental audit, the auditor and his support team conducted a number of activities to ensure that these objectives were met, including:

- two inspections of the site during the assessment and remediation program;
- numerous discussions with staff of Coffey Geosciences and Leederville Pty Ltd (site owner);
- review of all available relevant documentation including the site assessment reports, site plans, government agency policies and guidelines. A full list of documents relied upon for this audit is produced in Appendix A - List of Documents Reviewed;

- review of the quality and completeness of the environmental site assessment reports and verification of the assessors' conclusions; and
- preparation of this report of the environmental audit in support of a decision whether or not to issue a Certificate of Environmental Audit.

2.4 Limitations

This audit report and the accompanying Certificate of Environmental Audit relate to the site referred to as Marnebek Estate, Cranbourne South, and have been prepared in accordance with Part IXD of the Environment Protection Act 1970, relevant EPA guidelines and other standards, policies and guidelines.

The audit report and Certificate have been prepared for Leederville Pty Ltd (the site owner) for the purposes described in the audit report. It is acknowledged that the audit report and Certificate may also be used by the Environment Protection Authority and the City of Casey in reaching their conclusions about environmental conditions at the site. The scope of work performed in connection with the audit may not be appropriate to satisfy the needs of any other person. Any other person's use of, or reliance on, the audit report and Certificate, or the findings, conclusions, recommendations or any other material presented in them, is at that person's sole risk.

The conclusions of this environmental audit report and the issue of the Certificate of Environmental Audit are based on a review of information which was available to the auditor at the time of the audit and relating to the environmental quality conditions of the audit site and adjacent land. Sinclair Knight Merz and the environmental auditor are satisfied that the information and data available were adequate for this purpose.

Sinclair Knight Merz and the environmental auditor have taken due care to consider all reasonably available information in undertaking this audit and have taken this information to represent a fair and reasonable characterisation of the environmental status of the site, but recognise that any site assessment program is necessarily limited in scope and true site conditions may differ from those inferred from the available data. Whilst all reasonable care has been taken, to the extent practical under normal auditing procedures, to assure the reliability of the information, the environmental auditor and Sinclair Knight Merz cannot warrant that this is the case. If the information is subsequently determined to be false, inaccurate, misleading or incomplete, it is possible that the environmental auditor's conclusions as expressed in the audit report may change. Sinclair Knight Merz and the environmental auditor disclaim any responsibility for inconsistencies between the findings of this audit report (and the issue of a Certificate of Environmental Audit) and information or data which may become available after the date of completion of this audit.

Sinclair Knight Merz or the auditor did not conduct validation testing by sampling and analysis of site soils or groundwater, but relied primarily on the data produced from the site assessment, remediation and validation program undertaken by consultants Coffey Geosciences Pty Ltd for Leederville Pty Ltd. The auditor provided comment on, and approval of, some components of the site assessment and remediation program. The auditor was reasonably satisfied that the data were reliable for the purpose for which they have been used, and that independent testing was not justified in this case.

This environmental audit applies to the condition of the site at the time the site assessment was undertaken. The environmental auditor and Sinclair Knight Merz cannot be responsible for future activities that may result in changes to the site conditions. In the event that site conditions have since changed or are likely to change in the future, the environmental auditor recommends that the property owner engage an environmental consultant to confirm that the site conditions remain suitable for its proposed residential land use.

It is not possible in an environmental audit report to present all data that could be of interest to all readers of this report. Readers are therefore referred to the referenced documentation for further information and data.

3. Site History and Characteristics

3.1 Site Description and History

The site subject to this environmental audit is a large area of 286.2ha (2.826km^2) located at the north-east corner of the intersection of Pearcedale Road and Browns Road, Cranbourne South (refer Figure 1). The site is undulating to hilly with most of the site having an overall slope from north-east to south-west. It is generally cleared pasture land with little significant native vegetation, other than scattered stands of trees. The site is now unoccupied, but the buildings and structures of the former farm largely remain, including the owner's house, stock pens, farm sheds, internal roads, tracks and fences.

The site is bounded by:

- Pearcedale Road and rural farm land, with some poultry farms, to the west;
- Browns Road and rural/rural living land to the south;
- Smiths Lane and rural land to the east;
- The Cranbourne Botanic Gardens and a commercial quarry operation to the north-east and north.

The history of site use is documented in Dames and Moore (1999) and Coffey (2002), and summarised below.

The site has been a farming property since probably 1911, used predominantly for cattle and sheep grazing. Aerial photographs since 1959 show that the various houses and sheds were progressively added over the 1960s and 1970s. A small quarry has operated in the south-west area of the site but probably ceased in the 1980s. Since about 1996 market gardening was undertaken in the south-western portion of the site (reported to occupy about one-sixth of the total site area).

Anecdotal evidence was obtained that the sheep dip was operated only in the 1950s to 1960s. Prior to the 1950s sheep were dipped on another nearby property and after that time the site was predominantly used for cattle (not sheep). No detailed information was obtained on the sheep dip operational practices, such as sludge disposal from the dip.

From the site history and detailed site inspections, a number of activities were identified with significant potential for contamination of soil or groundwater, in particular:

Contamination Source	Potential Contaminants
Three underground fuel storage tanks (USTs) at the owner's house – one diesel and two petrol; unused since the 1980s	Petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons (MAH, or BTEX), lead
One aboveground fuel storage tank (petrol) at the manager's house – unused since the late 1970s	Petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons (MAH, or BTEX), lead
Sheep dip (located to the south of the owner's house adjacent to the shearing shed)	Arsenic, Dieldrin, DDT, possibly other pesticides

❑ Domestic and farm-related waste disposal area (adjacent to hayshed and silos)	❑ Heavy metals, petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCPs), organophosphorus pesticides (OPPs), miscellaneous
❑ Market garden – storage and use of fertilisers, pesticides and herbicides	❑ Nitrogen, phosphorus and heavy metals in fertilisers; OCPs and OPPs from pesticides and herbicides
❑ Fill material to construct a stock or produce loading ramp near south-west corner entrance roadway	❑ Heavy metals, PAH, miscellaneous

3.2 Proposed Site Development

Leederville Pty Ltd proposes to develop the site for single-dwelling residential use, on relatively large lots (average size 1000m^2 or more), with some open space areas.

The site is mostly zoned Residential 1, with an area at the north-west corner zoned Rural Zone Schedule 4.

Development is proposed to commence at the southern end with Browns Road frontage and progressively move to the northern and eastern parts of the site.

The site is currently constrained by two significant easements:

- PowerNet (formerly SECV) overhead high voltage power lines run north-south through the eastern half of the site; and
- A Melbourne Water water supply pipeline easement runs from north-east to south-west through about the middle of the property.

3.3 Geology, Hydrogeology and Surface Waters

Information on the geology, hydrogeology and surface waters of the site and surrounding area is provided in the environmental assessment reports (Dames and Moore 1999 and Coffey 2002), copies of which are attached as Appendices C and D of this audit report respectively. The auditor has confirmed and supplemented this information by reference to other sources. The relevant information is summarised below.

3.3.1 Geology and Soils

The Geological Survey of Victoria's Cranbourne Map Sheet (Scale 1:63,360) indicates that the site is located on the Silurian-aged sandstone, siltstone and mudstone of the Melbourne Formation, overlain (in the southern part of the site) by the Quaternary Pleistocene-aged sand dunes of the Cranbourne Sands and (on the northern part of the site) by the Tertiary-aged marine sands of the Baxter Formation. In places the coarse sands and gravels of the Baxter Formation have undergone cementation to form ironstone.

The site soils are generally consistent with the geology. The soil profiles on the northern and southern halves of the site differ, with generalised profile descriptions being (from Coffey 2002):

a) Northern half of site:

Depth	0-0.5m	Topsoil: silty sand or sand, fine to medium grained, grey to black
	0.5m-5m	Tertiary Sediments: sandy clay, clayey sand and sand, fine to coarse grained; low to medium plasticity clay, brown/ yellow with some red nottles at depth
	> 5.0m	Silurian siltstone: highly weathered, grey to brown

b) Southern half of site:

Depth	0-0.2m	Topsoil: clayey silt, dark brown low plasticity with some fine to medium grained sand
	0.2-2.0m	Residual Silurian: clay, sandy clay, clayey sand; medium plasticity light brown, fine to medium grained sand
	> 2.0m	Silurian siltstone: highly weathered, grey to brown

No significant fill was observed on the site, other than at subsurface structures such as USTs.

3.3.2 Hydrogeology

Coffey (2002) reports the findings of a search of the Victorian Groundwater Database. The database printout is provided in Appendix L of Coffey (2002). A total of 48 bores are registered within a radius of 3km from the site, comprising investigation/observation bores (35%), stock and/or domestic water supply (31%), irrigation (8%) and use unknown (25%).

Most of the abstraction bores registered for stock/domestic and irrigation use are screened at depth greater than 12m in sand (presumably Baxter Formation), or sandstone and mudstone (Silurian Melbourne Formation), with standing water levels typically in the range 12-43m below ground level. Based on the geology it would be expected that the useable aquifer in the region is the deeper Silurian mudstone aquifer.

The database records indicate widely varying groundwater salinity, between about 200-7000mg/L (TDS), with most bores exhibiting groundwater salinities less than about 3000mg/L. These salinities would classify the groundwater as (predominantly) Segments A1, A2 or B under the State Environment Protection Policy for Groundwaters of Victoria (Vic Govt 1997).

The Victorian Groundwater Beneficial Use Map (DCNR 1995) for the area indicates that the watertable aquifer in the Quaternary aquifer is either Segment B (TDS 1001-3500mg/L) or Segment C (TDS 3501-13000mg/L).

The potential beneficial uses of Segment B groundwater are:

- maintenance of aquatic ecosystems (likely to be relevant after discharge of groundwater to surface waters);
- potable mineral water supply (unlikely as this is not a designated potable mineral water supply area)
- irrigation for agriculture, parks and gardens (a likely and existing use in this area);
- stock watering (an existing use in the area);

- industrial water use (a possible use in the area);
- primary contact recreation (either after abstraction or discharge to surface waters);
- buildings and structures (unlikely to contact groundwater at the indicated groundwater table depth).

The protected beneficial uses of groundwater classified as Segments A1 and A2 are as above and also potable water supply, while the uses of Segment C groundwater are as for Segment B but excluding potable mineral water supply and irrigation.

3.3.3 Topography and Surface Waters

The site elevation is between about 60m and 100m above sea level, with the high area being a ridge which crosses the site roughly east-west through the centre-south of the site. The fall of the land is therefore to the north/north-east in the northern half of the site, and to the south-south west in the southern half of the site. Surface drainage (and shallow groundwater) flows are likely to follow these directions, with eventual runoff flowing to local drains, watercourses and Port Phillip Bay (from the northern part of the site) and Western Port Bay (from the south) respectively.

Water quality in surface waters of the area and the bays are managed in accordance with the State Environment Protection Policies for Waters of Victoria (Vic Govt 1988), including Schedule F6 Waters of Port Phillip Bay (Vic Govt 1997), and Western Port Bay and Catchment (Vic Govt 1979).

4. Review of Site Assessment Program

4.1 Introduction

The audit site has been the subject of a staged environmental site assessment, involving soil and groundwater investigations, and a remediation and validation program at locations where unacceptable soil contamination was identified.

The soil and groundwater assessments are described in detail in the assessment consultants reports (Dames and Moore 1999 and Coffey 2002) and summarised in this section of the audit report. The remediation and validation program is described in Coffey (2002) and summarised in Section 5 of this audit report.

4.2 Preliminary Environmental Site Assessment

A preliminary environmental site assessment was undertaken by consultant Dames and Moore for the former site owners in 1999. A copy of the report of this preliminary assessment is attached as Appendix C to this audit report.

The scope and findings of the preliminary assessment are summarised below:

The assessment incorporated soil sampling from a total of 33 soil boreholes, at locations BH1-BH33 on Figure 2 – PESA Site Layout and Borehole Location Plan (from Dames and Moore 1999). The sampling locations included both general grid-based locations and targeted locations. A relatively higher density of grid-based sample locations was placed in the northern corner of the site. Targets included the USTs and fuel bowser at the owner's house, the AST, garage and sheds at the manager's house, the sheep dip, the cattle yard, and the waste tip near the hayshed and silos.

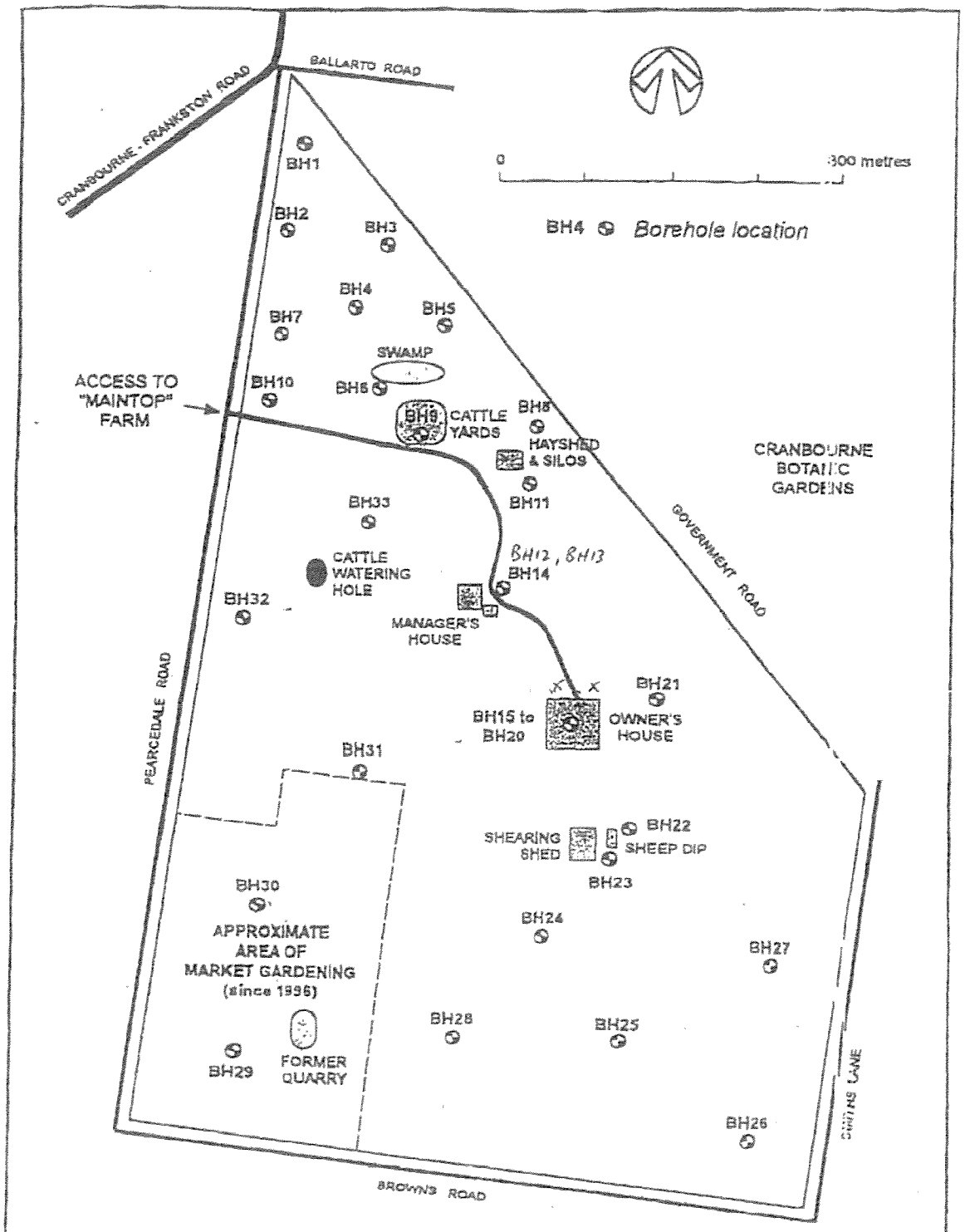
In addition, one water sample was collected from a stock watering hole and two samples were collected of sediments in ephemeral watercourses. No groundwater investigation was undertaken at this stage.

The sample location and depth details, and the analysis performed on selected samples are shown in Table 1 of Dames and Moore (1999). A total of 31 samples were analysed, comprising 7 3-part composite samples and 10 individual samples. Soil samples were generally taken at A level (surface) 0-0.2m depth interval and B level (sub-surface), typically 0.4-0.5m, but only the surface A level samples were analysed with the exception of the B level sample at 0.6-0.8m depth adjacent to the eastern UST at the owner's house.

Samples were analysed by NATA-accredited laboratory MGT Environmental Consulting Pty Ltd for a range of relevant potential contaminants including metals, petroleum hydrocarbons (TPH), PAHs, OC pesticides, OP pesticides and pH. Five composite or individual samples were analysed for the broad range of analytes referred to as the EPA screen (EPA 1992b).

The field sampling program did not report significant aesthetic evidence of contamination (odours, discolouration, soil staining or dead or distressed vegetation),

Figure 2 – PESA Site Layout and Bore Location Plan



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Job No.	43318-001	STATION CREEK PASTORAL CO PTY LTD & KERONA PTY LTD	DAMES & MOORE
Prep. By	M. R. 31-5-99	PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT MAINTOP, PEARCEDALE RD. CRANBOURNE, VIC. SITE LAYOUT & BOREHOLE LOCATION PLAN	Figure 2
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or elevated PID readings which would indicate the presence of volatile hydrocarbon contaminants.

The analytical program did not report elevated concentrations of any contaminant. Chemicals typically associated with sheep or cattle dips, notably arsenic and organochlorine pesticides such as dieldrin or DDT (or its metabolites DDD and DDE) were not detected at elevated concentrations in samples taken from adjacent to the former sheep dip. Hydrocarbons were not detected in samples from adjacent to the USTs, bowser or AST, although it was recognised that boreholes adjacent to the USTs did not penetrate to the full depth of the USTs and so contamination may have been present but undetected at the depths sampled.

The quality assurance/quality control program for the preliminary site assessment incorporated limited duplicate sample analyses, with only one sample taken in triplicate for analysis for only TPH, as a blind duplicate at the primary laboratory MGT and as a split duplicate at a second laboratory Australian Laboratory Services Pty Ltd (ALS). No TPH was detected in any of the samples.

MGT and ALS undertook a standard range of internal QA/QC procedures, including laboratory duplicate analysis, method blank analysis and spike sample recoveries. All results were acceptable and within data quality objectives.

Auditor's Comment

The preliminary environmental site assessment was generally consistent with the scope expected of such an assessment. The findings support the conclusion of Dames and Moore (1999) that the performed sampling and analyses has not revealed the presence of significant contamination at the site which would preclude the ongoing use of the site for pastoral purposes or for rezoning for residential purposes.

However, the auditor notes the limitations of the preliminary assessment, in particular:

- the virtual absence of soil analysis for any samples at depth greater than 0-0.2m;
- the absence of soil investigation at depths corresponding to the base of the USTs;
- no groundwater investigation;
- investigation was insufficient to identify the presence of arsenic and DDT contamination of soils at, around or beneath the former sheep dip.

A more comprehensive assessment was clearly required to identify and characterise any soil and groundwater contamination to the level of confidence required to support a statutory environmental audit.

4.3 State 2 Environmental Site Assessment - Soil

Following its acquisition of the site, Leederville Pty Ltd commissioned consultants Coffey Geosciences to undertake a more comprehensive environmental site assessment, to meet the requirements of the environmental auditor and identify any remediation needs.

The soil and groundwater assessment is described in Coffey (2002), a copy of which is included as Appendix D of this audit report (as separate volumes). The soil

assessment is summarised below, and the groundwater assessment is described in Section 4.4.

The scope of assessment was prepared by Coffey for review and comment by the environmental auditor and the auditor's recommendations were incorporated into the final scope of work.

4.3.1 Scope of Soil Contamination Investigation

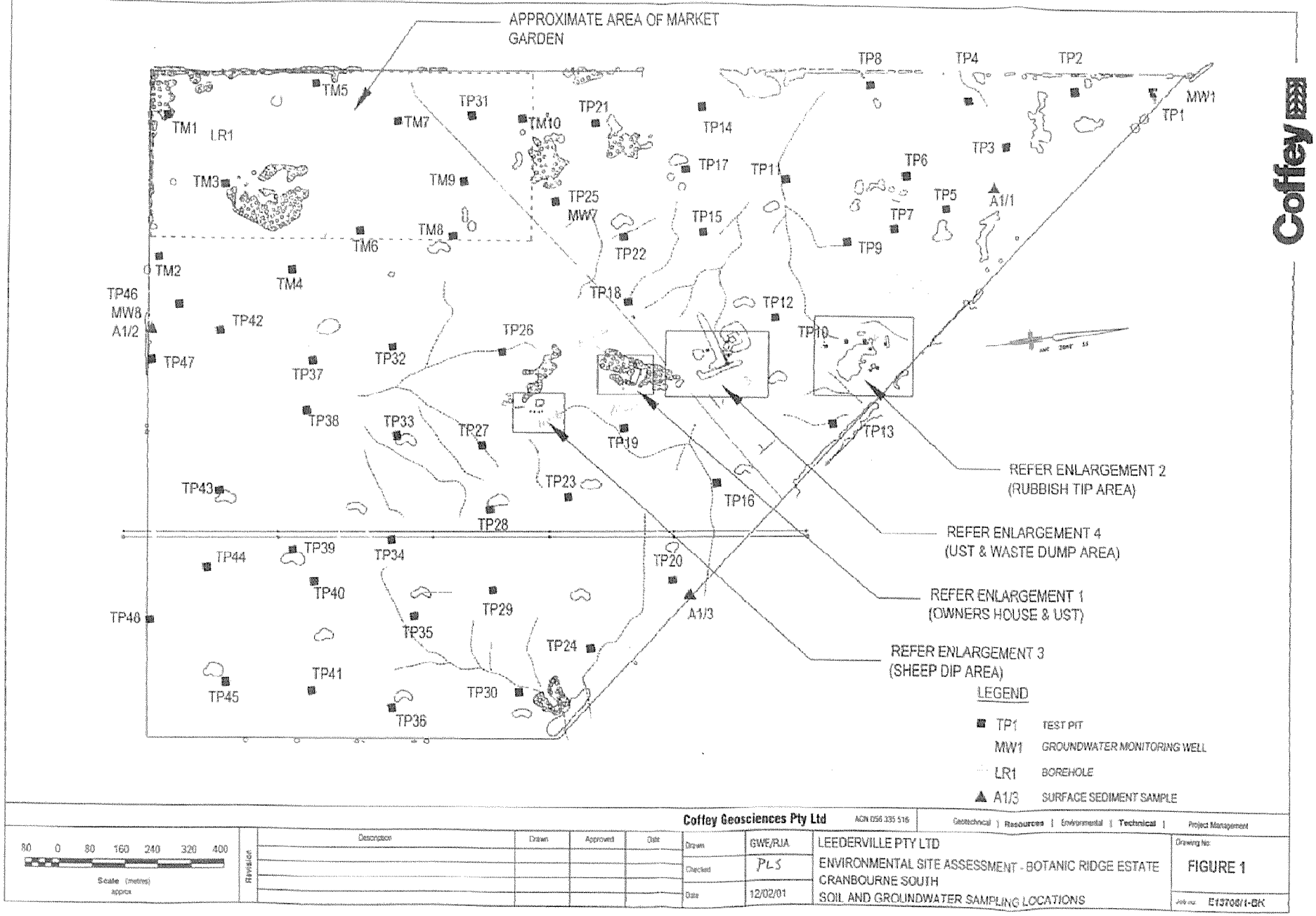
The Stage 2 soil contamination investigation incorporated:

- 48 grid-based soil sampling locations across the broad pastoral site, at a density of about one location per 5 hectares, at locations TP1 to TP48 shown on Figure 3 – ESA Soil and Groundwater Sampling Locations (from Figure 1 in Coffey, 2002). Soil samples were typically taken from the test pits at surface 0-0.2m and subsurface 0.4-0.5m depths. Test pits were generally terminated at a depth of less than one metre. Soil conditions were logged (see Appendix B1 of Coffey 2002) and selected samples were screened for volatile hydrocarbons by PID. No aesthetic evidence of contamination or elevated PID readings were reported (Appendix E of Coffey, 2002);
- 33 targeted soil sampling locations, including TM1-TM10 in the market garden area in the south-west part of the site (see Figure 3), TM11-TM16 in the rubbish dump area near the hayshed and silos, as shown in Figure 4 – ESA Targeted Soil and Groundwater Sampling Locations (from Figure 2 of Coffey 2002), TM17-TM21 at the sheep dip (see Figure 4), SS1 and SS2 at the shearing shed area (see Figure 4), TM23-TM31 at the USTs adjacent to the owner's house (see Figure 4), TM22, TM32 and TM33 at the waste dump area and AST at the manager's house, FS1-FS6 at the farm sheds near the manager's house and LT1 at the loading ramp near the south-west corner of the site (see Figure 3).
- Field conditions were logged (see Appendix B1 of Coffey 2002). No aesthetic conditions indicating contamination were observed, other than rubbish dump areas, and no elevated PID readings were reported (see Appendix E of Coffey, 2002).
- Sediment samples were taken from three drainage lines which drain broad areas of the site, as a cost-effective way of identifying contamination in particulate runoff from the agricultural areas of the property, including market gardens and stock pasture. The sediment sampling locations are shown as A1/A to A1/3 on Figure 3.

Samples were selected for analysis by the primary laboratory WSL Consultants Pty Ltd and the secondary (QC) laboratory AMDEL, as follows (refer to Coffey (2002) Appendix C1 for analysis schedule):

- 15 four-part composite soil samples from the general site locations TP1-TP48, comprising 11 A-level (0-0.2m) composites and 4 B-level (0.4-0.5m) composites, as well as individual samples from two general locations (TP1, TP31) were analysed for metals, pH, OC pesticides, with 3 samples being analysed for the EPA screen analytes.
- 61 individual soil samples and 3 sediment samples from target locations were analysed for a range of relevant potential contaminants, including pH, metals, OC pesticides, TPH, BTEX (MAH), and PAHs, with three samples analysed for the EPA screen analytes.

Figure 3 – ESA Soil and Groundwater Sampling Locations



Coffey

Coffey Geosciences Pty Ltd ACN 056 335 516

Geotechnical | Resources | Environmental | Technical | Project Management

80 0 80 160 240 320 400

Scale (metres) approx

Revision	Description	Drawn	Approved	Date

Drawn	GWE/RJA
Checked	PLS
Date	12/02/01

LEEDERVILLE PTY LTD

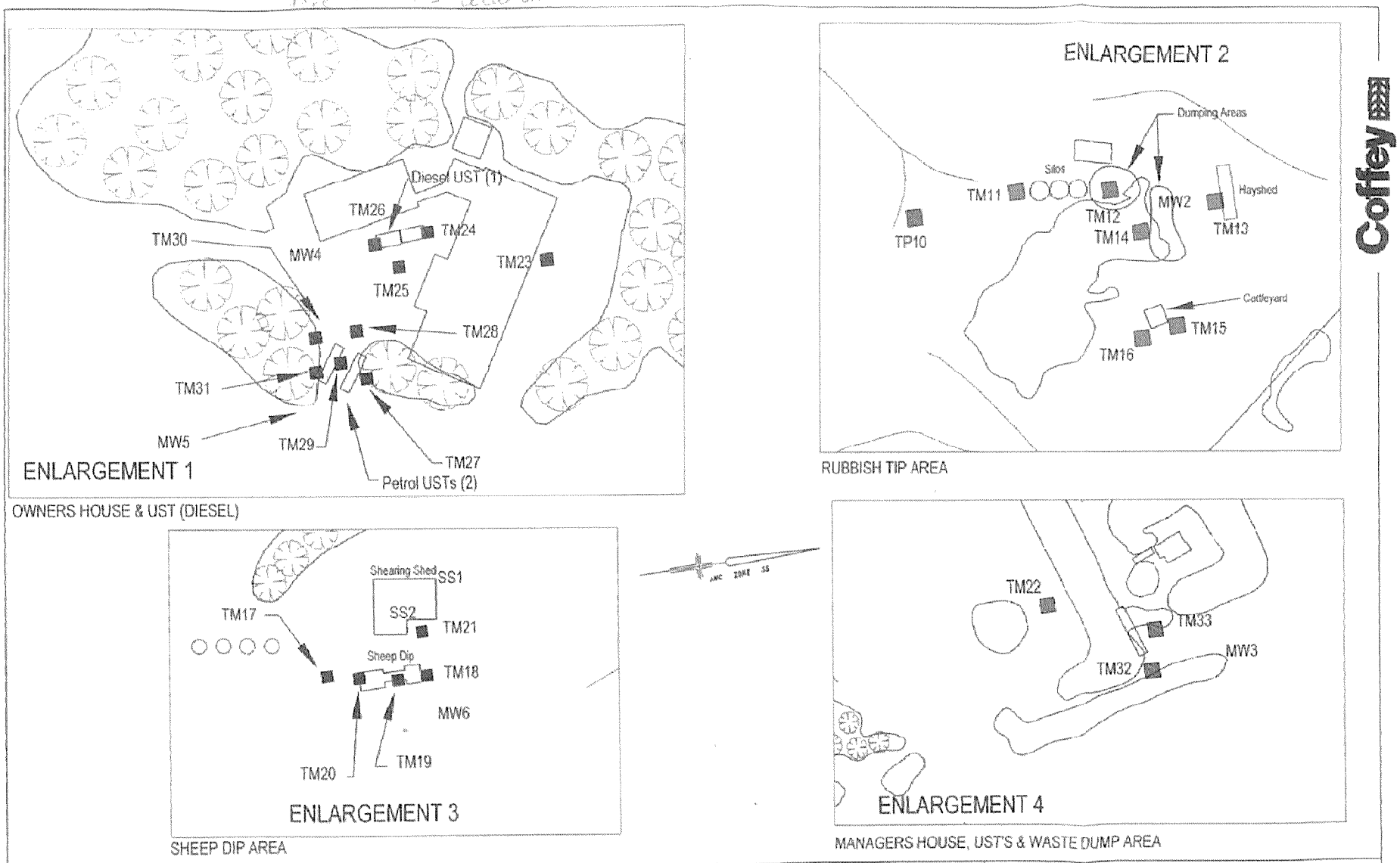
ENVIRONMENTAL SITE ASSESSMENT - BOTANIC RIDGE ESTATE CRANBOURNE SOUTH

SOIL AND GROUNDWATER SAMPLING LOCATIONS

Drawing No: FIGURE 1

Job no. E13708/1-BK

Figure 4 – ESA Targeted Soil and Groundwater Sampling Locations



Coffey Geosciences Pty Ltd ACN 055 335 515 | Geotechnical | Resources | Environmental | Technical | Project Management

NOT TO SCALE

Scale (metres)

Revision	Description	Drawn	Approved	Date

Drawn	GWE/RJA
Checked	PLS
Date	12/02/01

LEEDERVILLE PTY LTD
ENVIRONMENTAL SITE ASSESSMENT - BOTANIC RIDGE ESTATE
CRANBOURNE SOUTH
SOIL AND GROUNDWATER SAMPLING LOCATION DETAILS

Drawing No: FIGURE 2

Job no: E13708/1-BK

4.3.2 Results of Soil Analysis

The results of the soil and sediment analyses are tabulated in Appendix G (Tables G1 and G2) of Coffey (2002), with the complete laboratory reports provided in Appendix J1 of Coffey (2002).

Coffey (2002) compares the analytical results with relevant criteria, in particular NEPM A-setting health-based investigation levels, HILs (NEPC 1999) for sensitive (residential) land use, interim urban ecological investigation levels, EILs (NEPC 1999) and EPA Victoria (clean) fill guidelines (EPA 1995), which are relevant in the event that soil is classified for off-site disposal or reuse.

For composite samples, Coffey compared the analytical results to modified guidelines (the HIL or EIL divided by the number of samples in the composite) which conservatively assumes that all the contaminant detected is contained in one of the individual samples comprising the composite. In summary, the general site soil composite sample results reported:

- pH in the range 4.3-5.6, which indicates that soils on the site are naturally slightly acidic.
- All metals concentrations were low and within the relevant HIL-A and EIL guidelines, as modified for composite samples, with the exception of three composites in which concentrations of arsenic in the range 6-9mg/kg exceed the modified EIL of 5mg/kg (EIL 20mg/kg divided by 4) and one composite sample where the nickel concentration of 16mg/kg marginally exceeds the modified EIL of 15mg/kg (EIL of 60mg/kg divided by 4). These "exceedences" are insignificant. Coffey (2002) in Section 7.3 and Table 7.2 states that 7 samples exceed the modified EIL for chromium, but this is based on comparison with the modified ANZECC B guideline (ANZECC/NHMRC 1992) of 15mg/kg (60mg/kg divided by 4) rather than the more relevant EIL for CrIII. Again, these concentrations in the range up to 29mg/kg are not of significant concern.
- No organochlorine (OC) pesticides or other organic contaminants were detected in any general site soil samples.
- No reported results exceeded health-based guideline concentrations (HIL-A).

The targeted soil sample analysis results reported:

- pH in the range 3.8-8.8, with overall slightly acidic soil conditions;
- elevated concentrations of As (400mg/kg) Cd (8.2mg/kg), Cr (9.1mg/kg), Cu (180mg/kg) and Zn (700mg/kg) in surface soils at the rubbish tip area near the hayshed/silos (sample TM14, 0.2), which exceed EILs and (in the case of As) the HIL-A;
- elevated Zn (900mg/kg) in sample TM15, 0.1 of surface soils in a runoff area near the cattleyards, exceeding the EIL;
- elevated As (110, 55, 44mg/kg) in surface or sub-surface soils adjacent to the sheep dip (samples TM17, 18, 19) which exceed the EIL and in one case the HIL-A;
- elevated Cd(7.5mg/kg) and Zn (2100mg/kg) exceeding EILs in surface soils in an area containing minor rubbish/debris near the manager's house (TM22);
- elevated Zn (510mg/kg) exceeding the EIL in surface soils adjacent to the shearing shed (TM21);

- elevated TPH C_{10}-C_{36} of 1856mg/kg in surface soils beneath the former AST at the manager's house (TM33), which exceeds the NSW EPA (1994) guideline for residential use sites of 1000mg/kg (TPH >C_{10}). Low concentrations of TPH (<500mg/kg) were reported in five other samples, including in the rubbish tip areas, the owner's house, UST and the farm sheds at the manager's house;
- a low concentration of dieldrin (0.53mg/kg) was detected in one surface soil sample (TM18, 01) at the northern end of the sheep dip structure. No DDT/ DDD/DDE was reported in any sample;
- no other organic contaminants were detected in any sample;
- slightly elevated As concentrations of 47 and 21mg/kg in surface soil samples FS1 and FS6 at the farm sheds near the manager's house, and slightly elevated Zn (230mg/kg) in FS4 in this area and Zn (240mg/kg) in a surface soil sample near the shearing shed;
- drainage line sediment samples did not contain contaminants at concentrations of concern.

The assessment consultants (Coffey 2002) concluded that the soil sample analysis results identified some locations where concentrations of contaminants exceeded relevant health-based or ecological investigation levels, and where further investigation and/or remediation was required. These areas were specifically:

- at the former sheep dip structure, which remained in place in the ground at that time and where elevated arsenic concentrations were reported, further investigation and removal of the sheep dip structure were recommended;
- at the main rubbish area near the hayshed and silos, waste sorting/removal and soil surface validation was recommended;
- removal of all USTs and associated contaminated soil, followed by validation of remaining soil, was recommended.

4.3.3 Quality Assurance/Quality Control

The quality control/quality assurance measures incorporated into the site soil assessment program, and discussed in Section 6 and Appendix F1 of Coffey (2002) are considered generally satisfactory, in particular:

- sampling procedures followed good practice, including sample storage/transport, chain of custody, and equipment decontamination procedures;
- well-established and approved analytical methods were used by NATA-accredited laboratories;
- the proportion of soil samples from the soil sampling program which were analysed as field blind duplicate samples at the primary laboratory (WSL) was about 5% (4 duplicates for a total of 75 individual and composite samples analysed). The proportion of samples analysed as field split duplicates by the QA/QC Laboratory (AMDEL) was about 6.7% (5 duplicates for 75 primary samples). These rates of duplicate sample analysis comply with the recommended 5% minimum (AS4482.1-1997). Agreement between duplicate data pairs was reasonable and predominantly within data quality objectives. A relatively small number of data pairs had Relative Percent Differences (RPD) for some metals and dieldrin greater than the data quality objective of <50% (refer Tables 6.2 and 6.3 in Coffey 2002). These exceedences of data quality objectives are attributable to low contaminant concentrations which accentuate variability

and increase RPDs or the heterogeneous nature of some samples (eg from the rubbish tip area);

- internal laboratory duplicate analyses were undertaken for key indicators with generally good agreement (RPDs <50%) between duplicate data pairs;
- spiked sample recovery tests were performed by both laboratories for key indicators, with acceptable recoveries in the range 70–130% being generally achieved;
- field equipment final rinsate water samples were collected and analysed at a rate of one per day, and no contaminants were detected other than a low concentration of zinc in one sample. This detection is not considered to be significant;
- reagent (method) blank analyses by the laboratory did not detect any contaminants, indicating no significant contamination from this source.

No offsite background soil samples were obtained in the assessment of this site. This may be considered to be a departure from good practice, but in this case the on-site samples predominantly represent "background" soil quality and offsite soil samples are not necessary to establish these baseline conditions.

4.3.4 Auditor's Comments

The auditor has reviewed the results of the Stage 2 assessment for the audit site and is of the opinion that (combined with the preliminary assessment findings) there is little significant evidence of soil contamination on the audit site.

The assessment program was generally conducted in accordance with good practice. The number, placement and depth of soil sampling test pits, the number and depth of soil samples obtained and the analytes selected are considered to be reasonable given the available evidence of previous potentially contaminating land uses. The density and total number of sampling locations in the Stage 2 assessment (about one general location per 5ha, plus target locations) is considered appropriate for a very large site of this type. It is noted that this sampling density is considerably lower than indicated by Table 2 of AS4482.1-1997 (Standards Australia (1997) but it is noted that the AS4482.1-1997 Table 2 is not necessarily relevant to a large "green-fields" site. In this case, the sampling location design provides adequate confidence that significant contamination will have been located, if it exists.

The auditor considers that the QA/QC program was generally in accordance with recommended good practice and relevant guidelines (in particular Standards Australia 1997). Overall the program is adequate considering the scope and nature of the assessment program undertaken. Accordingly, the data are considered reliable for the purpose for which they have been obtained and used.

4.4 Groundwater Investigation

4.4.1 Overview

The investigation of groundwater conditions on the audit site was undertaken by Coffey Geosciences in conjunction with the soil contamination assessment described above. The groundwater investigation was required by and agreed with the auditor on the basis that groundwater is a relevant element of the environment of this audit site, and potential sources of groundwater contamination have been (or are) present on the

site, in particular underground and aboveground fuel storage tanks, waste/rubbish dump areas, the sheep dip and agricultural/horticultural activities involving the use of agricultural chemicals.

4.4.2 Scope of Groundwater Investigation

Groundwater bore locations were proposed by Coffey, and agreed to by the auditor, based on the need to both:

- target significant potential sources of groundwater contamination; and
- characterise groundwater across the site to identify any "broad scale" impacts.

Eight groundwater monitoring bores were installed in January 2001, at locations MW1 to MW8 shown in Figures 3 and 4 (from Coffey 2002, Figures 1 and 2). The locations selected were:

- MW1 at the northern corner of the site, downgradient of the northern half of the site;
- MW2 at the rubbish dumping area near the hayshed and silos;
- MW3 at the former diesel AST near the manager's house;
- MW4 at the diesel UST near the owner's house;
- MW5 at the two petrol USTs near the owner's house;
- MW6 adjacent to the in-ground sheep dip structure;
- MW7 north and immediately downgradient of the market garden area;
- MW8 at the southern boundary of the site, downgradient of the southern half of the site.

All groundwater bores were constructed to intercept the shallow groundwater in the Baxter Formation (where it is present) or other near surface water-bearing strata such as weathered mudstone. It was intended that investigation of deeper regional aquifers (in particular the Silurian mudstone aquifer) would not be required unless the shallow aquifer investigation reported significant contamination from surface or near-surface sources such as USTs.

Table 8.1 and Appendix B2 of Coffey (2002) contain information and logs of the groundwater bore construction. Bore depths were between 2.7 and 2.5m below ground level (bgl), with screen intervals typically over the 2 to 3m interval to the base of the bores. The bores were drilled to terminate in the upper surface layer of the Silurian mudstone (logged as siltstone), after penetration of the shallow Baxter Formation. The bore screens were placed to intercept groundwater in the Baxter sandstone. The groundwater table in the underlying Silurian Formation is expected to be at considerably greater depth (40-80m bgl) based on information from the registered bores in the area (refer to Section 3.3 of this audit report).

The development and sampling of groundwater in the bores was undertaken in early February 2001. No groundwater was found in bores MW3, MW4, MW5 or MW6 on this occasion or on other inspections subsequently. Coffey (2002) attributes this to the position of these bores on topographic high ground where the Baxter Formation is very thin due to erosion effects and where groundwater is not retained or may be ephemeral/seasonal.

This finding means that no direct groundwater quality information is available for these four locations where potential sources of groundwater contamination exist, namely the USTs, AST and sheep dip.

The auditor advised Coffey that further groundwater investigation need not be undertaken provided a sufficiently strong case is documented to conclude that the potential for groundwater contamination at these locations is very low. The factors to be considered in making this argument were to include:

- depth to groundwater and soil type/permeability;
- nature and potential significance of the sources, such as the age/condition of USTs and the evidence of leaks or spillage of fuel;
- potential leachability of soil contaminants, specifically arsenic in soils at the sheep dip.

The auditor recommended TCLP and citrate/dithionate tests to assess the potential for leaching and mobility of arsenic through the soil profile.

The assessment consultants' response is documented in Coffey (2002), Sections 8.4 and 12.6. In summary, the consultants conclude that the potential for contamination of groundwater at these target locations, and hence the justification for investigation of deeper groundwater, is very low on the grounds:

a) The shallow Baxter Formation aquifer is not present or ephemeral at these locations, and the deeper Silurian Mudstone aquifer is at considerable depth, 40-80m below ground level. The unsaturated zone is of low hydraulic conductivity.

b) Soil contamination at the USTs and AST locations was only minor, and the condition of the USTs on exhumation was sound, with no evidence of significant leakage or spillage of fuel to soils.

c) The leachability and mobility of arsenic through soils beneath the sheep dip (where elevated arsenic concentrations were found, as discussed in Sections 4.2 and 5 of this audit report) is assessed as very low on the basis of TCLP leachability testing and citrate-dithionate testing on four representative soil samples.

The results of this testing are described in Section 12.6.1 of Coffey (2002). All standard TCLP results for As were low, with no As detected in leachate from three Baxter Sandstone samples from depths 0.5-1.6m (total As 77-99mg/kg, TCLP As all <0.001mg/L) and a low concentration in leachate from one surface Quaternary sediment sample (total As 40mg/kg, TCLP As 0.23mg/L).

The citrate-dithionate test is intended to demonstrate the potential for leached arsenic (in the event that significant arsenic is mobilised by leaching from the contaminated soil profile) to be immobilised by adsorption and binding with iron or manganese oxy-hydroxides in the underlying soils (van de Graaff and Associates 2002). These oxy-hydroxides (if present) have a very strong capability to take up metal ions in their solid structures, and the insolubility of the adsorbed metals (including arsenic) means that this process would provide a virtually permanent sink for the metals.

At the auditor's suggestion, citrate-dithionate tests were conducted by Coffey Geosciences and WSL to confirm the presence of iron or manganese oxy-hydroxides in the natural soils. The total Fe concentrations in the Baxter Sandstone soil samples were in the range 22,000-39,000mg/kg (2-4%), although manganese concentrations

were uniformly low (<25mg/kg). The standard TCLP test showed that the iron is relatively insoluble under the mildly acidic conditions of the TCLP test (pH5), with leachate concentrations of <1mg/L. The citrate-dithionate method was used to selectively dissolve that proportion of iron present as oxy-hydroxides by a process of chemical reduction, and demonstrated that a relatively small proportion (about 1%) of iron was dissolved and so (by inference) is present as oxy-hydroxides.

Nevertheless, the adsorption and binding affect of the iron oxy-hydroxides is likely to be a significant contributing factor in immobilising arsenic in the Baxter Sandstone soils of the site.

The auditor is satisfied that the cumulative evidence of the soil analysis, TCLP and citrate-dithionate tests points strongly to the conclusion that the risk of leaching of arsenic from the soils at the sheep dip location to the deep groundwater table is negligible.

Furthermore, the auditor is satisfied that, on he evidence presented by Coffey (2002), the risk of contamination of soils and groundwater beneath the USTs and AST is low, and accordingly direct investigation of deep (Silurian aquifer) groundwater is not justified at those locations.

4.4.3 Results of Groundwater Investigation

The standing groundwater levels in bores MW1, MW2, MW7 and MW8 were recorded at between about 1 and 5m below ground level (refer Table 8.1 of Coffey 2002), and between 57 and 76m AHD. These RLs indicate that the groundwater gradients and flow directions are likely to be consistent with the topography, and:

- to the north in the northern part of the site, based on RLs of MW7 > MW2 > MW1; and
- to the south in the southern part of the site, based on RLs of MW7 > MW8.

The groundwater samples taken in February 2001 were analysed for a wide range of potential contaminants and other indicators (refer Table 8.2 of Coffey 2002).

Coffey (2002) assesses the groundwater analytical data against quality guidelines, in particular

- groundwater investigation levels (NEPM 1999) for aquatic ecosystems (freshwaters), which are based on the ANZEC (1992) guidelines. The auditor notes that these guidelines are now superseded by ANZECC/ARMCANZ (2000).
- Australian drinking water guidelines (NHMRC/ARMCANZ (1996) and mineral water guidelines (ANZFA 2002). Note that the salinity of the site groundwater classifies groundwater as Segment C under the SEPP Groundwaters of Victoria (Vic Govt 1997) in three of four bores, with the other bore (MW1) with salinity 2600mg/L classified as Segment B. Neither Segment B or C waters are suitable or protected for potable supply, and only Segment B waters are protected for potable mineral water supply. However this is not a mineral water production area.

Other relevant guidelines are those for irrigation, stock watering and primary contact recreation (ANZECC/AMRCANZ 2000).

Field-measured parameters and laboratory analysis showed that:

- groundwater in the shallow Baxter Sandstone aquifer is characterised by neutral to moderately acidic groundwater (pH 4.8-6.9), moderate salinity (TDS 2600-4000mg/L) with mainly sodium chloride in the cation-anion balance.
- Concentrations of nickel of 0.07 and 0.03mg/L in MW1 and MW2 exceed the ANZECC/ARMCANZ (2000) aquatic ecosystem guideline of 0.011mg/L (trigger value for 95% species protection); concentrations of zinc in all four bores (0.14-0.38mg/L) exceed the 95% species protection TV of 0.008mg/L, and the cyanide concentration in MW7 (0.02mg/L) exceeds the 95% TV of 0.007mg/L (for free CN), although it is noted that the blind duplicate sample analysed by WSL reported a lower concentration of 0.005mg/L, below the guideline. Furthermore, while no copper, mercury or lead were detected in any bore, the detection limits exceeded the 95% species TV for freshwater ecosystem protection. These exceedences (and potential exceedences) of aquatic ecosystem protection guidelines in groundwater at the site are not expected to be significant considering the likely attenuation of contaminant concentrations in the considerable distance to nearest significant surface water bodies to the north and south. The elevated concentrations of zinc are fairly consistent across the site and so are likely to reflect background concentrations. There are no known significant sources of heavy metal or cyanide concentrations on the site.
- The nitrate (as nitrogen) concentration of 30mg/L in MW2 (at the rubbish dump area) exceeded the Australian drinking water guideline of 11mg/L (NO_3-N), the mineral water guideline of 10mg/L (ANZFA 2002) and the recreational water guideline of 10mg/L (ANZECC/ARMCANZ 2000), and equalled the stock watering guideline of 30mg/L (ANZECC 1992).

  Accordingly, bore MW2 was resampled in June 2002 and analysed for nitrate. The result of 2.1mg/L NO_3-N indicated that the nitrate concentration had reduced in groundwater over the period of 16 months between sampling events. It is possible that the elevated NO_3 concentrations in February 2001 was influenced by leaching from waste materials (such as fertiliser residue or decaying organic matter) in the former rubbish disposal area.
- No other organic or inorganic contaminants were detected at concentrations of potential concern in groundwater at the site.

4.4.4 Groundwater QA/QC Program

The groundwater assessment program incorporated a quality assurance/quality control (QA/QC) program as described in Coffey (2002). This program included:

- Groundwater monitoring bore installation methods and groundwater well development and sampling procedures which were generally in accordance with good practice. Dedicated Waterra pumps were used for groundwater sampling and all samples were collected in duplicate.
- The groundwater monitoring program used an experienced, NATA-accredited laboratory and approved analytical methods. The groundwater analytical laboratory was WSL. No second QC laboratory was used.
- One field blind duplicate groundwater sample was analysed by WSL for the full range of analytes. Generally good agreement was obtained between duplicate data pairs. RPDs >50% were reported for the duplicate sample analysed for

cyanide, phenols and nitrate (as N), generally attributable to low contaminant concentrations which accentuate differences in results when expressed as RPDs.

- WSL performed internal QA/QC procedures, including spiked sample recovery tests, repeat analysis and laboratory (reagent) blanks. Results were predominantly within data quality objectives.

4.4.5 Auditor's Comments

The auditor was consulted on, and concurred with, the design of each stage of the groundwater investigation. From the auditor's review of the data, he concludes that the groundwater data are reliable for the purpose for which they have been obtained and used. The auditor notes that no secondary (QC) laboratory was used in the investigation, and field equipment rinsate blanks were not collected. These are departures from good practice but do not significantly undermine confidence in the data in this case.

The explanation provided by Coffey (2002) for the failure to detect shallow groundwater in bores MW3, MW4, MW5 and MW6 is plausible. The auditor is of the opinion that the risk of contamination of deeper groundwater at these locations (or any other location) is very low, and accordingly did not require a direct investigation of the potential impacts on the deeper groundwater quality, for the reasons described in Section 4.4.2 of this audit report.

The auditor has reviewed the findings and conclusions drawn from the groundwater investigation, in particular the evidence of groundwater contamination and the risks to onsite or offsite beneficial uses of groundwater. The significance of groundwater contamination for potential health or ecological risks, and for the audit outcome, is discussed further in Section 6.3 of this audit report.

5. Site Remediation and Validation

5.1 Overview

Based on review of the soil investigation data and observations during the field work, Coffey Geosciences proposed a remediation program which incorporated:

- removal of all three underground fuel storage tanks (USTs) at the former owner's house along with residual fuel or fuel/water contents and any associated contaminated soil;
- removal of the waste in the rubbish dump area adjacent to the haysheds and silos and associated (underlying) contaminated soil;
- removal of the former sheep dip structure and associated contaminated soil (based on validation of surrounding soil contamination conditions and subsequent soil removal) as required.

The other locations where some elevated contaminant concentrations were reported were considered to not require remediation on the basis that contaminant concentrations did not significantly exceed relevant health-based or ecological-based guidelines or for other reasons. These were the elevated zinc concentrations in soils from runoff from the cattleyard and shearing shed; elevated cadmium and zinc in soils at a minor rubbish dump area adjacent to the manager's house; and elevated hydrocarbons (as TPH) in surface soils at the former aboveground fuel tank near the manager's house.

In the case of the minor rubbish area, this was a small area with a scattering of household debris, which will be removed when buildings and structures are demolished and removed. The oil-stained soil beneath the AST was very minor and was effectively removed by the test pit backhoe and mixed with underlying soil before replacement in the test pit.

The auditor agreed that these localised contaminant concentrations did not require inclusion in the remediation program.

The remediation and validation program for the various areas is described in detail in Sections 9 to 12 of Coffey (2002) and summarised below.

5.2 UST Remediation and Validation

Three small USTs at the former owner's house were excavated and overlying/surrounding soil from the tank pits was stockpiled in May 2001 by contractors Bayport Quarries Pty Ltd.

The tanks exhumed were one diesel fuel tank of capacity 2500L and two petrol tanks (in a second, common pit) each of capacity 2500L. Two soil stockpiles of total volume about $50m^3$ were formed from the excavated soil.

Observations at the time indicated that the USTs had not leaked significant product to the surrounding soil. No aesthetic evidence of contamination was found other than a reported "weak hydrocarbon odour" in the stockpiled soil from the diesel tank pit (Table 10.1, Coffey 2002) at the time of initial sampling in May 2001. However, no hydrocarbon odour was evident at the time of resampling the stockpile material in

October 2001. The auditor's representative on site at the time confirmed that no odours or visual evidence of contamination were observed.

Validation samples were taken by Coffey Geosciences at locations shown in Figure 4 of Coffey (2002), of the stockpiles (five samples at an average density of 1 sample per $10m^3$) and of the walls and bases of the two UST pits (total of 12 samples plus one field duplicate) and analysed by WSL for TPH, BTEX and lead (all samples) and other analytes comprising the EPA screen (one stockpile sample).

No contaminants were reported in any sample other than a trace TPH C_{15}-C_{26} of 58mg/kg in one sample from the diesel pit soil stockpile, and low concentrations of dieldrin 0.31mg/kg in another sample from that stockpile. The results are summarised in Table H2 of Coffey (2002).

These contaminant concentrations were not considered to represent a significant risk to either human health or ecological receptors. The stockpiled soil was considered to be suitable for use as backfill in the UST pits. The auditor endorsed these conclusions and the reuse of the stockpiled soil as backfill. The stockpiled soil was replaced in the UST pits up to a level of 0.5m below surrounding ground level.

5.3 Rubbish Dump Remediation and Validation

The miscellaneous waste material in the rubbish dump area near the hayshed and silos was sorted and disposed offsite to landfill. The remaining soil surface was scraped to three soil stockpiles (of total volume about $100m^3$) and samples taken of the stockpiles and the exposed soil surface, at locations shown in Figure 3 of Coffey (2002), by Coffey Geosciences. Analysis by WSL for a range of relevant potential contaminants (as detailed in Table 11-1 and Table H1 of Coffey 2002) showed that:

- the stockpiled soil did not contain significant concentrations of contaminants, with one sample reporting slightly elevated concentrations of copper (69mg/kg) and zinc (360mg/kg) only;
- the remaining soil surface did not contain significant concentrations of contaminants, with one sample (RTV1) containing slightly elevated concentrations of coper (65mg/kg) and zinc (300mg/kg) and another (RTV3) low concentrations of TPH C_{29}-C_{36} (202mg/kg).

Coffey Geosciences (2002) concluded that the soil stockpile material was suitable for reuse on the site, and it was subsequently reused on the surface of the former rubbish dump area.

The auditor concurs that there is no contamination or significance aesthetic constraint on reuse of the stockpiled soil and that the remaining soil validation confirms that no further remediation is required in this location.

5.4 Sheep Dip Remediation and Validation

The soil assessment program (described in Section 4.2 of this audit report) found elevated arsenic concentrations in samples TM17, TM18 and TM19, and one sample with a low concentration of dieldrin, (TM18) in the vicinity of the sheep dip structure to the south of the owner's house on the site.

Prior to demolition and excavation of the sheep dip structure a further, more detailed soil investigation was undertaken, as described in Section 12.1 of Coffey (2002). This grid-based soil sampling and analysis program included 16 soil sample locations, SD1-SD16, with surface (0-0.2m depth) samples analysed for arsenic (all samples), OC pesticides (7 samples) and EPA screen (1 sample). The results are presented in Coffey (2002) Table I1, and confirmed the presence of elevated concentrations of arsenic (range <5-110mg/kg) and dieldrin (<0.05-20mg/kg). No other OC pesticides were detected other than trace concentrations of aldrin and endrin (0.08 and 0.11mg/kg respectively) in the sample with the highest dieldrin concentration.

The highest concentrations of arsenic and dieldrin exceed both health and ecological-based investigation levels (NEPC 1999) for sensitive residential land use. The auditor endorsed a proposal to excavate the sheep dip structure and adjacent contaminated soil, followed by validation of the remaining soil surface and classification of stockpiled soil for offsite disposal.

Between May 2001 and March 2002, there followed a sequential process of soil remediation and validation involving four stages of soil excavation and stockpiling, and five stages of soil validation as described in Sections 12.2 to 12.6 of Coffey (2002). The lateral and depth limits of the staged excavation and the validation sample locations are shown in Figure 5 – Sheep Dip Remediation Soil - Validation Program Sample Locations (from Figure 6 of Coffey 2002). Analytical results are tabulated in Tables I1 to I5 of Coffey (2002).

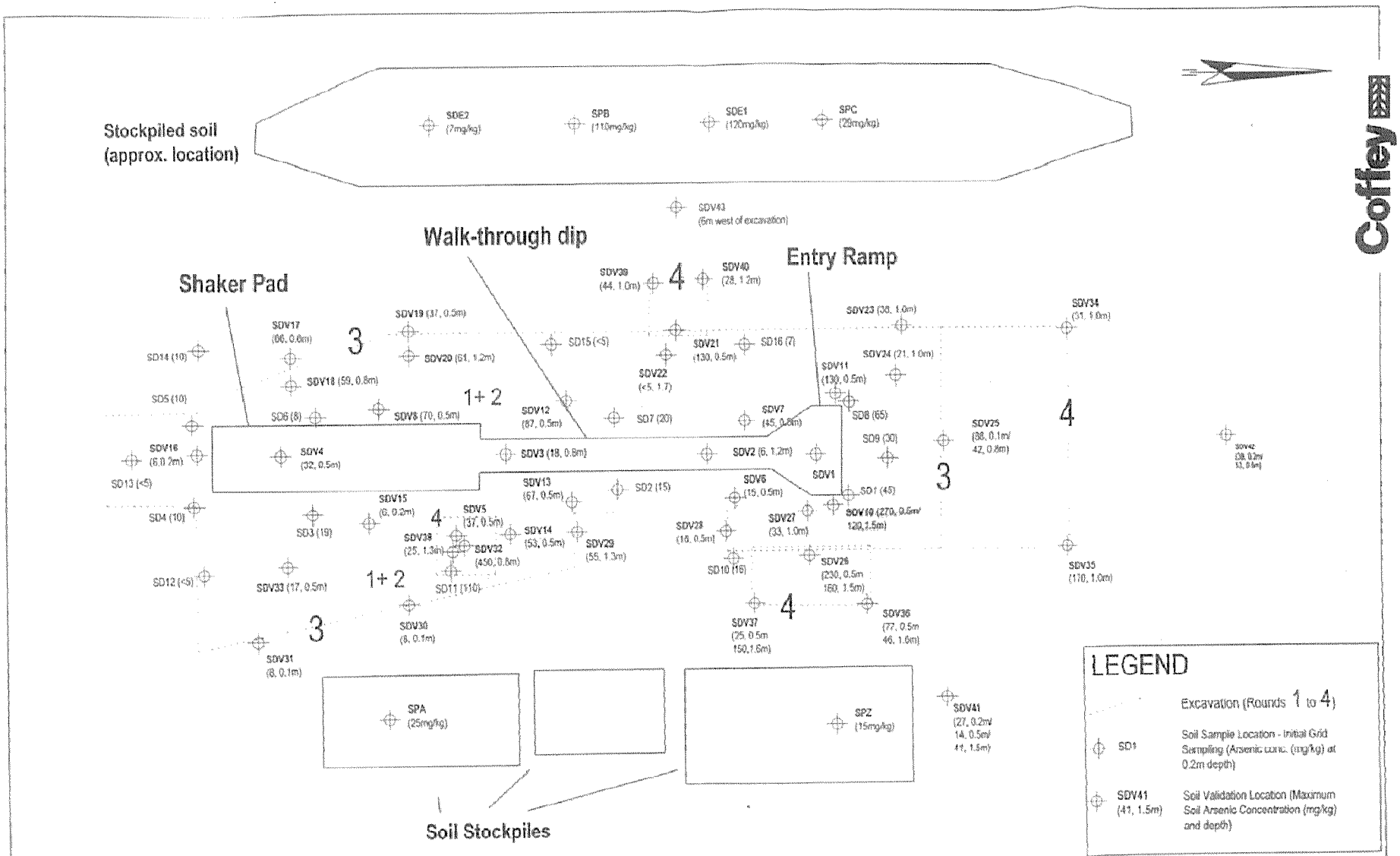
The auditor reviewed the results of each stage of the remediation and validation program, and made recommendations for further soil remediation and validation sampling/analysis. The scope of the remediation program was driven by the objective of removing soil contaminated with arsenic and dieldrin (as the chemical contaminants of concern) at concentrations above levels which may present unacceptable risks for future sensitive site use.

The investigation levels considered relevant in decision-making were:

	Arsenic	**Dieldrin**
Health-based investigation level (HIL-A, NEPC 1999)	100mg/kg	10mg/kg
Ecological investigation level (interim urban EIL, NEPC 1999)	20mg/kg	N/A
Environmental investigation Level B (ANZECC/NHMRC 1992)	20mg/kg	0.2mg/kg
Clean fill classification (EPA 1995)	30mg/kg	1mg/kg

As the staged remediation and validation program progressed, it was found that all dieldrin contaminated soil was removed by Round 3 of validation sampling and analysis, but elevated arsenic concentrations persisted in some places up to between 5 and 10m from the sheep dip structure itself, and at depths of 1.5m or more from ground surface level.

Figure 5 – Sheep Dip Remediation Soil Sample Location: Validation Program



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1 : 125
Scale (metres)

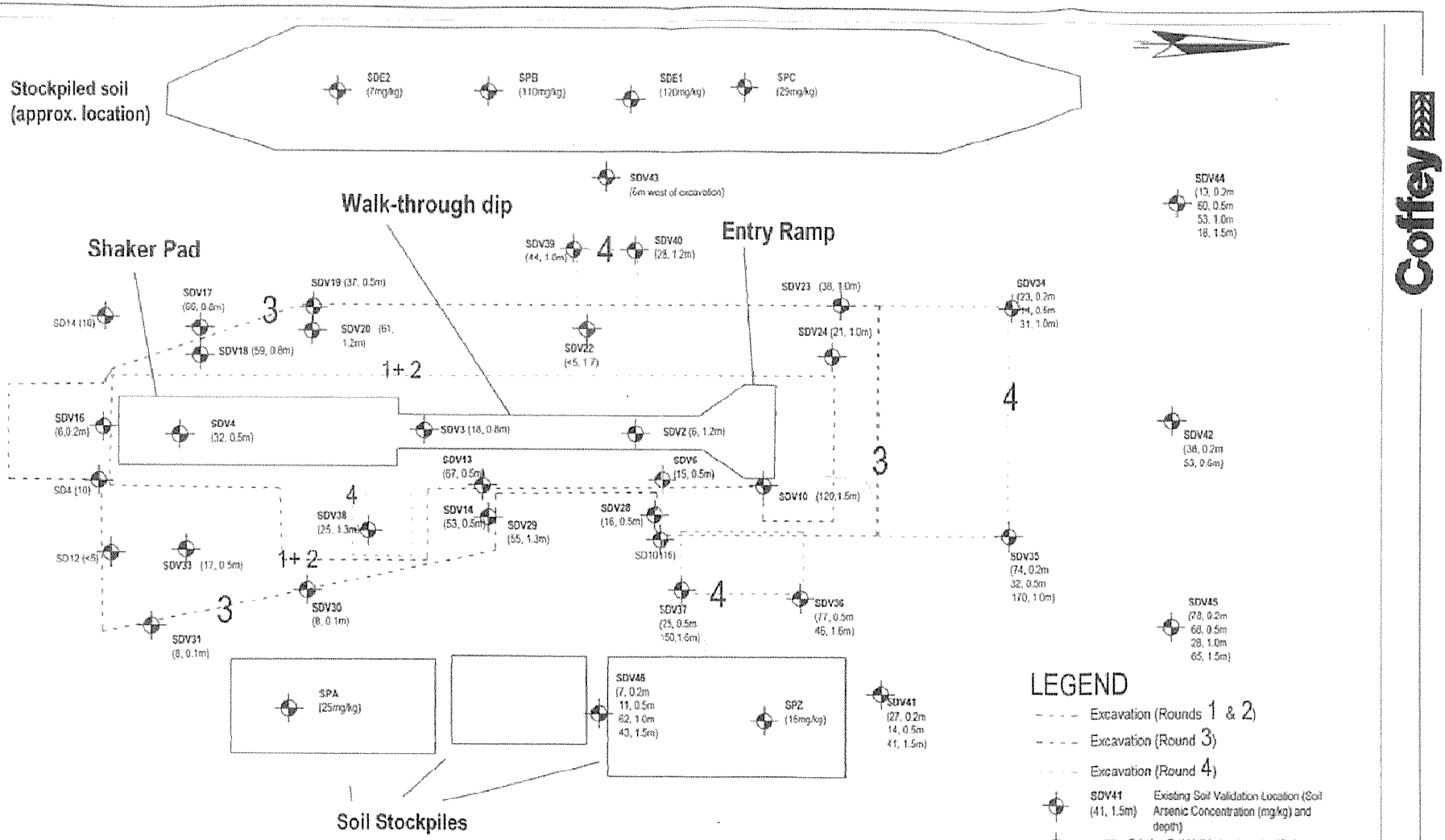
Revision	Description	Drawn	Approved	Date

Drawn	GWE
Checked	PLS
Date	11/2/02

LEEDERVILLE PTY LTD
MARNEBEK ESTATE - SHEEP DIP REMEDIATION
SOIL SAMPLE LOCATIONS - VALIDATION PROGRAM

Drawing No: FIGURE 6
Job no: E13708/1-BK

Figure 6 – Sheep Dip Remediation Sample Locations
Validation Program (Final State)



Coffey

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Revision	Description	Drawn	Approved	Date

Drawn	SM
Approved	PLS
Date	9/5/02
Scale	1:125

LEEDERVILLE PTY LTD
MARNEBEK ESTATE - SHEEP DIP REMEDIATION
SAMPLE LOCATIONS - VALIDATION PROGRAM (FINAL STATE)

Drawing No: FIGURE 7

Job no: E13708/1-BK

The final site conditions are summarised below and illustrated in Figure 6 – Sheep Dip Remediation Sample Locations Validation Program (Final State) (Coffey 2002, Figure 6) which shows arsenic concentrations of samples representative of the final site conditions, not soil which was removed.

- arsenic concentrations in the depth interval 0-1m around the former sheep dip were all below the HIL-A of 100mg/kg, although exceedences of the EIL of 20mg/kg were widespread up to at least 15m from the sheep dip excavation.
- arsenic concentrations exceeding the HIL-A and in the range 120-170mg/kg were reported at three locations in soil samples from depths 1.0-1.6m.
- the assessment guidelines for applying the HILs were complied with, that is:
  - the site average concentration of arsenic in soils is below the HIL-A of 100mg/kg
  - the maximum concentration of 170mg/kg is below 250% of the HIL-A
  - the standard deviation (calculated by Coffey (2002) as 33mg/kg) is less than 50% of the HIL-A
- the bioavailability and mobility (by leaching) of arsenic in the soil is low, based on the standard TCLP and citrate-dithionate tests undertaken at the auditor's recommendation and described in Section 12.6 of Coffey (2002) and Section 4.4.2 of this audit report. Accordingly, the risk of contamination of groundwater is very low and the risk of adverse ecological effects on plants, soil organisms or fauna on the site is also acceptably low. It is noted that elevated arsenic concentrations in the order of 100-200mg/kg (or more) occur in natural soils in some parts of Victoria including the Mornington Peninsula and goldfield areas. The arsenic is not normally bioavailable or soluble and has little or no apparent adverse ecological effects in those areas.

The auditor concludes that the remaining elevated arsenic concentrations, by their distribution (with area and depth) and physico-chemical characteristics (specifically that the arsenic is of low mobility and bioavailability), do not pose unacceptable risks of adverse human health or ecological effects under any feasible land use, including sensitive, low density residential use.

5.5 Soil Disposal and Backfill

Stockpiled soil from the staged sheep dip remediation program was classified as low level contaminated soil (LLCS), and disposed of to a licensed landfill at Balnarring Road, Moorooduc South. The waste transport certificates are provided in Appendix M of Coffey (2002) and show that a total of 117m^3 LLCS was disposed of at this site.

The sheep dip excavation was backfilled with clean soil from Bayport's Pottery Road, Somerville quarry. Coffey provided information on the condition of this backfill to the auditor in correspondence (Coffey Ref E13708/1-BC, 3 June 2002) which shows that the soil has been adequately characterised by sampling and analysis. The results show that the soil is uncontaminated, and no potential contaminants exceeded health or ecological investigation levels for sensitive site uses. The material contained naturally-occurring concentrations of chromium in the range 20-68mg/kg. Arsenic was predominantly not detected but one sample contained an arsenic concentration of 27mg/kg. This soil was a silty clay with no aesthetic evidence of contamination. The auditor confirmed that this soil was suitable for use as backfill on the audit site.

5.6 Validation Program QA/QC

The soil validation program for remediated areas was undertaken in accordance with quality control and quality assurance protocols consistent with those for the soil assessment, as described in Section 6 of Coffey (2002).

The scope and findings of the QA/QC program for the UST and rubbish dump area remediation/validation program is documented in section 6.4 of Coffey (2002). The auditor has reviewed the QA/QC protocols and results, and confirms that the scope of the program is consistent with good practice and relevant standards or guidelines, in particular AS4482.1-1997 (Standards Aust 1997). The findings confirm that the data are reliable for the purpose for which they have been obtained and used.

Inter-laboratory (WSL and AMDEL) and intralaboratory (WSL) field duplicate sample analyses reported good agreement, with only two data pairs for lead reporting RPDs >50%. This exceedence of the data quality objective was attributed to heterogeneity in the soil sample.

No contaminants were reported in the field equipment rinsate blanks other than detection of toluene at a concentration of 0.059mg/L in the field equipment rinsate blank for the UST pit validation and stockpile classification on 23 May 2001. Coffey (2002) does not comment on this finding. Analysis of the soil samples collected and analysed on that day did not report detection of any toluene (or other BTEX). The auditor does not consider that this detection of toluene in the rinsate water is significant enough to undermine confidence in the validation or classification data.

The internal primary laboratory QC program reported acceptable results for duplicate sample analysis, spiked sample recovery tests and method (reagent) blank analysis.

The scope and findings of the QA/QC program for the sheep dip remediation/validation program is documented in Section 6.5 of Coffey (2002). The auditor has reviewed the QA/QC protocols and results and confirms that they are satisfactory and accordingly the data are reliable for their purpose.

Duplicate sample results showed good agreement, with a small number of duplicate data pairs for some metals reporting RPD >50%, attributable to sample heterogeneity or low concentrations which accentuate small differences when expressed as RPDs.

No contaminants were reported in field equipment rinsate blanks. The internal laboratory QA/QC program results were satisfactory.

6. Review of Health and Environmental Risks

This section of the audit report comments on the hazards and levels of risk potentially arising from the contamination status of the audit site. Potential effects on the human health of future residents, users or neighbours of the site and on the onsite or offsite environment have been considered in making this assessment.

6.1 Health Effects of Soil Quality

Australian authorities have to date adopted guidelines for protection of human health for a range of inorganic and organic contaminants for a range of land use exposure scenarios. Health-based soil quality investigation thresholds (HILs) recommended by the Australian health authorities (NEHF 1999) have been adopted as national guidelines (NEPC 1999, Schedule B(7a)) for a number of land uses including both low-density and higher-density residential land use scenarios. The HILs are intended to be used for comparison with site average contaminant concentrations, with limitations also placed on individual sample concentrations and standard deviations of the data.

Human health is a potential beneficial use for all land uses under the State Environment Protection Policy (Prevention and Management of Contamination of Land) (Vic Govt, 2002). The SEPP refers to the NEPM HILs as the primary soil quality objective for the protection of this beneficial use.

With the exception of localised elevated arsenic concentrations at the former sheep dip, no contaminants were found to exceed health-based investigation thresholds at any assessment or validation sampling location on the audit site representative of final site conditions, or in imported backfill soil placed on the site subsequent to the staged environmental assessment and remediation program. The validation of final conditions at the sheep dip location reported three results of arsenic in the range 120-170mg/kg in soils near the north east corner of the former sheep dip. These concentrations exceed the HIL of 100mg/kg for arsenic on sensitive (low density residential) sites. In view of the localised area in which these moderate exceedences occur and the depth, the auditor considers that these arsenic concentrations do not pose a significant human health risk.

Coffey (2002) note that the assessment methodology recommended by NEHF (1999) indicates compliance with the health-based guideline (HIL-A), in that the maximum As concentrations of 170mg/kg is <250% the guideline of 100mg/kg, the standard deviation of 33.2mg/kg is <50% HIL-A and the average concentration is less than the HIL-A.

A soil sample from the soil surface beneath a former aboveground fuel storage tank at the manager's house reported a total petroleum hydrocarbon (TPH) C_{10}-C_{36} concentration of 1856mg/kg (mostly C_{15}-C_{28}) which exceeds the NSW EPA (1994) guideline of 1000mg/kg for residential use. This guideline is not based on human health considerations but more on aesthetics and potential environmental effects, as considered in deriving the Netherlands (1994) intervention value. Concentrations of TPH C_{10}-C_{36} of this order do not present a significant human health risk. This hydrocarbon contamination was confined to a small surface patch which was

subsequently mixed with other soil excavated in the test pit construction at that location and replaced in the pit.

Accordingly, with respect to the potential for adverse health effects, the auditor considers that the site is suitable for any feasible beneficial use, including the proposed future use of low density residential. A more detailed risk assessment, further investigation or remediation are not required in this case.

6.2 Environmental Effects of Soil Quality

6.2.1 Overview

Other than the potential risks to human health posed by soil contamination on the audit site, as discussed in Section 6.1, the quality of land at the site may have potential adverse environmental (including ecological) effects. These environmental hazards and risks must be evaluated by the environmental auditor in determining whether or not the land at the site is detrimental or potentially detrimental to future beneficial uses of the site.

The potential environmental effects of contaminated soil on the audit site include:

- uptake of contaminants by plants grown on the site, with phytotoxic effects;
- air quality impacts from volatile emissions or dust;
- contamination of surface or drainage waters ponded on or flowing through the site, with secondary effects on water quality in nearby surface waters;
- contamination of groundwater beneath the site, potentially with secondary effects on water quality in surface waters as groundwater flows discharge to surface waters.

These potential effects are considered below.

6.2.2 On-Site Soil Quality Effects

Soil quality data were assessed by Coffey (2002) against the interim urban ecological investigation levels (EILs) published by NEPC (1999) which are generally based on the ANZECC/NHMRC (1992) B-level thresholds of concern for environmental impacts. These threshold levels are mainly based on potential for phytotoxic effects on plants grown in site soils and are normally used to trigger further investigation or site specific risk assessment.

The State Environment Protection Policy (Prevention and Management of Contamination of Land) (Vic Govt, 2002) specifies the protected beneficial uses of land for various land uses. For low density residential use and recreation/open space use, modified ecosystems are protected, whereas for high density residential, commercial or industrial uses highly modified ecosystems are protected. The SEPP provides that "contamination must not adversely affect the maintenance of relevant ecosystems" and that acceptable contaminant concentrations are to not exceed either the NEPM interim urban EILs, levels which are derived from a site-specific risk assessment or levels approved by the EPA.

The data from the site assessment and remediation program show that some contaminants are present in soils at some locations on the site in individual samples at target locations with concentrations exceeding (or potentially exceeding in composite

samples) NEPM EIL thresholds. The contaminants for which some exceedences are reported in individual samples at target locations are arsenic, cardmium, copper and zinc. The most significant area is the former sheep dip, where soils remaining after remediation contain arsenic concentrations in the range up to 170mg/kg, and which exceed the EIL of 20mg/kg over a significant area of the order of 20x35m to the east, west and north of the former sheep dip structure.

From the data in Figure 6 (Figure 7 in Coffey 2002), the auditor has calculated the average As concentrations in soils in the 0-0.5m range in this area (not including the backfill soil used to fill the sheep dip excavation, which had As concentrations predominantly <5mg/kg) remaining after remediation to be 33mg/kg, with the range being 6-78mg/kg. This soil depth interval is that which will support most plants and soil organisms, and be exposed to fauna.

Furthermore, the leachability investigations undertaken demonstrate that the arsenic is relatively insoluble and immobile, and hence bioavailability is expected to be low.

Concentrations of arsenic, zinc, copper and cadmium exceeding the respective EILs were reported in soil samples from localised target areas, including rubbish dump areas, shearing shed and cattleyards. These localised exceedences are not considered to represent significant risks to ecological receptors.

A small number of composite soil samples contained concentrations of chromium, arsenic and nickel which exceeded modified EILs (EILs divided by the number of samples comprising the composite). This is a conservative assessment procedure and it is unlikely that individual samples contain significantly elevated concentrations of these contaminants.

The pH of the existing site soils is variable, in the range 3.8-8.8 pH units. Overall soils are typically slightly acidic with pH lower than the ANZECC/NHMRC (1992) background range of 6-8. This slight soil acidity should not present a significant constraint on growth of plants on the site and it does not present a significant risk of corrosion of concrete or other site structures.

In summary, the auditor is satisfied that the soil quality does not present significant environmental risks under any feasible future site use, including sensitive uses such as low density residential. Further investigation, ecological risk assessment or remediation are not considered to be required for this site.

6.2.3 Air Quality

The relevant Government policies are the State Environment Protection Policies for Ambient Air Quality (Victorian Government 1999) and Air Quality Management (Victorian Government 2001). The current site conditions are generally undisturbed grassed soils on the pastoral site. Earthworks in preparation for site development would be expected to result in areas of exposed soil. Even in the event of mobilisation of site soils as dust before and during construction, the low contaminant concentrations in soils on the site will not endanger compliance with the policy's air quality objectives or protection of the beneficial uses of the air environment. The audit site has negligible potential to contribute to air pollution from volatile contaminant emissions since no volatile contaminants were detected in soils present on the site.

6.2.4 Aesthetic Effects

The SEPP for Prevention and Management of Contamination of Land specifies aesthetics as a potential beneficial use for all relevant land uses, with the objective that "contamination must not cause the land to be offensive to the senses of human beings".

The site assessment and remediation/validation program did not report any odours or other visual evidence of contamination other than localised soil staining beneath the former AST at the manager's house, and the rubbish dump areas near the hayshed/silos and near the manager's house. These aesthetic impacts have either been cleaned up or are considered relatively inoffensive. Remaining debris is expected to be removed when houses and other structures are demolished. The site soils at the time of audit completion comprise predominantly natural soil and (in UST or sheep dip excavations) clean soil as fill (backfill soil derived from onsite or from offsite sources).

The auditor or his representative undertook inspections of the site during the assessment and remediation program and confirmed, within the practical limitations of the inspections, that site soils were visually uncontaminated (other than as noted above) and did not exhibit unacceptable or offensive odours.

6.3 Groundwater and Surface Water Issues

6.3.1 Groundwater Effects

The assessment report for the audit site (Coffey 2002) provides information on groundwater on the audit site, including local hydrogeology and characterisation of groundwater contamination. Groundwater on the site occurs locally in the shallow Baxter Sandstone formation and regionally in the underlying Silurian Melbourne Mudstone formation.

Information on the characteristics and extractive uses of groundwater in the area is summarised in Section 3.3 of this audit report.

The relevant policy is the State Environment Protection Policy for Groundwaters of Victoria (Vic Govt 1997). The SEPP specifies the beneficial uses to be protected for groundwater, and sets out water quality objectives and an attainment program to maintain quality consistent with these objectives. Based on the available information on groundwater salinity, the Baxter Sandstone groundwater is classified as Segment B with salinity in the range TDS 1001-3500mg/L or Segment C (TDS 3501-13,000mg/L). Protected beneficial uses for these segments are potable mineral water supply (Segment B only), irrigation or watering of parks and gardens (Segment B only), stock water supply, industrial water use, buildings and structures, primary contact recreation and aquatic ecosystem protection (the latter two uses are most likely to be applicable after discharge of groundwater to surface water bodies).

The Melbourne Mudstone aquifer is of variable salinity. In some bores in the area groundwater would be classed as Segment A2 with salinity in the range 501-1000mg/L, and in others Segments B or C. Protected beneficial uses for Segment A2 are as for Segment B but also including potable water supply.

In accordance with EPA guidelines to auditors (EPA 2001), the auditor must consider whether groundwater at the site is likely to be polluted from activities on (or in the vicinity of) the audit site. In this case the auditor considered that groundwater contamination was possible, on the basis that the current and past uses of the audit site involved activities with contamination potential, including underground or aboveground fuel storage tanks with potential for leakage and migration of liquid hydrocarbons to groundwater, rubbish dump areas and sheep dip with potential for leachate migration to groundwater, and a market garden area with fertiliser or pesticide storage and use.

Accordingly, the auditor endorsed the decision to undertake an investigation into groundwater conditions for the site, as described in Section 4.4. The groundwater investigation incorporated installation of groundwater monitoring bores targeting the shallow Baxter Sandstone aquifer. Four of the eight monitoring bores did not encounter groundwater at shallow depths.

The groundwater assessment found that groundwater at some of the four locations where shallow groundwater was found contained elevated concentrations of nitrate, nickel, zinc and cyanide.

The auditor must consider whether the contamination detected in the groundwater constitutes pollution, that is, whether the contaminant concentrations exceed levels acceptable for the protected beneficial uses. The auditor's assessment of this issue is as follows:

a) Elevated nitrate concentrations are a potential concern for potable water supply, as high nitrate concentrations in drinking water pose a risk of the disease methaemoglobinaemia ("blue baby syndrome") in babies younger than about 3 months. In this case a nitrate concentration above the Australian drinking water guideline level was reported only on the initial sampling event at one bore at the rubbish dump area. The resampling some 16 months later reported a low nitrate concentration below the guidelines. The salinity of the shallow Baxter Sandstone aquifer is too high for drinking water supply and in any case the aquifer is a minor, low yielding resource, which is highly unlikely in practice to be utilised for domestic or other water supply on the site or in the vicinity. The underlying Silurian Melbourne Mudstone aquifer was not investigated for potential elevated nitrate concentrations, and the risk of increased nitrate levels appears very low based on the depth to the Silurian aquifer and the minor nature of the apparent source.

b) Concentrations of zinc, nickel and cyanide in groundwater in one or more bores exceed the relevant ANZECC (2000) guidelines for protection of freshwater aquatic ecosystems.

   The localised elevated metals concentrations are not a significant risk of contamination of surface waters, as the attenuation processes which will occur prior to discharge at surface waters will be considerable and mitigate any potential adverse impact. In the absence of an apparent source, these metal concentrations are likely to represent local or regional background levels. The detection of cyanide in one bore appears anomalous and not supported by the duplicate sample results.

c) Shallow groundwater was not found in bores at the UST, AST and sheep dip locations. Groundwater monitoring bores were not installed to intercept the deeper Silurian Melbourne Mudstone aquifer. However, the risk of deeper groundwater contamination is considered to be very low for reasons that:

- the USTs had not leaked significantly as indicated by the absence of hydrocarbon contamination in surrounding soils, and the AST had caused very minor staining and hydrocarbon contamination on surface soil which did not penetrate to significant depth. The potential for hydrocarbon contamination to penetrate to the deep Silurian aquifer (which is 40-80m below ground surface) is very low.
- The sheep dip contained soils contaminated with arsenic and (to a lesser extent) dieldrin. The potential for contamination of deep groundwater is considered very low on the basis of the demonstrated low leachability and mobility of arsenic.

Furthermore the Baxter Sandstone clays and underlying weathered siltstone will have high capacity to adsorb and immobilise any metals solubilised and leaching from surface sources.

The auditor is satisfied that the available evidence supports a conclusion that groundwater at the audit site is not polluted with respect to protected beneficial uses of groundwater. The auditor concludes that the groundwater conditions at and in the vicinity of the audit site are not a constraint on the audit outcome or the issue of a Certificate of Environmental Audit for the audit site.

6.3.2 Surface Water Effects

The northern half of the site is in the catchment of Port Phillip Bay as described in Section 3.4. The beneficial uses, water quality objectives and attainment program to maintain appropriate water quality for surface waters in this catchment are set out in the State Environment Protection Policy (SEPP) for the Waters of Victoria, Schedule F6 – Waters of Port Phillip Bay (Victorian Government 1997). The southern half of the site is in the catchment of Western Port Bay, which is subject to the SEPP Waters of Western Port Bay and Catchment (Vic Govt 1979).

The audit site contains open drainage lines, and so in accordance with EPA guidelines to auditors, surface waters are a relevant element of the site for the purposes of the audit.

The assessment (Coffey 2002) included sampling and analysis of sediment from these representative locations in the drainage lines. No contamination of concern was found.

Otherwise, the soil on the site is uncontaminated and the site does not present a significant potential source of surface water contamination. Although the site is undulating to hilly, soils are stable and well grassed, and potential for transportation of sediment in stormwater runoff is low. Development activities would be expected to disturb site soils and substantially increase the potential for sediment runoff. Good practice in construction will manage soil erosion and transport to acceptably low levels.

The auditor is of the opinion that the existing risk of adverse offsite effects arising from site drainage is low. The potential impact on surface waters is not a constraint on the outcome of the audit.

7. Audit Conclusions and Certificate of Environmental Audit

7.1 Conclusions

Based on the assessment of all available relevant information about audit conditions and the health and environmental considerations outlined in this audit report, the auditor concludes that:

a) Known or likely previous site uses were agricultural and horticultural land uses (which include market gardening and stock grazing), hydrocarbon fuel storage, a sheep dip and minor rubbish or waste disposal activities. These operations had potential to cause contamination of soil or groundwater at the site.

b) A staged site assessment was undertaken which complied with good practice and adequately characterised the soil, groundwater and drainage line sediment quality conditions on the site. Furthermore, the design of the site assessment program was considered adequate to give confidence that significant unacceptable or undiscovered contamination is not present on the site.

c) Remediation and validation was undertaken to remove contamination sources or contaminated soils at the locations of three underground fuel storage tanks (USTs), a surface rubbish dump area and an in-ground sheep dip structure.

d) Final site soil quality complies with acceptance criteria protective of human health or ecological quality under any feasible future site use, including sensitive uses such as low density residential. Localised and minor exceedences of thresholds of potential concern for human health or environmental effects are not considered to present a significant risk of adverse health or ecological effects. Localised soil contamination with arsenic at depth greater than 1.0m adjacent to the former sheep dip exceeded health-based investigation levels. The risk of exposure to future residents at this depth is low. Soil imported onto the audit site to fill excavations was validated as clean and suitable for use on the site.

e) Existing and former land uses on the audit site and vicinity include potential sources of groundwater contamination, such as fuel storage in USTs or an above ground fuel storage tank, the sheep dip, waste disposal, and the use of agricultural chemicals. An investigation of groundwater quality in the shallow Baxter Sandstone Formation was undertaken and did not find significant contamination. An investigation of the quality of the deeper Silurian Melbourne Mudstone aquifer was not undertaken on the basis that the potential for contamination of this aquifer is very low.

   The auditor considers that the groundwater quality at the audit site does not present a constraint on any feasible future use of the site or on a decision whether or not to issue a Certificate of Environmental Audit for the site.

f) The aesthetic condition of the site is suitable for the future (sensitive) use. The site does not present a risk to air quality or surface water quality on or in the vicinity of the site.

In conclusion, the auditor is of the opinion that the environmental condition of the site is suitable for any feasible beneficial use, including the proposed development for low density residential subdivision, without further investigation, risk assessment or remediation.

7.2 Certificate of Environmental Audit

After considering the issues described in this audit report, and having prepared this audit report in accordance with Section 53X of the Environment Protection Act 1970, the environmental auditor is of the opinion that the site is neither detrimental nor potentially detrimental to any beneficial use of the site. Accordingly, the auditor has issued a Certificate of Environmental Audit for the site subject to this audit, known as Marnebek Estate, Cranbourne South, in accordance with Section 53Y of the Act.

The Certificate of Environmental Audit is attached to this audit report (see following page).

This Environmental Audit Report is signed and dated below by the environmental auditor.

RA Graham
Environmental Auditor

3 December 2002

Date

45226-1-C

ENVIRONMENT PROTECTION ACT 1970

CERTIFICATE OF ENVIRONMENTAL AUDIT

I, RICHARD ALAN GRAHAM of Sinclair Knight Merz, 590 Orrong Road, Armadale, Victoria 3143, a person appointed by the Environment Protection Authority ("the Authority") under the Environment Protection Act 1970 ("the Act") as an environmental auditor for the purposes of the Act, having:-

1. been requested by Mr Richard Torossi of Leederville Pty Ltd to issue a certificate of environmental audit in relation to the site referred to as the Marnebek Estate development site located 232 Pearcedale Road, Cranbourne South, Victoria, 3977, comprising Lots 1-7 on Plan of Subdivision PS212003D and defined respectively by Certificates of Title Volume 9836 Folios 530-536, ("the site"), owned/occupied by Leederville Pty Ltd;
2. had regard to, among other things:

   (i) guidelines issued by the Authority for the purposes of Part IXD of the Act;

   (ii) the beneficial uses that may be made of the site;

   (iii) relevant State environment protection policies/industrial waste management policies, namely the State Environment Protection Policies for the Prevention and Management of Contamination of Land, Waters of Victoria, Ambient Air Quality, Air Quality Management and Groundwaters of Victoria;

   in making a total assessment of the nature and extent of any harm or detriment caused to, or the risk of any possible harm or detriment which may be caused to, any beneficial use made of the site by any industrial processes or activity, waste or substance (including any chemical substance); and

3. completed an environmental audit report in accordance with Section 53X of the Act, a copy of which has been sent to the Authority and the relevant planning and responsible Authority.

HEREBY CERTIFY that I am of the opinion that the condition of the site is neither detrimental or potentially detrimental to any beneficial use of the site.

This Certificate forms part of the "Report of Environmental Audit: Marnebek Estate, Cranbourne South", Sinclair Knight Merz Report No. WC01656:R01RAGMARNEBEK.DOC, December 2002. Further details regarding the condition of the site may be found in the environmental audit report.

DATED: 3 December 2002

SIGNED: .....

R A Graham
ENVIRONMENTAL AUDITOR

INFORMATION REGARDING ENVIRONMENTAL AUDIT REPORTS

August 2007

VICTORIA'S AUDIT SYSTEM

An environmental audit system has operated in Victoria since 1989. The *Environment Protection Act 1970* (the Act) provides for the appointment by the Environment Protection Authority (EPA Victoria) of environmental auditors and the conduct of independent, high quality and rigorous environmental audits.

An environmental audit is an assessment of the condition of the environment, or the nature and extent of harm (or risk of harm) posed by an industrial process or activity, waste, substance or noise. Environmental audit reports are prepared by EPA-appointed environmental auditors who are highly qualified and skilled individuals.

Under the Act, the function of an environmental auditor is to conduct environmental audits and prepare environmental audit reports. Where an environmental audit is conducted to determine the condition of a site or its suitability for certain uses, an environmental auditor may issue either a certificate or statement of environmental audit.

A certificate indicates that the auditor is of the opinion that the site is suitable for any beneficial use defined in the Act, whilst a statement indicates that there is some restriction on the use of the site.

Any individual or organisation may engage appointed environmental auditors, who generally operate within the environmental consulting sector, to undertake environmental audits. The EPA administers the environmental audit system and ensures its ongoing integrity by assessing auditor applications and ensuring audits are independent and conducted with regard to guidelines issued by EPA.

AUDIT FILES STRUCTURE

Environmental audit reports are stored digitally by EPA in three parts: the audit report (part A), report appendices (part B) and, where applicable, the certificate or statement of environmental audit and an executive summary (part C). A report may be in colour and black-and-white formats. Generally, only black-and-white documents are text searchable.

Report executive summaries, findings and recommendations should be read and relied upon only in the context of the document as a whole, including any appendices and, where applicable, any certificate or statement of environmental audit.

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Audit reports are based on the conditions e and information reviewed at the time of pre and do not represent any changes that may occurred since the date of completion. As it possible for an audit to present all data thal of interest to all readers, consideration shoi made to any appendices or referenced docu for further information.

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Web: www.epa.vic.gov.au/envaudit

Email: environmental.audit@epa.vic.gov.a

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