FINAL REPORT

Dr Adrian Smith

Le Clos Verdun Estate, Sancrox NSW

Phase I and Phase II Environmental Site Assessment

February 2004

Environmental Resources Management Australia
Suite 3/146 Gordon Street
PO Box 5279
Port Macquarie, NSW 2444
Telephone +61 2 6584 7155
Facsimile +61 2 6584 7160
www.erm.com

FINAL REPORT

Adrian Smith

Le Clos Verdun Estate, Sancrox NSW

Phase I and Phase II Environmental Site Assessment

February 2004

Reference: 0011340rp1

For and on behalf of
Environmental Resources Management Australia

Approved by: Murray Curtis

Signed:

Position: Project Director

Date: 17 February 2004

CONTENTS

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Adrian Smith of the Le Clos Redevelopment Committee commissioned Environmental Resources Management Australia Pty Ltd (ERM), to undertake an Environmental Site Assessment (ESA) for potential soil contamination across the Le Clos Verdun Estate. The assessment was separated into two distinct investigations due to the size of the site and the land use history:

- Phase I - Preliminary Site Investigation was conducted over the vineyards; and
- Phase II - Detailed Site Investigation was conducted over the Estate's management lot.

The site is situated on Le Clos Verdun Road, west of the Pacific Highway, Port Macquarie NSW and is shown in *Figure 1, Annex A*. Currently most of the allotments in the Estate are established vineyards and associated infrastructure covering an area of 186ha and including:

- 80 dwelling lots (1,500m^2 each);
- three dwellings on larger lots;
- a gatekeepers lot;
- a management lot (0.57ha);
- vineyards (113ha); and
- vacant land.

The Le Clos Redevelopment Committee who requires the ESA to accompany an application for the redevelopment of the site from Clos farming to rural residential currently manages the site.

1.2 OBJECTIVES

The objectives of the Preliminary Site Investigation were to:

- determine the site history and previous and current land use practices to identify possible sources of soil contamination; and
- assess the potential for on and off-site soil or groundwater contamination and any potential responsibilities under the *Contaminated Land Management Act 1997*.

The objectives of the Detailed Site Investigation were to:

- ascertain the presence of Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethylbenzene and Xylene (BTEX), inorganic compounds and Organopesticides, which are associated with the storage of fuel and agricultural chemicals, by the laboratory analysis of samples collected from:
  - surface soils across the lot;
  - the sub-soils around the underground storage tank (UST), fuel lines and dispensers; and
  - if found the groundwater between the USTs and the closest receiving waters.

1.3 SCOPE OF WORKS

The scope of works for the Phase I Preliminary Site Investigation included the following:

- initial site inspection by ERM personnel to identify features of the property and any visual areas of potential contamination;
- a review of Council records, historical title information and topographical maps;
- interviews with personnel associated with historical site uses to supply relevant historical information;
- identification of the potential presence and use of hazardous materials, waste generation, handling, storage and disposal practices, including location of below ground storage tanks;
- summarise the findings of the above activities in the form of a chronological review of the site history and site condition, undertaken in order to provide baseline data for an assessment of the presence of potential areas of concern (PAOC) and compounds of concern (COC); and
- in addition a preliminary surface soil-sampling program was adopted on coarse grid spacing (one sample per 10ha of vineyards). Collected samples analysed for inorganics and organopesticides.

The scope of works for the Phase II Detailed Site Investigation included the following:

- reviewing of topographical, geology and soil maps to identify the site setting prior to commencing the field investigation;

- obtaining 'dial before you dig' plans showing underground utilities in the area and have locations marked by a professional cable locater;
- drilling four boreholes to a depth of 4.5 metres using a drilling rig;
- collecting soil samples at 0.5 metres and then 1 metre intervals to the depth of the borehole;
- screening all samples with a photoionisation detector (PID) for volatile organic compounds (VOCs);
- submitting the sample with the highest PID reading in each borehole for laboratory analysis for TPH, BTEX and lead;
- collection of surface soil samples from a grid pattern across the site and submission for laboratory analysis for TPH, BTEX, inorganic compounds and organopesticides;
- if ground water is reached, installing a groundwater monitoring well in the deepest borehole; and
- developing and sampling the groundwater monitoring well and submit groundwater samples for laboratory analysis for TPH, BTEX compounds and lead.

1.4 PERSONNEL

Tim Hosking, an Environmental Engineer and Nathan Smith, an Environmental Geologist with ERM undertook the site inspection on 27 November 2003.

Additional telephone contacts included Mr John Cassegrain and Sean Costigan of Cassegrain Wineries regarding past land use activities including chemical types used and storage locations. In addition to these contacts, Kevin Shoobert and Ray Cooper, from the Port Macquarie and Wauchope historical societies respectively, were contacted for historical information relating to the location of the Sancrox sawmill and potential areas of concern around the site.

2 SITE DESCRIPTION

2.1 LOCATION

The site is located 11kms west of Port Macquarie on the NSW mid-north coast. The site is located just north of Sancrox Road, approximately three kilometres west of the Pacific Highway and two kilometres north of the Oxley Highway. Site information is summarised in *Table 1* below.

Table 2.1 **SUMMARY OF SITE INFORMATION**

Characteristic	
Vineyards and Farming	Le Clos Verdun Road, Sancrox
Lot DP Number	Lot 80 DP 77587
	Lot 83 DP 77587
	Lot 95 DP 77587
	Lot 91 DP 77587
	Lot 86 DP 77587
	Lot 84 DP 77587
	Lot 51 DP 77587
Site Area	186ha
Geographical Coordinates (MGA94)	480500mE, 6522000mN

The site is bounded:

- to the north by the Hastings River;
- to the south by Sancrox Road and rural residential allotments;
- to the east by Haydens Creek and rural land; and
- to the west by Riverbend Road.

The layout of the site showing the location of each of the above allotments is presented in *Figure 2, Annex A.*

2.2 REGISTER SEARCH

A search of the EPA's contaminated land register revealed that there were no contaminated land records for the site. A specific search of the local government area was recommended for the site and surrounding associated land.

The Hastings Shire Council Notices of Contamination, identifies the nearest land with potential contamination to be located approximately 200 meters to the south of the site on the southern side of Sancrox Rd. The site has been considered by council for potential contamination due to a UST located on the site. The UST is not known to Council to have caused any contamination.

A copy of the map showing the area containing the UST has been provided by the Hastings Council and is included *Annex C.*

2.3 SITE HISTORY AND LAND USE

2.3.1 Previous Land Use

Advance Legal Search Pty Ltd was commissioned by ERM to identify the former proprietors of the current site. The complete title search results have been included in *Annex E*. The results indicate that from the late 1800's many of the individual lots within the site has been owned by a variety of people with general farming being the most common land use. The remaining crown land portion of the site was sold for private use in the late 1900's. Henry Verdun Robson was the primary purchaser of the Crown land. By 1989 many of the lots across the site were owned by Henry Verdun Robson. In 1989 Clos Farming Estates Pty Ltd purchased the land titles for the entire site for viticulture land use.

The historical search also revealed that in 1949 two of the lots within the site were owned by employees of a sawmill. The Port Macquarie and Wauchope historical societies were contacted to confirm the location of the sawmill at Sancrox. Ray Cooper from Wauchope advised that the sawmill that was in use in Sancrox was moved there from Wauchope. The exact location of the sawmill was not know to Ray however he knew it to be located close to the current Sancrox cemetery, which is located approximately 1km west of the site in Sancrox. Ray also advised that typical operations of sawmills like those at Sancrox did not include chemical treatment.

The information provided by the historical title search and advice from the local historians does not indicate the likely presence of any PAOC over the site due to past land uses.

2.3.2 Existing Land Use

The Le Clos Verdun Estate has not reached its full potential with only the vineyards, management lot, three larger dwelling lots and one of the standard dwelling lots developed. The remaining land remains vacant.

The current land use therefore comprises:

- residential;
- viticulture; and
- large storage shed for agricultural machinery and chemicals, workers cottage and fuel dispensing area including UST all located within the maintenance lot (Lot 86).

Adjoining Land Uses

The majority of the adjoining land use is farming and grazing. To the north west the site adjoins the Hastings River and the north east portion of the site adjoins Haydons Creek.

2.4 ENVIRONMENTAL FEATURES

2.4.1 Topography

The site lies adjacent to the Hastings River and has slightly undulating topography, with an elevation below 20 metres of the Australian Height Datum (AHD). The entire site drains into the Hastings River either directly or via Haydons creek. Two small man-made dams on the site collect small amounts of runoff for use by grazing stock.

2.4.2 Geology and Soils

Geology

The Tamworth-Hastings 1:250,000 scale Metallogenic Map published by the NSW Department of Mineral Resources (1987) details the geology of the site. The site lies within the Hastings Block and includes the Carboniferous Byabarra Beds. Rock types found in this formation are lithic sandstone, mudstone, siltstone, tuff and limestone.

A search of groundwater bores conducted by the Department of Infrastructure, Planning and Natural Resources (DIPNR) provided borelog data of the soil and rock types encountered during drilling in addition to the groundwater information. Soil data logs for three boreholes nearest to the site are provided below:

- GW 302376
  - 0-1m, topsoil and clay;
  - 1-10m, clay;
  - 10-18m, weathered shale; and
  - 18-23m, gray shale and sandstone.
- GW 073277
  - 0-0.5m, soil; and
  - 0.5-14.5m, shale.

- GW 055532
    - 0-1m, soil;
    - 1-3m, sandy clay;
    - 3-5m, sandy clay and gravel;
    - 5-8.5m, gravel; and
    - 8-8.75m, clay.

Copies of the borelogs provided by DIPNR are provided in *Annex B*.

Soil Landscapes

The Kempsey-Korogoro Point Soil Landscapes sheet (DLWC 1999) indicates the site is predominantly overlain by the 'Kundabung' residual landscape soil landscape group.

The Kundabung soil landscape contains shallow to deep soil (<100cm to >300cm depth), with poorly drained hardsetting soloths and grey-brown, yellow and red podsolic soils.

The soil landscape has the following limitations:

- seasonal waterlogging;
- water erosion hazard;
- foundation hazard;
- shallow soils;
- low wet bearing strength,
- high erodibility;
- high permeability;
- hardsetting;
- sodic;
- acidic; and
- high aluminium toxicity potential.

The soil profiles of boreholes drilled on site were also logged by ERM personnel during drilling. As the four boreholes were positioned within close proximity to each other there was minimal variation between the profiles of each borehole. A summary of the soil profile is provided below:

- 0-0.15m, gravel layer over ground surface;
- 0.15-0.4m, organic dark coloured sandy clay topsoil grading down to dark brown clay with some sand, medium moisture and medium plasticity;
- 0.4-3m, clay continues to lighten, contains less moisture and red/orange oxide colour occurs;
- 3-4m, red/orange coarse sandy clay, minor rock fragments, low moisture, moderate plasticity; and
- 4-4.5m, red/orange coarse sandy clay, minor rock fragments, low moisture.

2.4.3 Surface Water Drainage and Hydrogeology

The site is primarily grassed with rows of grape vines across the majority of the site. Semi impervious surfaces occur along the various compacted tracks throughout the site. The natural drainage features divide the runoff almost evenly with drainage occurring to the north west directly into the Hastings River and east into Haydons Creek. Two small man-made dams also catch minor water flow from the site.

A search of groundwater bores conducted by the Department of Infrastructure, Planning and Natural Resources (DIPNR) indicated that there were 13 registered groundwater bores within a two-kilometre radius of the site. However only two of these occurred within the site boundary. All data logs and the well locations map provided by DIPNR have been included in *Annex B*.

The two wells, located within the site are:

- Well GW 060513: located at the north eastern edge of the northern dam on the site. The well reaches a depth of 4.6m, there is minimal information provided regarding this well other than its purpose was for domestic/stock; and
- Bore GW 060512: located approximately 150m south of the above well. The well reaches a depth of 25m and after construction with an indicated yield of 0.63L/s. The authorised purpose for this well was for domestic/farming/stock.

Information on the two nearest wells also located to the south of the Hastings River has also been included below:

- Well GW 302376: located just north east of the site on the eastern bank of the Hastings River. The well depth is 23m with a yield of 0.4L/s. The salinity levels for this well were low at the time of completion in 1991. The authorised purpose for the well was for domestic/stock.
- Well GW 073277: is located to the west of the site within the village of Sancrox. The well depth is 15m with a yield of 0.5L/s and measured

salinity of 6000mg/L at the time of construction in 1994. It was authorised for stock use only.

2.4.4 Sensitive Receptors

The nearest sensitive surface water receptors are Hastings River and Haydens Creek, which receive direct runoff from the site. The nearest groundwater receptor is adjacent to the Hastings River at a depth of 18m, with a beneficial use for domestic and stock.

3 SAMPLING AND ANALYSIS PLAN

3.1 SAMPLING PLAN - VINEYARDS

A coarse surface soil sampling program was conducted with samples taken at 16 selected points across the entire site. This soil sampling was conducted as a preliminary approach to identify if past viticulture activities had the potential to result in soil contamination. The samples were composited at a ratio of 4:1 to produce 4 samples for analysis.

3.2 MANAGEMENT LOT 86

The Phase II assessment aims to validate the management lot, (lot 86) for Le Clos Verdun estate. This assessment was conducted to ascertain the status of the soils surrounding the UST, fuel lines and dispenser in terms of the presence of hydrocarbons and lead related with the storage and supply of fuel. As the UST, fuel line and dispenser are to remain insitu, the investigation aimed to identify any bulk contamination of the natural soil surrounding the UST.

For assessment of the soil around the UST four bore holes were drilled to 4.5m and soil samples taken at even depths from each hole. Samples were taken at 1m intervals starting from 0.5m depth, with the final sample taken form the bottom of the bore hole. No groundwater was encountered, so well installation and water sampling was not required.

Each of the 5 samples from each hole was tested using a photoionisation detector (PID) to test for concentrations of volatile organic compounds (VOC's). One sample from each hole that showed the highest reading of VOC's were dispatched to the laboratory for initial analysis, although all other samples were also dispatched to the laboratory these were requested to be held until the initial test results were reviewed.

Surface soil sampling was conducted across the management lot, following NSW EPA sampling guidelines. The sampling plan involved a 16 point grid pattern across the site with surface soil samples taken at each point. The samples were composited at a ratio of 4:1 to produce 4 samples for analysis.

3.3 LABORATORY ANALYSIS PLAN

Sample details and analytical requirements were documented on a Chain of Custody form and all samples from each phase of the project were submitted to LabMark, a NATA registered laboratory. Analysis of selected analyses was undertaken including:

Table 3.1 LABORATORY ANALYSIS PLAN

Number of Samples	Depth (mbgl)	Analysis Conducted for Samples			
		TPH/BTEX/lead	TPH/BTEX	Inorganics	OC/OP
		Vineyards			
4 (16 composited 4:1)	0 – 0.02	-	-	✔	✔
		Management Lot 86			
16	0 – 0.02	-	✔	-	-
4 (16 composited 4:1)	0 – 0.02		-	✔	✔
4	Highest PID reading	✔	-	-	-
Total		4	16	8	8
		QA/QC Samples			
Duplicates		1	2	1 [1]	1 [1]
Total Including QA/QC Samples		5	18	9	9

1. Duplicated in laboratory

Notes:

mbgl = metres below ground level.

TPH = Total Petroleum Hydrocarbons.

BTEX = Benzene, Toluene, Ethylbenzene, Xylenes

Inorganics = Copper(Cu), Lead(Pb), Zinc(Zn), Arsenic(As), Cadmium(Cd), Total Chromium (Cr), Nickel (Ni) and Mercury (Hg).

3.4 QUALITY ASSURANCE AND QUALITY CONTROL

3.4.1 Field Quality Assurance and Quality Control

Field QA/QC included ERM standard sample collection procedures, sample documentation and field equipment calibration procedures as well as the correct use of field equipment.

Three blind duplicate soil samples were collected to assess the accuracy and precision of field procedures and laboratory analysis. Duplicate soil samples were collected and analysed at a minimum rate of one per ten primary soil samples in accordance with NSW EPA guidelines. Samples were split in the field (where appropriate) to ensure good correlation between the primary and duplicate samples.

Duplicates can not be taken for composite samples due to inaccuracies during sampling, however for quality control the laboratory was requested to complete two separate analyses of one composite sample.

3.4.2 Laboratory Quality Assurance and Control

LabMark performed internal QA/QC testing and a review in accordance with NATA requirements, and internal quality standards. Laboratory QA/QC testing included analysis of laboratory duplicates, matrix spikes, method blanks and laboratory control samples.

4 SOIL ASSESSMENT RESULTS

4.1 SOIL ASSESSMENT CRITERIA

The following assessment criteria were selected for assessment purposes:

- *National Environment Protection (Assessment of Site Contamination) Measure* (1999), Schedule B(1) - Guidelines on the Investigation Levels for Soil and Groundwater, Exposure settings 'A' (standard residential) for OC/OP pesticides and metals; and
- NSW EPA *Guidelines for Assessing Service Station Sites* (1994), threshold concentrations for sensitive land use in soils for TPH and BTEX.

The criterion used for the composite soil testing has been reduced by 75% as each of the composite samples were combined at a ratio of 4:1. All other individual samples have been directly compared to the relevant criteria.

4.2 ANALYTICAL RESULTS

All soil analytical results, along with the relevant assessment criteria, are provided in summary tables presented in *Annex D*. Laboratory analytical certificates and chain of custody documentation are also provided in *Annex D*.

4.2.1 *Vineyards*

Laboratory results indicated:

- OC & OP pesticides were not detected in all four composite soil samples;
- arsenic, chromium, copper, lead, mercury and zinc were detected in all four composite samples, however all concentrations were below the assessment criteria for residential land use;
- cadmium was detected in two of the four composite soil samples, however these concentrations were below the assessment criteria for residential land use; and
- nickel was detected in one of the four composite soil samples, however this concentration was below the assessment criteria for residential land use.

4.2.2 *Management Lot 86*

Laboratory results indicated:

- OC & OP pesticides were not detected in all four composite soil samples;

- cadmium was not detected in all four composite soil samples;
- arsenic, chromium, copper, lead, nickel and zinc were detected in all four composite samples, however all concentrations were below the assessment criteria for residential land use;
- mercury was detected in two of the four composite soil samples, however these concentrations were below the assessment criteria for residential land use;
- lead was detected in all four borehole soil samples, however the concentrations were below the assessment criteria for residential land use;
- BTEX compounds were not detected in all four borehole and sixteen surface soil samples;
- TPH C6 - C9 compounds were not detected in all four boreholes and sixteen surface soil samples;
- TPH C10 - C36 compounds were not detected in all four borehole soil samples; and
- TPH C10 - C36 were detected in only one of the sixteen surface soil samples, however this concentration was below the assessment criteria for residential land use.

5 CONCLUSIONS

5.1 PHASE I – PRELIMINARY INVESTIGATION

The Phase I preliminary investigation of the Le Clos Verdun Estate did not identify potential areas of concern due to historical and existing land uses other than those identified on the management lot, which was subject to the Phase II detailed investigation.

The results from the preliminary surface soil investigation of the vineyard area did not identify the present of organopesticides or the selected inorganics above the relevant residential land use criteria.

5.2 PHASE II – DETAILED INVESTIGATION OF MANAGEMENT LOT 86

Investigation for bulk contamination of natural soils around the UST and fuel lines did not identify selected hydrocarbon compounds and inorganics above the relevant residential land use criteria.

Results from the surface soil investigation did not identify the present of TPH, BTEX, organopesticides or the selected inorganics above the relevant residential land use criteria.

REFERENCES

National Environment Protection Council (1999), *National Environment Protection (Assessment of Site Contamination) Measure.*

NSW Environmental Protection Authority (1994) *Contaminated Sites, Guidelines for Assessing Service Station Sites*

NSW Environmental Protection Authority (1995) *Contaminated Sites, Sampling Design Guidelines.*

Annex A

Figures

Annex B

Groundwater Bore Summary Sheets

Annex C

Hastings Council's Identified Contaminated Land Plan

Annex D

Laboratory Results

Annex E

Title Search Results