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Privileged & Confidential

Site History Review
Fiskville Training College, 4549 Geelong-Ballan Rd, Fiskville, VIC

Ref no: 212163.1

Prepared for Ashurst

March 2014

DOCUMENT CONTROL

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SITE HISTORY REVIEW

Fiskville Training College,

4549 Geelong-Ballan Rd, Fiskville, VIC

EXECUTIVE SUMMARY

Background

Cardno Lane Piper Pty Ltd was engaged by Ashurst ("the Client"), on behalf of the Country Fire Authority (CFA) to conduct a Site History Review for potential contamination at the Fiskville Training College (FTC) located at 4549 Geelong-Ballan Rd, Fiskville, Victoria ("the site"). This work arose from the recommendations of the Independent Fiskville Inquiry (IFI) Report by Professor Rob Joy (June 2012). The location and features of the site are shown on Figures 1 and 2 presented in Appendix A.

EPA issued CFA with two Clean Up Notices (CUN) on 22 January 2013. These have resulted in the engagement of an EPA-appointed Environmental Auditor to conduct a section 53X Environmental Audit and a section 53V Environmental Audit of the site.

Objectives

The specific objectives of the assessment were to identify the past or current activities and facilities at the site with potential to cause contamination of the land or water and to identify those already investigated and potentially requiring investigation.

Scope of Assessment

The assessment included a review of eleven reports on site contamination assessment and extraction of relevant data; inspection of selected historical aerial photographs; conduced several site inspections with a formal interview and subsequent informal discussions with CFA personnel; a detailed inspection of the Victoria University of Technology (VUT) facility (reported in Appendix E); development of a Geographic Information System (GIS) database of potentially contaminating features and preparation of this report.

Potentially Contaminated Areas

The review of site history confirmed the features identified in the IFI Report as potential contamination sources and several additional features as well as clarifying some ambiguities around the identity of key site features. Table 3-4 in the report and the GIS (figures presented in Appendix A) provides a comprehensive list of these features and facilities. The following section separates these into two groups:

- Areas Already Assessed
- Areas Potentially Requiring Assessment

Areas Already Assessed

The areas already investigated by Cardno Lane Piper were those specifically recommended for assessment in the IFI Report and reported under separate cover are:

- Former areas where diesel and petrol underground storage tanks (USTs) (Features 8a and 8b) were located near the Amenities Building (Feature 16a) and the Learning Centre (Feature 3).
- Aboveground storage tank (AST) 1 (Feature 23a) located adjacent to the Fuel Mixing Area (FMA) (Feature 22), and AST 2 (Feature 23b) located adjacent to the Flammable Liquid PAD (FLP) (Feature 27). AST 2 was removed after Cardno Lane Piper completed the field works for the targeted investigation.
- The former and current FLP (Feature 27), former Foam Training Pits (FTPs) (Feature 45), and other Practice Area for Drills (PADs), where fuels, oils, chemicals, solvents and foams for fire training drills have been burnt, stored and spilled.
- Prop Storage Area (PSA) (Feature 17) where flammable liquids were stored in drums or tanks.
- Soil Composting Area (SCA) (Feature 44) where approximately 4,200 to 5,300 m^3 of contaminated soil was remediated in 1999. Much of the remediated soil has since been moved. The location of the transferred soil is unknown, but is likely to be on-site.
- Two former landfills (Features 43 and 42) in the south-west corner of the site.
- Three areas possibly used to bury drums (Drum Burial Area DBA 1, DBA 2, DBA 3 and DBA 3a; Features 46 to 48, 48a). Two of these areas were reported as being remediated (probably DBA 1 and/or DBA 2), with a number of drums and associated contaminated soil removed.
- Water, sediments and ecology of Lake Fiskville.
- Water and sediments of Dams 1 to 4.

Areas Potentially Requiring Assessment

The areas with potential for contamination not yet assessed and which might require assessment, subject to the requirements of the EPA Environmental Auditor are:

- A Sewage Treatment Plant (STP) (Feature 5) including septic tank and sewerage discharge area (Feature 40) located to the west of the administration building.
- Drum Fire Area (DFA) (Feature 49) to the east of the Learning Centre (Feature 3).
- Maintenance workshop (Feature 6) near the Learning Centre (Feature 3), the garden and maintenance workshop (Feature 52) near the residential area and Amenities Building 2 (Feature 16b) where equipment and/or machinery are stored and/or maintained, and small volumes of fuels and chemicals may be stored.
- Areas of fill including the Driver Education Training PAD (DET PAD) (Feature 21a), fill platform in the operational areas and beneath the FLP (Feature 27) which was backfilled as part of soil remediation.
- Airstrip (Feature 14) and associated hangar (Feature 13). CFA has advised that the hangar is not used for fuel or chemical storage.
- Drainage channels and pipes for PAD effluent located between Dams 1 to 4, including a crushed concrete pipe between Dams 1 and 2 which is likely to be leaking.
- AST 3 (Feature 23c) adjacent to Dam 2.
- VUT Building (Feature 31) where research is conducted on the flammability of materials used in buildings and effluent including foam waste is discharged to Dam 1.
- Other PADs around the site used for fire training including wildfire PAD (Feature 15), explosives PAD (Feature 21a), Liquefied Petroleum Gas PADs (LPG PADs) (Features 32a and 32b) and Structural Fire Attack PADs (SFA PADs) (Features 33a and 33b).

- Three former diesel powered generators associated with Amalgamated Wireless (Australasia) / Overseas Telecommunications (Australia) Commission site use which were probably located in the Learning Centre (Feature 3) and ceased operating in 1941.
- Off-site land use for farming which may include use of pesticides, although impacts to the site are considered unlikely.
- The area of stockpiles of unidentified soil/material (Feature 60) located off Deep Creek Road west of Beremboke Creek.

Recommendations

Following on from the conclusions reached in relation to the key objectives of this investigation, the following actions are recommended:

1. Investigation of the potentially contaminated areas identified in Table 3-4 of this report (as shown in Figures 2 and 3 of Appendix A), if they have not already been assessed in other reports such as the *Surface Water & Sediment Contamination Assessment* (Cardno Lane Piper, 2014d), *Groundwater Contamination Assessment* (Cardno Lane Piper, 2014b), *Targeted Soil Assessment* (Cardno Lane Piper, 2014a), *Investigation of Risks at Former Landfills* (Cardno Lane Piper, 2014e) or *Buried Drums Assessment* (Cardno Lane Piper, 2014c) and subject to the requirements of the EPA Environmental Auditor.
2. The scope of this further investigation and assessment should be confirmed with the EPA Environmental Auditor and recorded in a Sampling and Analysis Quality Plan (SAQP) prior to commencement and should be undertaken at the same time as other assessment works to assist with the completion of a section 53X audit.
3. The volumetric balance of the soil windrows in the SCA should be assessed by a surveyor to confirm if it is all accounted for on-site (e.g. by comparing initial volume in windrows and current mounds in the DET PAD, also known as the 4WD area).
4. It is recommended in relation to the VUT facility that they should discontinue any effluent discharge to CFA property (including Dam 1) and be required to plan for management of their liquid effluent independently of CFA in the future.
5. An Environmental Management Plan should be prepared and implemented by VUT to control and minimise all impacts on the environment including land and water on and off-site from their facility and for management of solid and liquid wastes.

Limitations

While this Executive Summary has endeavoured to accurately summarise the key points of the Report, the latter shall take precedence and the Executive Summary must be read in conjunction with the full report.

While this report has been undertaken in accordance with the current industry guidelines and standards of practice, there may be some limitations on the meaning and use of this report. The reader is advised to read this report in conjunction with the attached document *Information About Environmental Reports* (Appendix F).

Cardno Lane Piper

March 2014

SITE HISTORY REVIEW

Fiskville Training College,

4549 Geelong-Ballan Rd, Fiskville, VIC

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LIST OF ABBREVIATIONS AND UNITS

Chemical Names

6:2 FtS	6:2 Fluorotelomer Sulfonate
BTEX	Benzene, Toluene, Ethylbenzene & Xylenes (subset of MAH)
MAH	Monocyclic Aromatic Hydrocarbons
OCP	OrganoChlorine Pesticides
OPP	OrganoPhosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCDD	Polychlorinated dibenzodioxins
PCDF	Polychlorinated dibenzofurans
PFC	Perfluoro Compounds
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PHC	Petroleum Hydrocarbons
SVOC	Semi-Volatile Organic Compounds
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
VOC	Volatile Organic Compounds

Technical Terms

4WD	Four Wheel Drive
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ASC	Assessment of Site Contamination
AST	Aboveground Storage Tank
COC	Chain of Custody
CoEA	Certificate of Environmental Audit
COPC	Contaminants of Potential Concern
CUN	Clean Up Notice
DNAPL	Dense Non-Aqueous Phase Liquid
DSE	Department of Sustainability and Environment (now Department of Environment and Primary Industries)
EIL	Environmental Investigation Levels
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
GCMS	Gas Chromatograph - Mass Spectrometer

GIS	Geographic Information System
GME	Groundwater Monitoring Event
GPR	Ground Penetrating Radar
HILs	Health Investigation Levels
LNAPL	Light Non-Aqueous Phase Liquid
LOR	Limit of Reporting
LPG	Liquefied Petroleum Gas
MDPE	Medium Density Polyethylene
N/A	Not Applicable
NAPL	Non-Aqueous Phase Liquid
NEPM	National Environment Protection Measure
PID	Photo-ionisation detector (measures in ppm)
SAQP	Sampling and Analysis Quality Plan
SEPP	State Environment Protection Policy
SoEA	Statement of Environmental Audit
TIT	Triple Interceptor Trap
UCL	Upper confidence Limit ("95% UCL of the mean" is a value for the mean concentration from sampling which has only a 5% chance of being greater than the true mean value.)
UST	Underground Storage Tank

Units

ha	Hectares
kL	Kilolitre (equivalent to 1,000 L)
mbgl	Metres Below Ground Level
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
ppm	Parts per Million
µg/kg	Microgram per Kilogram (approximately equivalent to ppb)

Site Specific

AWA	Amalgamated Wireless (Australasia) Ltd
BA	Compressed Air Breathing Apparatus
CFA	Country Fire Authority
CHW	Central Highlands Water
CSR	Confined Space Rescue
DBA	Drum Burial Area
DFA	Former Drum Fire Area
DET	Driver Education Training

EX	Explosives
FLP	Flammable Liquid Practice Area for Drills or PAD
FMA	Fuel Mixing area
FTC	Fiskville Training College
FTP	Foam training pits
IFI	Independent Fiskville Investigation
OTC	Overseas Telecommunications (Australia) Commission
PAD	Practice Area for Drills
PSA	Props Storage Area
RAR	Road Accident Rescue
RR	Rope Rescue
RTG	Regional Training Ground
SCA	Soil Composting Area
SFA	Structural Fire Attack
STP	Sewage Treatment Plant
TR	Trench Rescue
USR	Urban Search and Rescue
VUT	Victoria University of Technology
WF	Wildfire
WSP	Water Supply Pit

SITE HISTORY REVIEW

Fiskville Training College,

4549 Geelong-Ballan Rd, Fiskville, VIC

1 INTRODUCTION

1.1 Background

Cardno Lane Piper Pty Ltd was engaged by Ashurst ("the Client") on behalf of the Country Fire Authority (CFA), to conduct a Site History Review at the CFA Fiskville Training College (FTC) located at 4549 Geelong-Ballan Rd, Fiskville, Victoria ("the site"). This has arisen from the recommendations made in the Professor Rob Joy's report titled *Fiskville, Understanding the Past to Inform the Future - Report of the Independent Fiskville Investigation* (hereinafter referred to as the IFI Report) issued in June 2012. The location and key features of the site are shown on Figures 1 and 2 presented in Appendix A.

This report is also provided for the purposes of the EPA-appointed Environmental Auditor engaged in response to Clean Up Notices (CUN) issued to CFA by EPA for the site on 22 January 2013. These notices require a section 53X Environmental Audit and a section 53V Environmental Audit of the site to be carried out by an EPA-accredited Environmental Auditor.

1.2 Purpose & Objectives

The purpose of this assessment is to provide a consolidated summary of the site history relevant to its potential to cause contamination. This is in addition to the site history information reported in the IFI Report.

The specific objectives of the assessment, subject to the limitations stated in Section 1.4, are:

- To identify the potential for past or current activities at the site to cause contamination of land and water at the FTC,
- To identify the areas or features at the site with potential for contamination that have already been assessed, and
- To identify those areas or features at the site with potential for contamination that have not been assessed.

1.3 Scope of Assessment

Cardno Lane Piper carried out the following tasks in order to satisfy the purpose and objectives of this assessment.

1.3.1 Site History Review

A review of available information provided to Cardno Lane Piper was undertaken, including review of the following reports provided by CFA:

- Professor Robert Joy (IFI 2012), Understanding the Past to Inform the Future – Report of the Independent Fiskville Investigation

- Golder Associates (2012), Preliminary Site Assessment, CFA Training College, Fiskville, Vic.
- Rio Tinto Research and Technology Development Melbourne (1999), Remediation of Hydrocarbon Contaminated Soil, CFA Training College, Fiskville
- Coffey Partners International Pty Ltd (1998), Soil Remediation and Validation Program, Fiskville near Ballan, Vic
- Rio Tinto Research and Technology Development Melbourne (1997), Remediation Action Plan, Fiskville Training College.
- CRA ATD (1996), Review of Site Assessments and Remediation Options, Fiskville Training College.
- Coffey Partners International Pty Ltd (1996), Field Site Appraisal and Sampling, Ballan, Vic
- Minenco Pty Ltd (1996), CFA Fiskville Site Inspection.
- Coffey Partners International Pty Ltd (Coffey 1996b), Groundwater Monitoring Network Installation, Ballan, Vic
- Coffey Partners International Pty Ltd (Coffey 1996c),Sediment and Surface Water Sampling, Ballan, Vic
- AS James (1988), Geotechnical Investigation, Waste Disposal Site, Fiskville Training Centre

Additional sources of information reviewed included:

- Selected historical aerial photographs obtained by Cardno Lane Piper from the Department of Sustainability and Environment (DSE) and CFA archive.

1.3.2 Site Inspection

A number of site inspections were conducted by Cardno Lane Piper with the aid of site plans and information obtained from the desktop review to:

- Confirm the site features and identify any visible evidence of petroleum hydrocarbon (or other flammable liquid) fuel storage tanks (above or below ground) and other infrastructure with potential to cause contamination of soil and/or groundwater.
- Check for evidence of soil type and evidence of site cutting and filling or subsidence or placement of solid wastes that are potentially contaminated.
- Record site conditions and relevant observations by taking notes and photographs.

The following areas of FTC were not inspected as part of this site history review:

- Tree plantation area at the north-west corner of the site (Feature 55).
- Farming area (Feature 56).
- Vacant land (Feature 50).
- Inside the airport hangar (Feature 13)
- Airstrip (Feature 14).
- Inside the buildings of the temporary (trainee) residential area (Feature 11a) and permanent (staff) residential area (Feature 11b) located west of Lake Fiskville.
- Inside the buildings of recreational facilities (Feature 9) and temporary cottage accommodation (Feature 10) located adjacent to Geelong-Ballan Road.
- Inside the building of fire truck storage (Feature 18).

1.3.3 Interview

A formal interview and subsequent informal discussions were conducted with current CFA employees most familiar with the site history and operations to seek information relevant to the assessment.

1.3.4 Geographic Information System

A Geographic Information System (GIS) was established for the site to consolidate all relevant information on potential sources of contamination a map base. This was necessary due to the sometimes ambiguous nomenclature used in the IFI Report. As well as similar types of features and past land uses that were not easily distinguishable from others in that report.

Each identifiable site feature or facility was assigned a unique Feature Number and name for inclusion in any site plan required for presentation or reporting of site contamination information. This GIS will be available tool for informing the EPA Auditor of the location of features and contamination and also for the future management of the site by CFA. It is proposed to integrate this information with the map base already developed by the CFA GIS team.

1.3.5 Reporting

This site assessment report documents the investigation activities and results in order to provide findings and recommendations relevant to the objectives of the assessment.

1.4 Standard of Assessment & Limitations

This assessment has been undertaken in general accordance with the current “industry standards” for an ESA for the purpose, objectives and scope identified in this report. These standards are set out in:

- National Environment Protection [Assessment of Site Contamination - ASC] Measure (NEPM), December 1999, National Environment Protection Council (NEPC)
- AS4482.1-2005: Guide to the sampling and investigation of potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds, Standards Australia (2005).

This report has been completed following the general requirements of the ASC NEPM (1999). The ASC NEPM was amended in 2013 and came formally into operation on 16 May 2013. The ASC NEPM is implemented in Victoria through State Environment Protection Policy (SEPP). EPA Victoria has directed that all current investigations can use the old NEPM during the transition period of 12 months before full implementation of the amended ASC NEPM (2013). This phase of the assessment was completed prior to the amended ASC NEPM becoming operational.

The agreed scope of this assessment has been limited for the current purposes of the client. The site history is based predominantly on historical reports and anecdotal evidence provided by CFA management and operational personnel at Fiskville. Cardno Lane Piper has attempted to verify the information presented, particularly the anecdotal evidence, however, the assessment may not identify contamination occurring in all areas of the site. No soil or groundwater sampling or analysis has been conducted as part of this assessment. Some areas of the site were not accessible for inspection at the time of the site inspections for this phase of work, including the Victorian University of Technology (VUT) building.

This assessment report is not any of the following:

- An Environmental Audit Report as defined under the *Environment Protection Act* 1970.
- An intrusive soil assessment.
- A Detailed Environmental Site Assessment (ESA) sufficient for an Environmental Auditor to be able to conclude a statutory Environmental Audit of the entire site.
- A geotechnical report and the bore logs may not be sufficient as the basis for geotechnical advice.
- A detailed hydrogeological assessment in conformance with EPA Publication 668 *Hydrogeological Assessment (Groundwater Quality) Guidelines,* September 2006.

An overview of environmental site assessments is included in Appendix F.

2 SITE DESCRIPTION & SETTING

2.1 Site Definition

Table 2-1 summarises the key details defining the site. The location of the site is shown on Figure 1, Appendix A.

Table 2-1: Site Identification Details

Site Name	CFA Fiskville Training College
Site Address	4549 Geelong-Ballan Rd, Fiskville, Vic
Site Area	150 ha (approximately)
Title Details	Lots 1, 2, 3 and 4 on Title Plan 845669K Volume 09503, Folio 693
Municipality	Moorabool Shire
Current Site Owner	Country Fire Authority
Planning Zone	Farming Zone (FZ)
Planning Overlay	Design and Development Overlay (DDO) Environmental Significance Overlay (ESO)

2.2 Geographic Setting

The site and its immediate surrounding area are in an elevated plateau about 440 m above sea level. The land to the east of the site falls away, steeping into the valley of the Yaloak Creek.

On site, the topography is dominated by the shallow valley occupied by Beremboke Creek and Lake Fiskville in the western area of the site, and the elevated fill platform constructed south of Dam 1 and around Dam 2. The lowest point on the site is near the south-western corner, where Beremboke Creek exits the site in a southerly direction. The maximum difference in elevation of the land across the site is approximately 8 m. The topography and site layout is presented in Figure 2-1. (Note that this figure contains a vertical exaggeration of 5 times the horizontal scale.)

Figure 2-1: Oblique Aerial Photo of Site

Surface water drainage of the undeveloped areas of the site is towards Beremboke Creek which was dammed several decades ago to form Lake Fiskville. The central area of the site drains to the west (apart from Practice Area for Drills (PADs) and bunded areas) although some stormwater is directed towards Dam 1, 3 and 3 (including from the Flammable Liquid PAD, FLP, between training events) they were primarily designed and operated to contain water from the firewater system on the FLP and not for stormwater runoff.

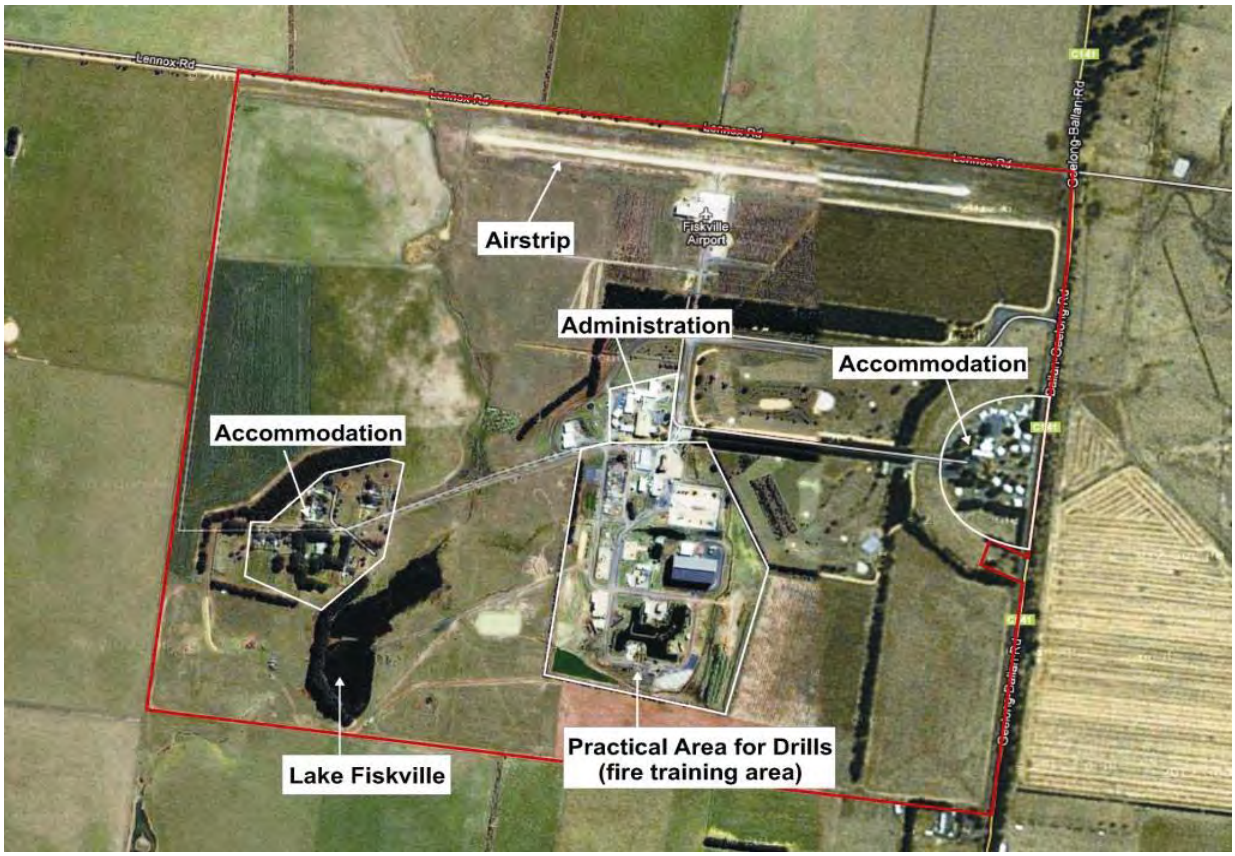

Figure 2-2: Main Site Facilities

2.3 Site Use & Infrastructure

The site is rectangular in shape, and is occupied by a number of fire training related facilities, as shown in Figure 2-2.

The site currently operates as a fire fighting training college, primarily used by CFA members, including instructors, trainees and administration/maintenance staff. The site is also used by other government agencies such as Metropolitan Fire Brigade (MFB), State Emergency Service (SES) and private companies for fire fighting training and other forms of operational and classroom-based training.

The training program includes hot fire training, emergency response and incident management, road accident rescue simulation, 4WD vehicle driver training, leadership and other types of classroom training. While the site is open all year-round and 7 days per week, hot fire training does not generally occur during fire season between December and March.

In general, the fire training facilities are located in the centre of the site while the ancillary and support services and accommodation are located away from this area, in both the far eastern and western areas of the site. The operational area accounts for about 50 ha of the 150 ha site. The remaining 100 ha is either paddocks used for grazing or hay-cutting. There are also recreational spaces such as the golf course and a perimeter running track.

An aerial image of the site is presented in Figure 2-2. The site layout, key areas and current infrastructure at the site are presented in more detail in Figure 2, Appendix A (generated from the GIS), and are summarised below. Each feature has been given a unique identifier.

The main buildings in the eastern part of the site are:

- Dining room and recreational facilities (Feature 9)
- Temporary accommodation cottages (Feature 10)
- Garden and maintenance shed (Feature 52)

Key buildings in the central operations area:

- Main reception building and learning centre (Features 2 and 3)
- Teaching centres (classrooms) (Feature 4)
- Maintenance workshops (Feature 6)
- Amenities building (Feature 16a and 16b) and nearby portable buildings

Key buildings in the western area:

- Temporary (trainee) residential area (Feature 11a)
- Permanent (staff) residential area (Feature 11b)

Key infrastructure facilities include:

- Airstrip and hangar building located in the northern portion of the site (Features 13 and 14)
- Sewage treatment plant (STP) and associated effluent soakage area (Features 5 and 40)
- A golf course north and south of Plantation Parade (Feature 54)
- Five shallow dams located within the golf course used to water the golf course (Dams A, B, C, D and E)

We understand that the STP only treated wastewater from residential properties (Feature 11a and 11b), offices and amenities present on-site, not industrial or fire-fighting wastewater.

The Practice Area for Drills (PAD) fire training area which includes:

- Props storage areas (PSA) which include miscellaneous drums, tyres, cars and car batteries (Features 17)
- Fuel mixing area (FMA) (Feature 22)
- Flammable liquid PAD (FLP) (Feature 27)
- Confined space training PAD (CSR PAD) and rope rescue PAD (RR PAD) (Feature 20)
- Standard and advanced LPG PADs (Features 32a and 32b)
- Victorian University of Technology (VUT) building (Feature 31)
- Two areas of former diesel/petrol UST (UST 1 and UST 2) (Features 8a and 8b)
- Diesel ASTs (Features 23a and 23b)
- Liquefied petroleum gas (LPG) AST (Feature 7a)
- Fire attack building (Feature 24)
- Water supply pit (WSP) (Feature 25)
- Parade ground water storage tank and pump house for fire training drills (Feature 26)
- Water storage tank (Features 57a and 57b)
- Material Storage (Feature 19)
- Tank formerly used as fire prop (Feature 30)
- Structural fire attack building (SFA PAD) (Features 33a and 33b)
- Great southern stand (Feature 34)
- Mess hall (Feature 35)
- Backup water tank and pump house (Feature 38)
- Former foam training pits (FTP) (Feature 45), which is located in the south-eastern corner of the FLP (Feature 27).
- Remediated area of former flammable liquid PAD (Feature 58), which is located west of the former Foam Training Pits (Feature 45) inside and outside the boundary of the current FLP
- Shallow spoon drain connecting VUT building to Dam 1 (Feature 59)

Other facilities surrounding the PADs

- Driver education training PAD (DET PAD, also referred to as 4WD area) and explosives PAD (EX PAD) (both PADs are located at Feature 21a)
- Water crossing DET PAD (Feature 21b) and sand crossing DET PAD (Feature 21c) are components within the main DET PAD (Feature 21a) as shown in Figure 3 (Appendix A)
- Trench rescue PAD (TR PAD) (Feature 36)
- Road accident rescue PAD (RAR PAD) (Feature 37)
- Urban search and rescue PAD (USR PAD) (Feature 39)
- LPG AST (Feature 7b)
- Fuel AST 3 (Feature 23c)
- Car storage (Feature 51)
- Soil composting area (SCA) (Feature 44)
- Fire truck storage (Feature 18)

The PAD also includes a series of water treatment facilities and dams used to contain effluent from the fire training drills. These are:

- Surge basin (Feature 29)
- Oil-water separator, also called Triple Interceptor Trap (TIT) (Feature 28)
- Pump sump between the TIT and Dam 1 (Feature 41)
- Dam 1
- Dam 2
- Dam 3

To the west of the PAD is open ground and includes:

- Dam 4
- Lake Fiskville
- Beremboke Creek

Two former waste management areas are located in the far south western corner of the site known as:

- Landfill 1 (AWA) (Feature 42)
- Landfill 2 (CFA) (Feature 43)

The areas associated with drum storage, possible drum burial and buried drum removal include:

- Former drum fire area (DFA) (Feature 49)
- Drum burial area 1 (DBA 1) (Feature 46), to the south of the airstrip
- Inferred area of drum burial removal (Feature 46a) within DBA 1
- Additional area of inferred drum burial removal (Feature 46b) within DBA 1
- Suspected drum burial area 2 (DBA 2) (Feature 47), to the north of the administration building
- Suspected drum burial area 3 (DBA 3) (Feature 48), on the golf course to the west of Dam A
- Suspected drum burial area 3a (DBA 3a) (Feature 48a), on the golf course to the west of Dam A and south of DBA 3

Other site features include:

- Wildfire PAD (WF PAD) to the east of the airport hangar (Feature 15)
- Tree plantation area at the north-east corner of the site (Feature 55)
- Farming area (Feature 56)
- Vacant land (Feature 50)
- An area of stockpiles of unidentified soil/material located west of Beremboke Creek off Deep Creek Road (Feature 60)

The site features can be seen on Figure 2, Appendix A. Photographs of a selection of these facilities are presented in Appendix B.

2.4 Dams and Drainage System

There are no records available about the formation of dams and the channels connecting the dams present at the site over time. Therefore, historical aerial photographs (Appendix C) are used to piece together an approximate history of the formation of the dams on-site. A summary of the history is presented in Table 2-2 below. (Refer to Cardno Lane Piper's *Surface Water and Sediment Contamination Assessment* report (Cardno Lane Piper, 2014d) for further information about the surface water management system present at FTC).

Table 2-2: History of Surface Water Dams and Channels Associated with PAD

Location	Aerial Photograph (Year)	Comments
Dam 1	1977	This aerial photograph shows the early development of Dam 1, which seemed to have been approximately half its current size comprising only the current northern portion (which is orientated east-west). A Drainage Channel in the form of a spoon drain can be observed which connects Dam 1 to the northern part of Lake Fiskville.
	1990	Dam 1 had been constructed to its current shape. The drainage channel is still visible from the west of Dam 1.
	1998	This photograph shows the Drainage Channel from Dam 1 is still present at the site.
Dam 2	1990	Initial work on the development of Dam 2 is visible. The red soil colouration around Dam 2 is consistent with its construction from imported crushed scoria rock.
	1999	Scoria fill imported to site to backfill excavations made to remediate soil from the PAD area. A fill platform was placed around Dam 2 to reach its current capacity.
Dam 3	1998	Dam 3 has been constructed. A spoon drain from the northern portion of Dam 3 to Lake Fiskville is visible.
	2001	Dam 3 is in use; however, Dam 4 had not been constructed at this time.
Drainage Channel	2002	The Drainage Channel (spoon drain) connecting Dams 2 and 3 can be clearly identified. This drain extends past the east side of Dam 2 and around the northern side of the FL PAD area.
Dam 4	2002	Dam 4 was not yet in place in 2002.
	2004	Dam 4 was constructed by 2004.
	2007	The 2007 aerial photo shows the dams and lake in their current configuration.
Dam 1 & 2	26 June 2012	CFA ceased using water from Dam 1 and 2 including for training drills.

Other key information of the water supply and treatment systems past and present are:

- Lake Fiskville - has been present since the 1970s as two water bodies and in 1981 it had the appearance of one large water body. The lake was dredged in the early 1990s.

- Pump 1 (Primary pump for FLP) (Feature 26) - Installed in 1998 as part of the new PAD development at the site.
- Pump 2 (Backup pump for FLP) (Feature 38) - Installed in 1998 as part of the new PAD development at the site.
- WSP (Feature 25) - Installed in 1998 as part of the new PAD development at the site.
- Surge Basin (Feature 29) - Installed in 1998 as part of the new PAD development at the site.
- Triple Interceptor Trap (TIT) (Feature 28) - Installed in 1998 as part of the new PAD development at the site.
- Temporary storage tanks - Installed in August 2012.

The current site drainage system and infrastructure is summarised schematically in Figure 2-3 below.

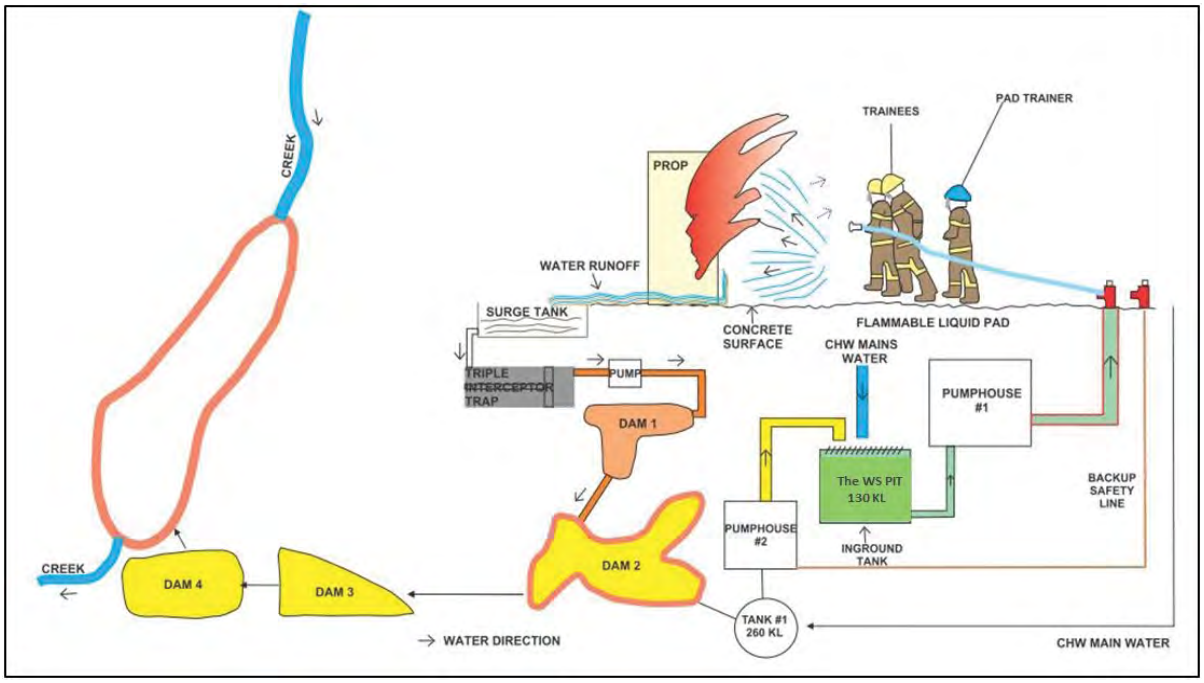

Figure 2-3: Schematic figure showing the dams and drainage system at FTC

2.4.1 Water Supply and Treatment System (late 1980s to June 2012)

The water treatment system is limited to oil separation and retention and consists of:

- Surge Basin (Feature 29): Training effluent and stormwater runoff from the FLP (Feature 27) drains to a 'Surge Basin' which is used to buffer the flow before it is discharged to a large capacity TIT (Feature 28). The Surge Basin and TIT are designed to remove litter, larger suspended solids/coarse sediment and free floating hydrocarbons (such as diesel and oil).
- TIT (Feature 28): The TIT is the primary treatment system involving oil-water separation with manual de-sludging to intermediate bulk containers for transport off-site by a waste contractor. It was not possible to ascertain the efficiency and capacity of the existing TIT. This treatment does not adjust the pH of the water or remove dissolved metals, light suspended solids, surfactants or emulsified or dissolved hydrocarbons. The design of the existing TIT did not allow flow to gravitate to Dam 1. Therefore, a pump was installed in a sump lower than the installed interceptor to transfer water from the TIT to Dam 1.

- Dam 1 and Dam 2 are serviced with aeration devices (propeller type) operated to provide some aeration to the water; this is expected to have limited benefits as far as improving the quality of water from the FLP. Between Dam 1 and Dam 2 there is a collapsed 300 mm concrete pipe that allows Dam 1 to overflow to Dam 2. Whilst the pipe is collapsed, water still passes through. The overflow from Dam 2 drains via an overland drain to Dam 3 and onto Dam 4 and ultimately to Lake Fiskville. There is also potential for additional runoff into Dam 1 from the VUT building (Feature 31).

There are two water supply pumps servicing the FLP:

- The primary pump (Pump 1, Feature 26) beside the PAD was originally connected to a water supply pit ('the WS Pit') adjacent to the FLP. The WSP is a below ground concrete structure holding approximately 130 kL of water with an open grated type cover that allowed surface runoff from the nearby area to enter. The WSP also received water from Central Highlands Water's potable supply available to the site from a 125 mm medium density polyethylene (MDPE) pipe on the Geelong-Ballan Road as well as water recirculated out of Dam 2 via a pipe connecting Dam 2 to the WSP.
- The secondary pump (Pump 2, Feature 38) located at Dam 2 delivers water recirculated from Dam 2 to the 'safety line' for the FLP. The primary and secondary/safety lines are also reported to be cross connected to allow the supply sources to the FLP to be changed over.

2.4.2 Water Supply and Treatment System (June 2012 to Present)

The use of water from Dam 2 (and Lake Fiskville) was suspended on 26 June 2012. The WSP was subsequently taken out of service and since 26 June 2012 the existing potable service from Central Highlands Water (CHW) has been used in training by filling a recently installed temporary tank (260 kL with approximately 180 kL nominal capacity) at the primary pump station (Feature 26). A second temporary 260 kL tank was installed at the secondary pump station on the safety line near Dam 2. This replaced the supply from WSP and Dam 2 with a town water supply. However, there are limits to filling these tanks with town water via the existing pipe infrastructure and potentially from the CHW. The above reconfiguration meant water used on the FLP does not include recirculated from Dam 2 and occasionally from Lake Fiskville. Therefore the following water supply changes were made at the site in July 2012:

- Dams 1 to 4 (offline)
- Lake Fiskville (offline)
- 130 kL (gross capacity, net capacity unknown) WSP (offline)
- 260 kL (gross) bulk (180kL net) temporary storage Tank 1 (replaced WSP)
- 260 kL (gross) bulk (180kL net) temporary storage Tank 2 (replaced Dam 2)
- 125mm MDPE pipe from CHW's potable supply pipe along the Geelong-Ballan Road
- Pump 1 (Primary pump for FLP) (Feature 26)
- Pump 2 (Backup pump for FLP, water previously supplied by Dam 2 currently supplied by Tank 2) (Feature 38)

The current arrangement also poses a water supply risk by relying on a single water supply source e.g. due to potential future water restrictions or drought conditions. The current water supply arrangement is a temporary arrangement due to limited supply capacity and further assessment of treatment options available for foams.

2.4.3 Other on-site dams

In addition to the features discussed above, there are seven other surface water features at FTC as shown in Figure 2 (Appendix A):

- Dam A, B, C, D and E are located in the golf course (Feature 54)
- A small unnamed dam located south-east of the airport hangar (Feature 13)
- A small shallow water body used for driver training drills, Water Crossing DET PAD (Feature 21b)

The source of water in these seven dams is inferred to be rainfall and local runoff or in the case of the driver training pond, mains water.

These dams are not associated with fire fighting training water supply or effluent management system on the PAD or Dam 1, 2, 3 and 4. The golf course dams are located east of the PAD area, which is topographically above the land where fire training activities occur which means that it is unlikely for runoff from potentially contaminated areas at the PAD to reach these dams. However, there is a potential for spray drift from fire training activities to reach these dams.

The quality of the water and sediment in these seven dams has not been assessed by the current or previous environmental assessments.

2.5 Surrounding Land Uses

The surrounding land uses, nearby to potential sources of contamination and sensitive receptors, are outlined in Table 2-3.

Table 2-3: Surrounding Land Uses

Direction	Land Use or Activity
North	• Lennox Lane, then farm land to the north • Widely spaced farm houses further north
West	• Farm land (livestock grazing) • Beremboke Creek is present in the western part of the site (Beremboke Creek changes name to Swamp Gully further to the north)
East	• Geelong-Ballan Road, then farm land (livestock grazing) • The deep valley of Yaloak Creek is located approximately 250 m east of the site at its closest point • A few scattered farm houses further east
South	• Farm land (livestock grazing) • Beremboke Creek to the south west • Off-site dams to the south west

2.6 Geology

The geology of the site and its regional setting has been ascertained from the following sources:

- Ballan 1:50,000 Geological Map Series (Geological Survey of Victoria, 1986)
- Melbourne 1:250,000 Geological Map Series (Geological Survey of Victoria, 1997)

The CFA Fiskville site is underlain by Newer Volcanics basalts of Quaternary age. The basalts are derived from lava flows from volcanic eruption centres that were scattered across a wide area to the west of Melbourne. The basalt is variably weathered and with clayey intervals present to a depths of between 24 and 29 mbgl. This is underlain by Tertiary sediments (clay and sand units) of the Werribee Formation. The surface soil at the site is generally basaltic

clay of less than 2 m thickness and is typically grey silty clay of high plasticity and low permeability when moist

Further details of site geology and aquifers are presented in Cardno Lane Piper's report titled *Groundwater Contamination Assessment - Fiskville Training College* (Cardno Lane Piper, 2014b).

3 SITE HISTORY & POTENTIAL FOR CONTAMINATION

3.1 Search of Historical Records

Historical records were reviewed in order to prepare the scope of works in the targeted areas listed in the IFI Report and to supplement the site history and assessment work completed by Golder Associates in June 2012. The scope of further work by Cardno Lane Piper beyond review of available documents was limited to collection and review of aerial photographs, certificates of title and CFA underground service plans.

3.1.1 Aerial Photographs

Aerial photographs were retrieved from DSE archives and CFA. These were reviewed and collected for evidence of relevant activities every 5 to 10 years over the recorded history of the site, subject to quality and resolution of the photographs. Photographs from DSE (pre 1991) were available in stereoscopic pairs and were viewed for additional evidence of excavations and landfilling. Copies of the reviewed aerial photographs are presented in Appendix C. Key observations relevant to this assessment are summarised in Table 3-1.

3.1.2 Certificates of Title

A search of the current certificates of title was conducted. A search of historical titles was conducted by Golder Associates in early 2012 (see Section 3.2.12). Copies of the current certificates of title are presented in Appendix D. Key milestones in site ownership relevant to site contamination are summarised in Table 3-1.

3.1.3 Amalgamated Wireless Australasia (AWA) Search

A search of the Internet for information on AWA was conducted to investigate the site use prior to CFA's occupation. Key observations relevant to the site are summarised in Table 3-1.

3.2 Review of Previous Environmental Assessment Reports

Cardno Lane Piper has reviewed several reports of previous environmental assessments and remediation works carried out at the site since 1988 (referred to above). A summary of relevant findings from a review of eleven reports, including the IFI report, are provided in the following sections. Historic soil sampling locations across the site, including the validation samples from remediated area within the FLP (Feature 27), are shown on Figures 4 to 9, Appendix A (and registered in the GIS).

References to specific areas of the site in the following sections are in line with existing nomenclature, which is sometimes different from that used in the historical reports.

3.2.1 AS James (1988), Geotechnical Investigation, Waste Disposal Site, Fiskville Training Centre, 1 July 1988

AS James was engaged to advise on the nature of waste in drums buried in trenches at the site in the early 1980s[1]. A summary of the findings is presented below:

[1] See separate Cardno Lane Piper report on investigation of buried drums titled "Buried Drums Assessment" (Cardno Lane Piper, 2014c)

- Drums were encountered in three trenches, each extending approximately 20 to 30 m in length
- Samples were collected from the drums and surrounding soil for laboratory analysis, where they were found to contain hydrocarbon compounds such as resins or solvents. Consistent with industry standards of practice at the, the laboratory did not report specific compounds of concentrations.

The actual location and depth of the trenches on the site, or the condition of the drums, were not recorded in the report.

3.2.2 Minenco (1996), CFA Fiskville Site Inspection, 31 May 1996

A Minenco (a former business of CRA, now Rio Tinto) representative conducted a site inspection and discussed activities at the site with a CFA representative. The objectives of the inspection were not identified in the letter prepared by Minenco. A summary of the findings is presented below:

- Diesel/petrol mixture used in the FMA (Feature 22) and former FLP (Feature 58) had been discharged to the ground due to the absence of appropriate pavements and bunding in these areas.
- The lack of bunding may have resulted in approximately 40,000 L of fuel loss in the previous 12 months. Fuel loss had also occurred in other areas of the site. The locations of the fuel losses and when the losses occurred are not stated.
- The ground surface in the FLP and FMA were observed to be saturated with hydrocarbons, including pools of free phase hydrocarbon at the surface in some areas. Some perimeter drains were found to be filled with water and petroleum fuel.
- Dam 1 was receiving all run off from the FLP and a hydrocarbon sheen was observed on its surface.
- One diesel UST was located at UST1 (Feature 8a) and was most likely used for indoor space heating.
- A decommissioned 2,000 L diesel UST, and two diesel and petrol USTs were located adjacent to the amenities building at Underground Storage Tank area 2 (UST 2) (Feature 8b).
- Three drum burial trenches were reportedly excavated parallel to each other south of the airstrip and north of Deep Creek Road in the mid-1980s (DBA 1; Feature 46). Trenches extended to a depth of approximately 1.0 mbgl. Anecdotal evidence of excavations conducted at that location suggested that the drums had rusted away completely. Further anecdotal evidence in the report asserts the contents of the drums (inferred to be solvents, thinners and paint sludges) had leaked into the bottom of the pit and were burned prior to backfilling the trench. The backfilled trench locations were evident in aerial photographs reviewed by Minenco in their report (refer to 1990 aerial photograph in Appendix C).
- Backfilled pits adjacent to the FLP (interpreted to be the former FTPs; Feature 45) were identified. The unlined pits were formerly used to burn fuels during fire training drills involving foam.
- Soil excavated from the former FTPs during decommissioning was reportedly buried in a “sludge burial pit” located 40 m east of the former FTPs, up to 6m deep. (Subsequent investigations conducted by Coffey with test pits TP1, TP2, TP3 and TP4 did not find evidence of the sludge burial pits which may indicate that these pits never existed and the sludge was backfilled into former FTPs and/or spread across the ground surface in the area of the former FTPs (Coffey 1996). However, it is noted that these four test pits excavated by Coffey did not test all possible areas where the sludge burial pits could have been located.)

3.2.3 Diomides & Associates (1996), Environmental Site Assessment, 27 June 1996

Cardno Lane Piper was not provided with this report. However, Minenco (1996) reported several details regarding the Diomides investigation. The following is a summary of this information.

- Diomides drilled sixteen boreholes at the site, targeting the FLP (Feature 27), former FTPs (Feature 45), FMA (Feature 22), UST1 (Feature 8a) and DBA1 (Feature 46).
- Individual soil samples were tested for TPH, BTEX, PAH and lead. Composite samples (3 and 5 part composites) were tested for phenols, zinc and chromium.
- Elevated lead (710 mg/kg) and TPH (14,132 mg/kg) concentrations were recorded in soil at one location at 0.5 mbgl in the former FTP area.
- TPH concentrations of 1,070 mg/kg and 1,585 mg/kg were recorded in soil at separate locations in the FLP, at depths of 0.1 m and 0.5 mbgl respectively.
- TPH concentrations of 7,040 mg/kg (1.0 mbgl), 2,548 (0.5 mbgl) and 1,185 mg/kg (0.1 mbgl) and a BTEX concentration of 62 mg/kg (1.0 mbgl) were recorded at DBA1.
- Phenol concentrations of 1.9 mg/kg and 1.3 mg/kg were recorded in three-part composite samples in DBA1.
- Chromium concentrations above the modified assessment criterion were recorded in seven of the nine composite samples analysed. The maximum concentration recorded was 140 mg/kg. The majority were five-part composites making this assessment of low reliability than would be the case if individual samples were tested.
- Three sediment samples were recovered from Dam 1 and analysed for TPH, BTEX, PAH, and selected heavy metals, with elevated TPH concentrations detected above the adopted criteria.
- There was no testing for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) or 6:2 fluorotelomer sulfonate (6:2 FtS) during this phase of work. Awareness and testing for these compounds has only arisen in the industry practice in the last several years.

3.2.4 Coffey Partners International (1996a), Field Site Appraisal and Sampling, Ballan, Vic, 7 August 1996

Coffey reviewed aerial photographs and conducted intrusive investigations in the former FTP area (Feature 45). Coffey excavated twenty test pits in areas referred to as the “former sludge pit” or foam training pits (FTPs). Soil samples were collected from seven of these test pits. A summary of the results and findings is as follows:

- The area surrounding the former FTPs was covered with black diesel sludge until about 1989. Significant spillage had occurred at the eastern end of the pits.
- In 1990, a 300 mm layer of scoria was deposited on the spillage area and former FTPs.
- The sludge burial pits referred to by Minenco (1996) could not be located.
- Black hydrocarbon sludge was identified beneath the topsoil in the area of the former FTPs. The sludge was generally 20 to 50 mm thick, or where mixed with soil, was up to 400 mm thick. The area of sludge was approximately 1,200 m^2, equating to a volume in the range of 20 to 60 m^3.
- Twelve headspace PID readings and eight in-situ PID results recorded three concentrations in the range of 23.4 to 30.9 ppm. The remainder of the results were below 7.2 ppm, indicating no widespread presence of volatile hydrocarbons in soil at the former FTPs.
- Laboratory analysis of the soil samples recorded the following:

- TPH concentrations greater than 80,000 mg/kg in two soil samples at depths of 0.6 m and 1.0 m from the same test pit.
- TPH concentration of approximately 3,000 mg/kg in two soil samples from separate test pits at depths of 0.2 m and 0.3 m.
- TPH was detected in two other samples but at concentrations below Coffey's assessment criterion of 1,000 mg/kg, and was not detected in the remaining four samples.
- BTEX concentrations in two samples were below Coffey's assessment criterion. Eight other samples recorded BTEX concentrations below the laboratory limits of reporting.

- There was no testing for PFOA, PFOS or 6:2 FtS during this phase of work. Awareness and testing for these compounds has only arisen in the industry practice in the last several years.

3.2.5 Coffey Partners International (Coffey 1996b), Groundwater Monitoring Network Installation, Ballan, Vic, 15 October 1996

Coffey was engaged to install a groundwater monitoring network at the site to ascertain the potential for groundwater contamination from a number of potential contaminant sources at the site. During the drilling of these bores two soil samples were analysed from each of the following three locations:

- FLP (Feature 27)
- Former FTPs (Feature 45)
- DBA 1 (Feature 46)

The results are summarised as follows:

- One shallow bore adjacent to DBA 1 recorded TPH, copper and zinc at concentrations above assessment criteria. Coffey concluded that TPH was due to impacts from the drums in DBA 1, while the copper and zinc levels were representative of background concentrations.
- Chromium, copper, mercury, nickel, lead and zinc were detected in all six soil samples but at concentrations below Coffey's assessment criteria.
- The groundwater bore installed within the basalt recorded nickel, copper and zinc above assessment criteria but at concentrations which Coffey concluded to be representative of background concentrations.
- The maximum headspace PID result recorded was 4.5 ppm, indicating an absence of volatile hydrocarbon compounds at the locations and depths investigated.
- One borehole adjacent to DBA 1 intersected shallow groundwater (<1.8 mbgl), suspected to be due to perched water in the DBA 1 trench. Three other shallow bores (<3 mbgl) near the FLP did not encounter any groundwater.
- One borehole near the FLP intersected groundwater in the basalt at approximately 15 mbgl. Three other bores extending between 20 and 25 mbgl into the basalt did not encounter any groundwater (this is consistent with Cardno Lane Piper's subsequent groundwater investigation detailed in the report titled *Groundwater Contamination Assessment - Fiskville Training College* (Cardno Lane Piper, 2014b)).
- There was no testing for PFOA, PFOS or 6:2 FtS during this phase of work. Awareness and testing for these compounds has only arisen in the industry practice in the last several years.

Further detailed reviews of the groundwater observations in this report can be found in Cardno Lane Piper's report titled *Groundwater Contamination Assessment - Fiskville Training College* (Cardno Lane Piper, 2014b).

3.2.6 Coffey Partners International (Coffey 1996c), Sediment and Surface Water Sampling, Ballan, Vic, 15 October 1996

Coffey was engaged to undertake a preliminary assessment of surface water and sediment contamination status in the drainage system of the site. The results are summarised as follows:

- Surface water samples were recovered from seven locations including: Dam 1 inlet, Dam 2 inlet and outlet, two Lake Fiskville inlets (from Dam 2 and upstream), Lake Fiskville outlet and downstream of Lake Fiskville.
- TPH was recorded at concentrations above Coffey's assessment criteria at the inlets of Dams 1 and 2, and at the outlet of Dam 2.
- Copper, zinc, nickel and lead were recorded at concentrations above Coffey's assessment criteria at some locations, including both upstream and downstream of Lake Fiskville, but were considered by Coffey to be representative of background concentrations.
- Sediment samples were collected from three locations within Dam 2.
- TPH was detected at concentrations above the criterion in one sediment sample.
- Chromium was recorded at concentrations above Coffey's assessment criterion at all three locations, but at concentrations considered to be background levels.
- There was no testing for PFOA, PFOS or 6:2 FtS during this phase of work. Awareness and testing for these compounds has only arisen in the industry practice in the last several years.

3.2.7 CRA ATD (formerly Minenco) (1996), Review of Site Assessments and Remediation Options, Fiskville Training College, 28 November 1996

CRA was engaged to review previous environmental investigation results to identify areas of contamination, assess the risks associated with the contamination and evaluate remediation options. The data used for the CRA report is summarised in the previous sub sections (i.e. historical reports). Significantly, a figure showing the approximate location of DBA 1 is presented in the 1996 Minenco report, and is also presented in Figure 9, Appendix A of this report. The remediation options section of the CRA report concluded the following:

- Hydrocarbon contamination found in soil at the UST1 (Feature 8a) at the training centre did not constitute a human health risk
- The risks from contamination at the site arise from:
  - Worker and trainee exposure to contamination, particularly in the FLP (Feature 27) and FMA (Feature 22).
  - Surface water run-off and soil erosion from the FLP and FMA (Feature 22) to Dam 1, and off-site via Dam 2.
  - Exposure of workers during excavation of contaminated areas.
- Removal of contaminated soils and buried wastes would remove future risks to groundwater
- CRA recommended bioremediation ("land farming" or "composting") of hydrocarbon impacted soils from the former FLP, FMA, former FTPs (Feature 45), DBA 1 and sediments in the dams.

3.2.8 Rio Tinto (1997), DRAFT Fiskville Training College Remediation Action Plan, 11 December 1997

Rio Tinto (formerly CRA ATD) was engaged to prepare a Remediation Action Plan (RAP) for soil in the FLP (Feature 27) and former FTPs (Feature 45). The details of the proposed remediation were:

- Excavation of the impacted soils from the FLP and former FTPs for on-site bioremediation at the Soil Composting Area (SCA; Feature 44).
- The SCA would be unlined underneath the windrows.
- Compacted clay bunding between 0.3m and 0.5 m high would be installed around the perimeter of the SCA.
- Runoff from the SCA bunded area would be diverted to Dam 1.
- Equipment and machinery would be excluded from the SCA where possible, and any machinery or equipment that comes in contact with the SCA would be decontaminated.
- Bulking material, green material, microorganisms, gypsum and nutrients should be added to the soil as required.
- The remediation was expected to take 3 months but would be sampled and analysed weekly.
- At the completion of remediation, the soil could be re-used for landscaping or construction of the new FLP.

3.2.9 Coffey Partners International (1998), Soil Remediation and Validation Program, Fiskville, 18 March 1998

Coffey was engaged to oversee the construction of the remediation facility, and supervise and validate the excavation of the contaminated soils at the FLP (Feature 27) and former FTPs (Feature 45). A summary of the works is as follows:

- The excavated soil was placed in windrows in the SCA (Feature 44).
- The excavation occurred in two stages. Stage 1 involved major excavation works and Stage 2 was conducted approximately 2 months later, following receipt of validation sample results, to remove the remaining contaminated material (from Stage 1 excavation).
- Contaminated soil was excavated from the following areas, although it was noted that the two areas were adjoining, resulting in one large excavation:
  - FLP and adjacent features/areas including an open drain along the Dam 1 boundary, an interceptor pit to the north-west and former fuel mixing area.
  - The two Former FTPs.
- The FLP excavation area was approximately 90 x 80 m with a typical depth of 0.6 mbgl although in some areas it was extended to 1.2 mbgl. The approximate volume of soil excavated was 4,300 m^3.
- Contaminated scoria and sludge were excavated from the former FTPs. The excavated area was approximately 55 x 40 m with a typical depth of 0.4 mbgl along the eastern side (including the spillage area from the former FTPs). Depths of up to 1.2 mbgl were excavated in the western area of the former FTPs. The approximate volume of soil excavated was 1,080 m^3.
- The results of validation sampling from the walls and base of the excavation confirmed the absence of TPH, lead and total phenols in soil at concentrations above the assessment criteria, and therefore it was recommended that the excavations be backfilled with clean fill (Cardno Lane Piper has not sighted any documentation regarding the quantity or quality of backfill material).

- There was no testing for PFOA, PFOS or 6:2 FtS during this phase of work. Awareness and testing for these compounds has only arisen in the industry practice in the last several years.

3.2.10 Rio Tinto (1999), Remediation of Hydrocarbon Contaminated Soil, CFA Training College Fiskville, 15 June 1999

Rio Tinto was engaged to manage the on-site treatment of the contaminated soils being remediated in the SCA (Feature 44). The following presents a summary of the soil treatment works conducted at the site:

- A total of 4,300 m^3 of contaminated soil from the excavated areas was remediated in four windrows. This is approximately 1,000 m^3 less than that reported by Coffey in 1998.
- The TPH concentrations of samples recovered from the windrows averaged 730 mg/kg after 6 months' remediation.
- Samples were also analysed for lead, due to one elevated lead concentration being detected in the former FTP area (Feature 45) prior to remediation. A lead result of 360 mg/kg was recorded in one sample, however, subsequent analysis of the same sample recorded a concentration of 60 mg/kg. Of the other samples collected from the four windrows, the maximum lead concentration detected was 97 mg/kg – well below criteria.
- Rio Tinto concluded that soil could now be re-used on-site e.g. possibly placed under a new FLP (Feature 27) to be constructed (subject to a geotechnical assessment), or spread across the SCA.
- Rio Tinto reported that CFA had advised that the windrows would remain in situ for the "foreseeable future".
- There was no testing for PFOA, PFOS or 6:2 FtS during this phase of work. Awareness and testing for these compounds has only arisen in the industry practice in the last several years.

3.2.11 Professor Robert Joy, (IFI 2012), Understanding the Past to Inform the Future – Report of the Independent Fiskville Investigation, June 2012

In 2012, CFA launched an independent investigation into the possible impacts of training practices at the Fiskville Training College. The investigation involved a team of independent consultants including Golder Associates, led by Professor Rob Joy. The investigation involved interviews and a detailed search into the document archive of CFA. The findings of this investigation relevant to site contamination issues are summarised as follows:

- The site accepted various types of flammable materials (including flammable liquids) and fire extinguishing agents from numerous sources on an "ad hoc" basis. The flammable liquids were typically supplied in 200 L steel drums or delivered by tanker truck. The flammable liquids may have included materials such as waste oil, solvents, paint thinners, aviation gasoline, kerosene and other aircraft fuels, although the exact contents of these shipments are not known.
- The flammable liquids were stored in areas mainly around the FLP (Feature 27) (in drums placed in the sheds or in above ground storage tanks), and within the Props Storage Area (Feature 17). Some of this material was also stored in drums near the Learning Centre (Feature 3). The drums were typically in good condition but it was noted that a few drums were damaged.
- The site contained various USTs (Features 8a and 8b) and ASTs (Features 23a and 23b), some of which were used to store the flammable liquids for fire fighting training and others to store fuels for vehicles.
- The ad hoc approach to receipt of flammable liquids ceased in the mid-1990s.

- Solid combustible substances such as timber pallets, motor vehicles, other wood and tyres were stored and burned on-site.
- Combustible solid chemicals including aluminium, chlorine, phosphorous, magnesium, sodium and sulphur were also stored and burned on site as part of fire safety demonstrations by trainers. Storage of the items discussed above was generally not well controlled.
- The site has two closed landfills:
  - Landfill 1 (AWA landfill; Feature 42) which was present prior to CFA's occupation of the site in 1970 and was probably disused after 1984 when the new Landfill 2 was established.
  - Landfill 2 (CFA landfill; Feature 43) which was operated from 1984 until its closure in 1996. The CFA landfill accepted crushed drums that were usually empty or contained solidified waste, and scrap from the FLP area. It should be noted that there is no information available about the location or method of drum crushing undertaken and refer to Cardno Lane Piper's report titled *Buried Drums Assessment* (Cardno Lane Piper, 2014c) for further information.
- Four Drum Burial Events and two Drum Extraction Events are known to have taken place at the site, including;
  - First Drum Burial Event in the vicinity of Landfills 1 and/or 2 (Features 42 and 43): A large number of drums (possibly one hundred drums) that were corroded by flammable liquids and were releasing unpleasant odours were buried in a pit in the vicinity of the landfills in 1979 or 1980. Additionally, drums no longer considered useable were typically crushed and disposed of to the landfills in the 1970s and 1980s.
  - Second Drum Burial Event most likely at Drum Burial Area 2 (DBA 2; Feature 47): In 1982, about six drums (in a group of 160 drums) containing toxic and corrosive liquids caught fire at the DFA and damaged 20 to 30 drums. The fire-affected drums were removed and reportedly buried in three trenches just north of the administration building, according to the IFI Report. Prior to burial, the drums were split open and the remaining liquid was set on fire.
  - Third Drum Burial Event at an unknown location. Between 1983 and 1986, drums from the former drum storage area not affected by the drum fire in 1982 were buried in three trenches of between 30 m and 50 m in length. Anecdotal information from a former contractor indicated the location to be Drum Burial Area 3 (DBA 3; Feature 48) (the same contractor later advised in an interview that the location could be Drum Burial Area 3a (Feature 48a). IFI concluded that it could also have been one of the other areas of drum burial areas (i.e. DBA 1 or DBA 2).
  - Fourth Drum Burial Event, most likely to have occurred at Drum Burial Area 1 (DBA 1; Feature 46): In the mid-1980s, three trenches were excavated south west of the airport hangar and approximately 120 to 400 empty and partially empty drums were rolled into these trenches and burnt. It is unknown how deep the trenches were or what material was used for backfilling, or if the excavated material was re-used elsewhere on site during this process. (Figure 1 in the CRA report (CRA, 1996) shows the location of the burial trenches in relation to the Coffey bores BH4 & BH5 which can be located today. This indicates that the southern-most trench is south of Deep Creek Rd.)
  - First Drum Extraction Event: In 1991, 75 drums and 243 tonnes of contaminated soil was removed from Fiskville, most likely associated with the Third Drum Burial Event according to the IFI Report (possibly DBA 1, DBA 2, DBA 3 or DBA 3a (Features 46, 47, 48 and 48a).
  - Second Drum Extraction Event: In 2002, an independent contractor encountered buried drums and associated liquids whilst operating a bulldozer deep-ripping an area for tree plantation to the south of the airport hangar. Following this discovery, approximately 56 drums, 136 tonnes of contaminated soil and 2,940 L of liquid

"product"[2] were removed from the site (Second Drum Extraction Event). There were no records of where the waste drums, soils and liquids were disposed to. This discovery and extraction event is believed to be in DBA 1 (Features 46a and 46b).

- USTs used for fuelling vehicles were removed by Coffey in 1996, however, the removal and location of the USTs is not reported.
- The IFI report concluded that PCB may have been brought onto the site as a constituent of waste motor oils or within electrical transformers, although it was considered unlikely.
- An upgrade to the FLP (Feature 27) was completed in 1999 following remediation of the contaminated soil excavated from this area. The upgrade included a concrete pavement hard stand and bunding. LPG was also introduced as the primary fuel source instead of flammable liquid fuels, for the majority of fire training.
- Aqueous film-forming foams were used at the site for fire fighting training. These foams contained PFOS and PFOA, and were used from the 1970s until 2007. (While the replacement foams do not contain PFOS or PFOA, Cardno Lane Piper has identified that the currently used foam contains other perflouoro compounds (PFC).
- The most likely sources of contamination at the site include:
  - Materials used in the fire training activities on the PAD, including foams
  - Storage of fuels and other flammable materials
  - Burial of drums containing liquids and sludges on-site, including in the on-site landfills
  - Potential leakage from former underground fuel storage tanks
- Further work is needed to:
  - Characterise risks to groundwater
  - Better quantify the potential risks to human health downstream of Lake Fiskville (taking into account dilution, environmental fate and transport mechanisms)
  - Investigate and potentially reduce sources of PFOA and PFOS discharges into Lake Fiskville.
- PFOS and PFOA residues will have moved off-site via Lake Fiskville and Beremboke Creek, however, the off-site risk presented by waterborne contaminants are low to very low
- There is no off-site risk presented by sediment and/or soil contamination

The IFI report provided ten recommendations, including investigations into the likely areas which may be sources of contamination as stated above.

3.2.12 Golder Associates (2012), Preliminary Site Assessment, CFA Training College, Fiskville, Vic, 15 June 2012

Golder Associates (Golder) was engaged to undertake a preliminary environmental site assessment for the purpose of informing the IFI inquiry. Golder was tasked with assessing the risk of buried flammable substances or other contaminants on-site, identifying their locations, identifying data gaps, recommending any clean up required, and recommending actions to improve the information base. Golder conducted a site history review and a limited investigation of soil, sediment, surface water and tree material in targeted areas. The following presents a summary of Golder's investigation and results:

- Surface water samples from Lake Fiskville and Dams 1 to 4 recorded concentrations of PFOA and PFOS above drinking water criteria.
- Surface water samples from Lake Fiskville and Dams 1 to 3 recorded concentrations of TPH above drinking water criteria.

[2] The term 'product' in the environmental industry generally means liquid petroleum hydrocarbon product such as petrol or diesel or another fuel type.

- Surface water samples from Lake Fiskville recorded concentrations of copper and zinc above ecological protection criteria.
- Sediment samples from Lake Fiskville recorded concentrations of dioxins and furans above ecological protection criteria.
- Sediment samples from Dams 1 and 2 recorded concentrations of PFOS and TPH above human health criteria.
- Golder concluded that the surface water and sediment concentrations in Lake Fiskville were unlikely to have an adverse impact on human health or ecological ecosystems, but further assessment was recommended to confirm this.
- Some potential areas of contamination were targeted for intrusive soil investigations, including the soil composting area (SCA; Feature 44), drum burial area 1 (DBA 1; Feature 46), props storage area (PSA; Feature 17) and former drum fire area (DFA; Feature 49).
- Golder identified additional areas where potential sources of contamination may be present but due to the time constraints to complete their assessment, many of these areas were not investigated including the PAD training areas and 4WD area (Feature 21).
- Golder collected nineteen primary soil samples from their targeted investigation areas and analysed them for potential contaminants of concern as determined from their site history review. A summary of their results and findings is presented below:
  - A 4-part composite sample from a windrow in the SCA (Feature 44) area recorded PFOS at 2.19 mg/kg. Individual samples from the composite were not tested in this case. Thus, the result could be a combination of up to four samples and the actual result for one sample could be up to about 12 mg/kg.
  - One sample from the PSA (Feature 17) recorded a 3- and 4-methyl phenol concentration above the ecological protection criterion but was well below the human health investigation level (HIL-F).
  - Apart from the analytes discussed above, all other results (including TPH, metals, BTEX, PAH, PCB, pesticides, perchlorates, VOC and SVOC) were recorded at concentrations either below the LOR or the assessment criteria.
  - The maximum headspace PID result recorded was 2.0 ppm, indicating an absence of volatile hydrocarbon compounds at the sample locations in the areas investigated.
- Golder engaged Cardno AUS to perform ground penetrating radar (GPR) surveys of three drum burial areas (i.e. DBA 1 (Feature 46), DBA 2 (Feature 47) and DBA 3 (Feature 48)). The GPR survey did not report any subsurface anomalies indicative of drum burial.
- Tree core samples were collected from eucalyptus trees in DBA 1 (Feature 46). These samples were analysed for VOC to identify potential uptake of contaminants in the soil via tree roots. All samples reported VOC concentrations below the laboratory limits of reporting.

3.3 Summary of Relevant Site History Events

Historical land uses and investigation activities occurring at the site are summarised in Table 3-1. Activities and features with the potential to cause contamination are in **bold text**.

Table 3-1: Land Use History & Activities

Date	Information Source	Interpretation
29 January 1910	Certificate of Title Vol 3538. Fol	Edward Brown owner.

Date	Information Source	Interpretation
	279412	
2 October 1911	Certificate of Title Vol 3538 Fol 707516	Registered proprietor is William Frederick Coltman and Frederick Edward Sides.
11 October 1911	Certificate of Title Vol 3390 Fol 667672	Registered proprietor is James Isaac Watson.
6 November 1920	Certificate of Title Vol 3390 Fol 121375	Registered proprietor is George William Stead.
5 May 1925	Certificate of Title Vol 3390 Fol 971789	Registered proprietor is the Amalgamated Wireless (Australasia) Ltd (AWA). The site was used as a **radio transmitter station**.
1927	Angelfire Website Feb 2013	**Diesel generators** were used to power the site.
1940s	Angelfire Website Feb 2013	**Workshops** were expanded to make high speed telegraph apparatus. There is no information available about the AWA workshops in 1940s and therefore, the location and potential COPC for the workshops are unknown.
December 1941	Angelfire Website Feb 2013	3 x 150 hp **diesel engines** shut down and mains power took over.
5 August 1948	Certificate of Title Vol 3390 Fol 2157364	Registered proprietor is the Overseas Telecommunications (Australia) Commission (OTC) who took over AWA's operations
31 May 1969	Angelfire Website Feb 2013	Final radio transmission after which the station was closed.
February 1970	Aerial Photograph	A building in the centre of the site is present, which may have been the **diesel generator** house for AWA/OTC operations. Other buildings are present which resemble the dining room and recreational facilities (Feature 9) and temporary accommodation (Feature 10) on the east boundary. Two buildings are present in the residential area of the site. Lake Fiskville is present in the south west area of the site. The **STP** seems to be present to the west of the amenities building. Dense tree growth is present around the buildings. The remainder of the site appears to be pasture/grassland, apart from a couple of roads between the buildings on the west of the site. There is some evidence of ground disturbance in the south-western corner at the location of **Landfill 1** (Feature 42). Surrounding land off-site appears to be predominantly rural farmland.
1971	IFI Report 2012	CFA 'purchased' or occupied the site (although land titles show it was not owned by CFA until 1982).
1972	Aerial Photograph	The site does not appear to have as much grass cover as in 1970, including the south-western corner where the **landfills** (Features 42 and 43) are located. The remainder of the site and off-site remains relatively unchanged from the 1970 aerial photograph.
August/September	IFI Report 2012	CFA staff move into newly renovated buildings at Fiskville and classroom-based training of fire fighters commences

Date	Information Source	Interpretation
1972		at the site.
1974	IFI Report 2012	**FLP** (Feature 27) constructed and practical **fire fighting training** commences at the site (Golder report states that practical fire training started in 1973).
1977	Aerial Photograph	The **FLP** (Feature 27), **FTPs** (Feature 45) and amenities building (Feature 16a) are visible near the Learning Centre (Feature 3). **Dam 1** is also present. There is some evidence of ground disturbance or materials storage to the west of the Learning Centre (Feature 3). **Landfill 1** (Feature 42) is also evident and the area slightly north of Landfill 1 is cleared for CFA communication antennas to be located here. There appears to be additional buildings in the residential area (Features 11a and 11b) in the western area. Fiskville Parade East and associated tracks and road heading towards the air strip (Feature 14) are visible.
1977	Golder 2012	Construction of **FLP** (Feature 27) and **FTPs** (Feature 45) has been completed.
1979 or 1980	IFI Report 2012	**First Drum Burial Event**: Approximately 100 corroded drums, reportedly releasing unpleasant odours were believed to have been crushed and disposed of in the vicinity of the landfills, such as Landfill 1 (AWA; Feature 42) or Landfill 2 (CFA; Feature 43).
21 December 1982	Certificate of Title	Registered Proprietor is the CFA.
22 December 1982	IFI Report 2012	Six drums (in a stack on 160 drums) containing highly flammable liquids and located to the west of the Learning Centre (Feature 3) caught fire (**Drum Fire Area**, Feature 49). A total of 20 to 30 drums were damaged in the fire.
December 1982 or early 1983	IFI Report 2012	**Second Drum Burial Event**: 20 to 30 fire damaged drums from the DFA were believed to have been buried to the north of the administration building at DBA 2 (Feature 47).
1983 (to 1986)	IFI Report 2012 and AS James 1988	**Third Drum Burial Event:** Three drum burial trenches were excavated somewhere on-site, the exact location is unknown, but it was believed to be either DBA 1, DBA 2 DBA 3 or DBA 3a (Features 46, 47, 48 and 48a), to bury remaining drums not impacted by the drum fire. It was probably more than 100 drums, and trenches were between 20 to 50m in length.
1984	IFI Report 2012	**Landfill 2** (Feature 43) is opened by CFA in the south west portion of the site. Landfilling of Landfill 1 (Feature 42) probably ceased at this time.
1984 (approx.)	Minenco 1996 & IFI Report 2012	**Fourth Drum Burial Event:** Three drum burial trenches were excavated south of the airport hangar (Feature 13) in DBA 1 (Feature 46). Minenco reports that the drums were split and the contents burnt and large volumes remained unburnt at the time of backfill. IFI reports that the drums were rolled in, crushed and buried, and the number of drums was in the range of 120 to 400.
1985	Aerial Photograph	There is land disturbance to the east of the Learning Centre (Feature 3), most likely for the construction of

Date	Information Source	Interpretation
	(low resolution)	Dams A and B on the golf course. It appears that the **PSA** (Feature 17) is under construction. There are no other significant changes evident either on-site or off-site, although this cannot be confirmed due to the low resolution of the photograph.
1985	Golder 2012	Drums no longer stored at rear of training centre, and were moved to PSA (Feature 17)
31 May 1988	AS James 1988	AS James investigated three drum burial trenches. However, the location of the drums and investigation is unclear as the report did not include a satisfactory site plan. This may have been in DBA 1, DBA 2 or DBA 3 (Features 46, 47 and 48) according to IFI Report (referred to as Third Drum Burial Event in IFI Report). Subsequent anecdotal evidence provided to Cardno Lane Piper indicates the burial could also have occurred at DBA 3a (Feature 48a).
1989 - 1991	IFI Report 2012	**FTPs** (Feature 45) backfilled, possibly with composted soil or scoria used to construct the platform around Dam 2.
1990	Coffey 1996a	FTPs (Feature 45) backfilled with scoria, and 0.3 m of scoria placed around contaminated area adjacent to FTPs (Feature 45).
1990	Aerial Photograph (colour)	Additional buildings are present, resembling the classrooms (Feature 4), **maintenance workshop** (Feature 6) and the reception building (Feature 2). The **PSA** (Feature 17) and **aircraft hangar** (Feature 13) are also visible. A large amount of scoria (appearance of red soil) and land disturbance to the south of the FLP (Feature 27) in the vicinity of **Dam 2.** Two additional training **PADs** and buildings are also present in that area. Additional buildings in the residential (Features 11a and 11b) and recreation areas (Feature 9) are also present. A small excavation is visible in the stereo pair at **Landfill 2** (Feature 43). There are 3 or 4 narrow scars in the ground in the vicinity of **DBA 1** (Feature 46). These are potentially backfilled trenches. Lake Fiskville and Dam B (golf course) appear to be full of water. Between the 1985 and 1990 images, a lot of development has occurred at the site for its use as a training college.
1991	IFI Report 2012	First Drum Extraction Event: 75 drums and 243 tonnes of contaminated soil, probably associated with the Third Drum Burial Event were disposed off-site. The exact location is unknown, and could be in any of DBA 1, DBA 2, DBA 3 or DBA 3a.
1995	IFI Report 2012	Fire Attack Building on FLP is decommissioned.
May 1996	Minenco 1996	Minenco conducted site inspection and observed significant soil staining in FLP (Feature 27) and surrounding area. A hydrocarbon sheen was also observed on the surface of Dam 1.

Date	Information Source	Interpretation
June 1996	Diomides 1996	Diomides drilled 16 boreholes across site in the vicinity of the FLP (Feature 27), DBA 1 (Feature 46) and UST 2 (Feature 8b).
August 1996	Coffey 1996a	Coffey encountered a significant area of black sludge in the **former FTPs** (Feature 45) and FLP (Feature 27).
October 1996	Coffey 1996b	Coffey installed groundwater monitoring wells at the site and conducted additional soil sampling.
November 1996	CRA 1996	CRA reviewed historic environmental reports and provided a summary report of the findings.
1996	IFI Report 2012	**Former USTs** (Features 8a and 8b) were used to refuel vehicles) were removed by Coffey between 1996 and 1998. However, the Coffey reports from 1996 and 1998 do not discuss UST removal.
December 1997	Rio Tinto 1997	Rio Tinto prepared a Remediation Action Plan and recommended on-site bioremediation (composting) of contaminated soils to be excavated from the FLP (Feature 27), FTP (Feature 45) and nearby area.
January to March 1998	Coffey 1998	Between 4,300 and 5,400 m^3 of contaminated soil from FLP (Feature 27), former FTP (Feature 45) and surrounding area is excavated and placed in bioremediation windrows in **SCA** (Feature 44).
1998	Aerial Photograph	The golf course, Dam 2 and Dam 3 have been constructed. Dam 3 appears to be not in operation as it was not filled with water. The remediated area of the former FTPs (Feature 45) and FLP (Feature 27) are visible, as are the 4 windrows of soil approximately 250 m in length in the SCA (Feature 44). The smaller **training PADs** and some additional buildings are evident to the south of the FLP (Feature 27). Additional roads have been constructed. Landfill 2 (Feature 43) does not appear much different from the 1990 image. The remainder of the site and off-site appear relatively unchanged.
June 1999	Rio Tinto 1999	Soil in the windrows in SCA (Feature 44) was tested for TPH and lead. The concentrations of TPH and lead recorded were considered acceptable for re-use on-site. CFA advised they would leave the windrows in place for the foreseeable future. (This soil has since been used, probably on-site, and only about 30% of the original length of windrows remain). The volumetric balance of the soil windrows in the SCA should be assessed to confirm if it is all accounted for on-site (e.g. in 4WD area)
1999	IFI Report 2012	FLP (Feature 27) upgrade completed by construction of the infrastructure currently at the site, including the **fill platform**. LPG replacing flammable liquids as primary fuel on FLP (Feature 27) for the majority of training.
Early 2002	IFI Report 2012	Buried drums encountered by maintenance worker (bulldozer ripping soil) at DBA 1 (Feature 46), which were then subsequently removed during the Second Drum Extraction Event.
March 2002	IFI Report 2012	Second Drum Extraction Event: 56 drums, 136 tonnes of contaminated soil and 2,940 L of “product” (probably from

Date	Information Source	Interpretation
		the inferred areas of buried drum removal (Features 46a and/or 46b) within DBA 1 (Feature 46) and associated with the Fourth Drum Burial Event) disposed of off-site.
2002	Aerial Photograph	The image is quite dark and changes may not be evident. However, the new FLP (Feature 27) is present and **Dam 3** appears to contain water and is in-use. The remainder of the site and off-site remain relatively unchanged.
2004	Aerial Photograph	Dam 4 has been constructed and contains water. A channel connecting Dam 3 to Dam 4 is also shown.
2007	IFI Report 2012	PFOS use ceases at site.
2007	CFA Personnel	DET PAD (Feature 21a; also known as 4WD training area) constructed using soil sourced from the SCA (Feature 44) and sediments dredged from Lake Fiskville.
2007	Aerial Photograph	The northern end of the SCA (Feature 44) and some of the windrows are no longer visible. The remaining windrows appear to be about half the original length. This soil was understood to have been used to construct the DET PAD (Feature 21a). Additional infrastructure visible at the site including **DET PAD** (Feature 21a), the USR PAD (Feature 39) and **VUT building** (Feature 31). Significant tree plantation is evident near the north-east and south-east of the site. The dense tree growth around the recreational area is gone but appears to have been replaced with a new plantation. The remainder of the site, and off-site, appear relatively unchanged.
2010	Aerial Photograph	The **DET PAD** (Feature 21a) appears to have been expanded and tree plantations appear to be denser. The remainder of the site and off-site appear unchanged.
2012	Golder 2012	Golder conducted intrusive investigations at SCA (Feature 44), PSA (Feature 17), DFA (Feature 49), and DBA 1 (Feature 46); and GPR survey at DBA 1 (Feature 46), DBA 2 (Feature 47) and DBA 3 (Feature 48).

3.4 Site Inspection Observations

A detailed site inspection was carried out by Cardno Lane Piper on 13 July 2012. The site inspection did not include the VUT building (Feature 31) which is used for testing the fire-rating of building materials. Table 3-2 summarises the observations recorded. Figure 2 in Appendix A shows the locations of the site features. Selected site photographs are presented in Appendix B. The VUT Building was inspected at a later date and is documented in the report titled *Environmental Inspection of VUT Facility* presented in Appendix E.

Table 3-2: Site Inspection Observations

Item	Observations and Descriptions
Surface coverings	Concrete pavements are present at the FLP (Feature 27) and other PADs, around the reception (Feature 2) and learning centre (Feature

Item	Observations and Descriptions
	3) areas and dining halls (Feature 9). In the FLP (Feature 27), where the concrete is up to 300 mm thick, was observed to be in good condition with minimal cracking. The concrete in the other PADs were also in good condition. The PSA (Feature 17) and both ASTs (Features 23a and 23b) had gravel surface cover. Gravel and crushed rock roads lead to the west of the site towards residential buildings and Lake Fiskville, and north towards the hangar building. The airstrip (Feature 14) has no pavement and appears to be constructed on bare ground. Other parts of the site comprise grassed open areas and tree plantations.
Site slope & drainage features	The operational area of the site is generally level but drains towards Beremboke Creek to the west. The ground rises again towards the residential area on the western boundary. The highest elevation is at the north-western corner and the lowest the point is where the creek leaves the site near the south western corner. The PAD area south of the FLP (Feature 27) has been artificially raised by filling with scoria to form Dam 2. Surface water at the site drains west towards Beremboke Creek which drains into Lake Fiskville, which then flows south west off-site via Beremboke Creek. Local drainage due to overflows from fire fighting water system during training drills would also occur close to Dams 1 to 4. In the summer of 2012/13 the lake level fell such that the lake has not overflowed to the creek since. The source of the water in Dam A, B, C, D and E (inside the Golf Course) is likely to be from rainfall and local runoff. The quality of the water and sediments in these dams has not been assessed by current or previous assessments.
Nearby natural water bodies	Beremboke Creek runs along the western portion of the site, through Lake Fiskville. It continues off-site to the southwest with two off-site dams present within 2km of the site boundary.
Buildings	There are numerous buildings on the site, listed and numbered in Figure 2, Appendix A. Refer to Section 2.3 for a description of the buildings on the site.
VUT “Green Building”	Refer to Appendix E for information gathered in relation to activities undertaken in this building. Currently this building is leased by VUT for fire testing of building materials and various chemicals. In summary the facility discharges an unknown but relatively small volume of effluent from its fire research activities at an unknown quality and directly into Dam 1. This is likely to be limited to PFC effects from hand-held extinguishers impacting sediment and water quality in Dam 1. For further discussion on the water and sediment quality in dams at FTC, please refer to Cardno Lane Piper’s *Surface Water and Sediment Contamination Assessment* report (Cardno Lane Piper, 2014d).

Item	Observations and Descriptions
SCA (Feature 44) Windrows	Only one of the four original soil treatment windrows appears to remain intact, and is estimated to contain about 1,000 m^3 of soil. Two other windrows remain but are much smaller than the original remediation windrows, with an estimated soil volume of approximately 200 m^3. Therefore approximately 70% of the original volume in these windrows has been excavated and reused on-site – most probably in the 4WD training area. The volumetric balance of the soil windrows in the SCA should be assessed to confirm if it is all accounted for on site (e.g. in 4WD area) A perimeter bund orientated roughly northeast-southwest was observed along the eastern boundary of the SCA.
Site cut & filling	Evidence of fill is present at the southern part of the site, near the SCA (Feature 44) and in the DET PAD (Feature 21a). Red scoria is also present around the training PADs, particularly adjacent to Dam 2 and the USR PAD (Feature 39). The southern part of the fire training area (i.e. PADs and surrounding area) is slightly elevated, and known as the fill platform.
Aboveground storage tanks	During the site inspection conducted in July 2012, the following AST were observed to be present on-site: • AST 1 comprises two diesel tanks of approximately 10,000 to 15,000 L each (Feature 23a). • AST 2 comprised one diesel tank (Feature 23b). This AST was removed by CFA in approximately August 2012 and no other information is available about the fate of this AST. • AST 3 comprises one diesel tank (Feature 23c). • LPG AST 1 comprises three horizontal tanks of approximately 20,000 L each (Feature 7a). • LPG AST 2 comprises one horizontal tank of approximately 20,000 L (Feature 7b). • Back Up Water Tank (Feature 38). • Water Storage Tank 1 (Feature 57a). • Water Storage Tank 2 (Feature 57b).
Dangerous goods	Storage of bulk petroleum and chemicals were observed near the FLP (Feature 27). FTC has a Dangerous Goods Register and it has been provided to the Auditor separately for review. The information in the Dangerous Goods Register is also reviewed by Cardno Lane Piper and is consistent with observations made on-site and the contaminants of potential concern (COPC) are provided in Table 3-4.
Solid waste deposition	Observations of site areas where solid waste has been deposited include the following: • DET PAD (Feature 21a) contains soil mounds located between the fire training PADs and Lake Fiskville. • Landfill 1 (AWA) (Feature 42) • Landfill 2 (CFA) (Feature 43) • SCA (Feature 44) The area immediately north of Landfill 1 was observed to be used for storage of old vehicles and building rubble on the ground surface (i.e. no evidence of buried waste observed). As this area has not been assessed by Cardno Lane Piper, the potential impacts relating to the storage of this solid waste are unknown.
Liquid waste disposal features	Liquid waste disposal infrastructure present on site is primarily associated with the FLP (Feature 27) and consists of a Surge Basin

Item	Observations and Descriptions
	(Feature 29), TIT (Feature 28) and a series of dams (Dams 1 to 4). Water used on the FLP (Feature 27) during training drills is discharged into the surge basin which flows into an oil-water separator or TIT (Feature 28), then into a Pump Sump (Feature 41). The effluent is pumped via the sump pump into Dam 1. Water from other PADs also runs into Dam 1 via open channels or underground pipes. From Dam 1, water is gravity fed via an underground pipe (reported to be crushed and partly blocked) into Dam 2. Dam 2 was historically pumped to provide the "back-up line" and also to fill the WSP (Feature 25) as part of the primary water supply, and also connects via an open earth drain to Dam 3. Dam 2 overflows eastward to a perimeter channel that flows into Dam 3. Runoff from the amenities area drains via an open channel to Dam 3. From Dam 3 water runs via an open channel to Dam 4. From Dam 4, water runs through an open channel and culvert under Lake Road into Lake Fiskville. The separated oil and hydrocarbons is collected in the TIT (Feature 28) adjacent to the FLP (Feature 27) and removed periodically by a licensed waste collector. A STP (Feature 5) is located west of the administration area (away from the PAD area). Treated wastewater from the STP appears to be discharged to subsurface absorption drains in the paddocks to the north-east of Lake Fiskville.
Evidence of previous site contamination investigations	Several groundwater bores installed during the previous site investigations were observed on the site. They are located in the former landfill area, near fire training PADs and in the wood lot in the northern area between the entry road and the hangar building.
Evidence of land contamination (staining or odours)	Soil staining was observed beneath both ASTs (Features 23a and 23b). There is also visible and odorous evidence of contamination by petroleum hydrocarbons in the soil.

3.5 Underground Storage Tanks (UST)

Anecdotal information provided by CFA personnel indicates that all on-site USTs were removed in 1996. There is no documented information available for the removal and fate of the tanks and associated underground pipes. Table 3-3 summarises the current knowledge of USTs at the FTC.

Table 3-3: List of Former USTs (all removed in 1996)

Name and Feature No.	Description	Size
UST 1 (Feature 8a)	One diesel tank, which was likely to be used for indoor space heating.	Unknown
UST 2 (Feature 8b)	One diesel tank	Approximately 2,000 L
	Two diesel tanks	Unknown
	One petrol tank	Unknown

3.6 Interview

A formal interview was held on 13 July 2012 and subsequent informal discussions (to clarify anecdotal information provided during the formal interview) were held between 13 July and 31 August 2012 with several CFA staff holding the following positions:

- Facility and Program Managers
- Facility Maintenance Workers

Additional information obtained during interviews includes:

- The DET PAD (Feature 21a) was constructed in 2007 using sediments sourced from Lake Fiskville and soils sourced from the SCA.

The interview and subsequent discussions confirmed key information in the available reports and provided valuable insight into the operational aspects of the facility, in particular the use of water and foams and the operation of the water management system. The interviewees requested to have their names and positions to be anonymous.

3.7 Summary of Potential Contamination

The site history review has identified several potential sources of contamination and associated contaminants of potential concern (COPC). The location of these areas is identified on Figures 2 and 3, Appendix A. Table 3-4 presents a summary of the areas where potential for soil contamination exists, based on site history, and also summarises the COPC in each area. The site features/buildings which were not inspected (refer to Section 1.3.2) are not included in Table 3-4 and it should be noted that the table below focuses on the COPC based on activities that occurred or occurring in each area. It is recognised that there is a potential for spray drift associated with fire training activities to impact these on-site features. Further information about the extent, exposure and impacts from spray drift across the FTC is discussed in Cardno Lane Piper's report titled *Human Health Risk Assessment – Fiskville Community* (Cardno Lane Piper, 2014f).

Table 3-4: Site Activities and Contaminants of Potential Concern

Site Features	Site Activity / Potential Source	Contaminants of Potential Concern	Comments
On-Site Sources			
Former UST1 (Feature 8a; near training centre)	Diesel UST & associated fuel lines	BTEX, TPH, PAH, lead	Minenco 1996 reported that the UST had been decommissioned by May 1996, although Coffey 1996 report indicates it may still have been insitu in October 1996. IFI Report states that all USTs were removed in 1996 by Coffey. No validation reports or results were available.
Former UST 2a (Feature 8b; UST near Amenities building)	2,000L diesel UST & associated fuel lines		UST was known to have leaked, and was decommissioned by 1996 (Minenco, 1996). IFI Report states that all USTs were removed in 1996 by Coffey. No validation reports or results were available.
Former UST 2b (Feature 8b;	Petrol & diesel USTs &		Minenco 1996 report indicates at least two USTs were located in this

Site Features	Site Activity / Potential Source	Contaminants of Potential Concern	Comments
UST near Amenities building)	associated fuel lines		area. IFI Report states that all USTs were removed in 1996 by Coffey. No validation reports or results are available for these USTs.
AST 1 (Feature 23a) south of the PSA (Feature 17).	Diesel and petrol ASTs		Some staining observed outside of bunded areas of AST
AST 2 (Feature 23b) adjacent to FLP (Feature 27)	Diesel and petrol ASTs		Staining of the soil beneath the AST was observed. This AST was removed soon after Cardno Lane Piper fieldworks were completed.
LPG AST 1 and LPG AST 2 (Feature 7a and 7b)	LPG	None suspected	Gas is being stored (not solid or liquid) and is not considered to be a potential source of impact on the soil and groundwater.
Existing FLP (Feature 27), Surge Basin (Feature 29) and associated Triple Interceptor Trap (Feature 28)	Fire training effluent discharge and spillage to ground	VOC, SVOC, Metals, BTEX, TPH, PAH, PFOS, PFOA, 6:2 Fluorotelomer Sulfonate (6:2 FtS)	Runoff of unburnt fuel and associated wastewater could contaminate the underlying and surrounding soils. Contamination likely restricted to drainage channels and associated pits, drains/ lines and traps, as well as areas where overflow may occur and the ground beneath cracks in the concrete. Concrete was observed to be in good condition at the time of inspection in 2012. Incidents of overflow of the Surge Basin (Feature 29) were identified in anecdotal evidence.
Former (pre 1999) FLP (Feature 27) and former FTPs (Feature 45)	Fire training, water runoff & fuel storage	VOCs, SVOCs, Metals, BTEX, TPH, PAH and PFCs.	This area was heavily contaminated up to 1996. Impacted area was excavated, remediated and validated by 1999. Deep sludge burial pits reported by Minenco are based on anecdotal information (Minenco 1996) were not located during subsequent test pitting by Coffey (1996). IFI believe that sludge burial pits never existed (IFI Report 2012).
FLP (Feature 27) and surrounding area	Burning of flammable materials	VOCs, SVOCs, Metals, BTEX, TPH, PAH, dioxins and furans	Incomplete combustion of flammable liquid materials could result in contaminants being deposited at the surface. Would only impact the surface soil, and unlikely to cause deep, widespread or heavily localised contamination. Dioxins and furans were detected in sediment samples (Golder 2012), possibly as a result of soot deposition from burning on FLP.
SCA (Feature	Remediated Soils	PFOA & PFOS,	Soils were remediated to remove

Site Features	Site Activity / Potential Source	Contaminants of Potential Concern	Comments
44)		Metals, TPH, BTEX, PAH, dioxins & furans	hydrocarbons but there was no testing for PFOA, PFOS, dioxin & furans. CFA advised that some of these soils were re-used on-site to construct the DET PAD (Feature 21a).
PSA (Feature 17) and Material Storage (Feature 19)	Storage and spillage of liquids in drums or chemicals from other materials stored	Metals, TPH, BTEX, PAH, PCB, VOC, SVOC	Operational since the mid-1980s for fuel storage. The evidence of corroded drums and manual handling practices in the IFI report indicates there is likely to have been leakage and spillage of fuels in this area.
DBA 1 (Feature 46) including inferred area of drum removal (Feature 46a) and inferred additional area of drum removal (Feature 46b)	Buried drums with flammable liquids	VOC, SVOC, Metals, BTEX, TPH, PAH	The Fourth Drum Burial Event appears to have occurred at DBA 1, and included the drums and flammable liquids buried in three trenches A large number of drums, product and contaminated soil was most likely removed from this area in 2002 (Second Drum Extraction Event) at the inferred areas of buried drum removal (Features 46a and/or 46b). DBA 1 could also be the location of the Third Drum Burial Event.
DBA 2 (Feature 47)	Buried drums with flammable liquids		Anecdotal evidence indicates that the Second Drum Burial Event occurred at DBA 2. DBA 2 could also be the location of the Third Drum Burial Event.
DBA 3 and DBA 3a (Features 48 and 48a)	Buried drums with flammable liquids		Anecdotal evidence indicates that the Third Drum Burial Event, consisting of drums and possibly some flammable liquids being buried in 3 trenches, may have occurred at DBA 3 or DBA 3a. These drums may have been removed in 1991.
Landfill 1 (Feature 42)	Solid Waste, FLP waste and drum disposal	VOC, SVOC, Metals, BTEX, TPH, PAH, Leachate, PFOS, PFOA, 6:2 FtS, dioxins, furans	Operated from the 1970s or possibly earlier by AWA, until about 1984. Known to have accepted waste from the FLP (Feature 27) as well as old drums, which were probably empty (IFI Report). The First Drum Burial Event was located in the vicinity of the landfills also, although exact location is unknown.
Landfill 2 (Feature 43)	Solid waste, FLP waste and drum disposal		Operated by CFA from 1984 until about 1996. Known to have accepted waste from the FLP (Feature 27) as well as old drums, which were probably empty (IFI Report). The First Drum Burial Event was located in the vicinity of the landfills also, although

Site Features	Site Activity / Potential Source	Contaminants of Potential Concern	Comments
			exact location is unknown.
FLP (Feature 27)	Backfilling excavations	Various contaminants, predominantly metals and PAH, PFOS, PFOA and 6:2 FtS	The remediation area was backfilled prior to construction of the FLP (Feature 27). The source of the fill is unknown. There is also potential for PFOS, PFOA and 6:2 FtS to be present below the validated area and requires delineation.
Other PADs around the site used for fire training including wildfire PAD (Feature 15), explosives PAD (Feature 21a), LPG PADs (Features 32a and 32b), fire attack building (Feature 24) and SFA PADs (Features 33a and 33b)	Fire training and water runoff	VOC, SVOC, Metals, BTEX, TPH, PAH, PFOS, PFOA, 6:2 FtS, dioxins, furans	Runoff of unburnt fuel and associated wastewater could contaminate the underlying and surrounding soils. Contamination likely restricted to drainage channels and associated pits, drains and traps, as well as areas where overflow may have occurred and the ground beneath cracks in the concrete. Concrete was observed to be in good condition at the time of inspection in 2012.
DET PAD (Feature 21a) including water crossing DET PAD (Feature 21b) and sand crossing DET PAD (Feature 21c)	Fill used to create PAD (Feature 21a)	Various contaminants including PFOA, PFOS, 6:2 FtS and predominantly metals and PAH	CFA have advised that the DET PAD (Feature 21a) was constructed in 2007 using soil sourced from the SCA (Feature 44) and sediment sourced from Lake Fiskville.
CSR PAD (Feature 20), RR PAD (Feature 20), TR PAD (Feature 36) and USR PAD (Feature 39)	PADs used for search and rescue training/exercises, not for fire training	None suspected	No burning of fuel or chemicals and no fire-fighting activities with foams were conducted at these PADs.
Fill Platform around Dam 2 and surrounding PADs	Fill used to elevate and level operational areas	None suspected	The southern part of the operational area is elevated above natural ground level. The source of the fill is predominantly quarry product scoria which was unlikely to be contaminated when placed. The fill platform was constructed prior to the SCA (Feature 44) soils being removed and Lake Fiskville being dredged. The fill around Dam 2

Site Features	Site Activity / Potential Source	Contaminants of Potential Concern	Comments
			contains contaminated water at concentrations unlikely to result in significant contamination of the fill.
FMA (Feature 22)	Area adjacent to AST 1 (Feature 23a) where fuel are mixed for training drills.	TPH, BTEX, PAH	Concreted ground surface and no burning activities occurring here (mixing of fuel only).
Car storage (Feature 51)	Potential for old vehicles to contain fuel.	TPH, BTEX, PAH, metals	Storage area of old vehicles used in training drills. We understand that the fuel tanks of the vehicles are drained prior to being stored on-site. No burning activities occurring in this area.
Garden & Maintenance workshop (Feature 52)	Workshop for general maintenance of ground keeping equipment	Pesticides, herbicides, TPH, BTEX, PAH	Constructed in the mid-1980s, may have contained fuels, lubricants and chemicals, but unlikely to have been in great quantities
Maintenance Workshop (Feature 6)	Workshop for repairs and maintenance of vehicles and plant	TPH, BTEX, PAH	Constructed in the mid-1980s, may have contained fuels and chemicals
Amenities Building 1 (Feature 16a)	Showers and amenities facilities	None suspected	Wastewater from amenities is piped to the STP.
Amenities Building 2 (Feature 16b)	Workshop for repairs and maintenance of fire fighting equipment including hand held extinguishers	TPH, BTEX, PAH, 6:2 FtS , PFOS & PFOA	May have contained fuels and chemicals, and possibly wash-water from fire extinguisher maintenance but unlikely to have been in great quantities
STP (Feature 5) and sewerage discharge area (Feature 40)	Storage, treatment and discharge of sewerage	Metals, TPH, VOC, ammonia, nitrate, E. coli.	Tank was observed to have subsided and cracked in the mid-1990s, possibly resulting in leakage. Cardno Lane Piper is not aware of any testing conducted of the effluent by CFA prior to its release.
Airstrip (Feature 14) & hangar (Feature 13)	Aviation use	Aviation Fuels (include Jet A1 and possibly AvGas), TPH, BTEX, PAH, lead	Operational since the 1980s. Fuels and oils associated with aircraft use may have been stored in this area in the past. No significant spills of aviation fuel have been reported. Likelihood of contamination much lower than some other areas of the site.
Drainage channels from FLP (Feature	Drainage of effluent from FLP potentially	PFOA, PFOS, 6:2 FtS , Metals, TPH, BTEX , dioxin &	Drainage pipe between Dam 1 and Dam 2 was reported damaged and may be leaking contaminated water

Site Features	Site Activity / Potential Source	Contaminants of Potential Concern	Comments
27) and between Dams 1 to 4	contaminated with fuels and foams	furans	and fuels from the PAD into the subsurface. Open drain from Dam 2 to 3 potentially contaminated by effluent flow.
DFA (Feature 49)	Historic flammable liquid storage and drum fire	TPH, BTEX, PAH, VOCs, dioxins and furans	Flammable liquids stored here until the PSA (Feature 17) was developed in the mid-1980s. Golder (2012) did not detect contamination in this area. They did not test for dioxins and furans.
AST 3 (Feature 23c)	Diesel AST	BTEX, TPH, PAH, lead	Concrete bunding did not show any evidence of fuel leakage from the tank
VUT Building (Feature 31) and shallow spoon drain (Feature 59)	Fire research on building materials.	VOCs, SVOCs, Metals, BTEX, TPH, PAH, dioxins and furans, PFOS, PFOA, 6:2 FtS	Effluent from small fire pads in the building discharges to Dam 1 but unlikely to impact the VUT site. Fire fighting foams used include PFC materials. Some potential for land contamination from handling of flammable liquids. It is likely that contamination may be similar to existing FLP or with further contaminants depending on the nature of the experiments at the time. Refer report titled *Environmental Inspection of VUT Facility* for further details included as Appendix E.
Current training centre	Power generation for AWA operations	BTEX, TPH, PAH, lead	3 x 150 horsepower diesel generators were used to power the AWA site from 1927 to 1941. The generator house appears to have been located in the vicinity of the Learning Centre (Feature 3) and may have been powered by former USTs (UST 1)
Dams 1 to 4 & Lake Fiskville	Fire training water.	VOCs, SVOCs, Metals, BTEX, TPH, PAH, dioxins and furans, PFOS, PFOA, 6:2 FtS	Water runoff from chemicals used fire training drills to extinguish fires in the past and currently flows to Dam 1 to 4 and eventually Lake Fiskville. Lake not overflowing since summer of 2012-2013.
Driver Training PAD. (Feature 21a)	Driver training over mounds	Metals, PFOS, PFOA other PFC	The mounds were constructed using the sediments that were dredged from Lake Fiskville in 2007.
Area north of Landfill 1	CFA communication antennas and storage of old vehicles and building rubble on	TPH, BTEX, PAH, metals	There is limited information about the history, source and contamination status of the stockpiles of solid inert waste.

Site Features	Site Activity / Potential Source	Contaminants of Potential Concern	Comments
	ground surface		
Stockpiles of unidentified soil/material (Feature 60)	Stockpiles of unidentified soil/material	TPH, VOC, SVOC, metals	There is no available information about the history, source and contamination status of the stockpiles.
Off-site Sources			
Off-site in all directions	Historical farming practices / farm operation and maintenance	Herbicides & pesticides (OCP, OPP); petroleum fuels and lubricants BTEX, PAH, VOC and SVOC	Impacts from off-site are considered unlikely, and of minor concern relative to historical on-site activities

There was no information suggesting that drums containing fire-fighting foams were buried or disposed. This list of COPC for buried drums areas (DBA 1, DBA2 and DBA 3) were identified from the IFI report for fieldworks and additional historical information obtained post fieldwork. Therefore, PFC, dioxins and furans were not included in the COPC.

As discussed in Section 4.1.2 below, limited information is currently available for STP (Feature 5) and the sewage discharge area (Feature 40). Therefore, it is not feasible to conclude on potential impacts associated with these two features at this stage.

For further discussion on the water and sediment quality in Dam 1 to 4 and Lake Fiskville, please refer to Cardno Lane Piper's *Surface Water and Sediment Contamination Assessment* (Cardno Lane Piper, 2014d) report.

Several areas of FTC have been investigated by Cardno Lane Piper in response to Recommendation 1, 2, and 7 of the IFI Report and are reported in other reports entitled *Targeted Soil Assessment* (Cardno Lane Piper, 2014a), *Buried Drums Assessment* (Cardno Lane Piper, 2014c) and the *Investigation of Risks at Former Landfills* (Cardno Lane Piper, 2014e), namely:

Targeted Soil Assessment (Cardno Lane Piper, 2014a)

- Former UST 1 (Feature 8a; near training centre)
- Former UST 2a (Feature 8b; UST near Amenities Building 1)
- Former UST 2b (Feature 8b; UST near Amenities Building 1)
- AST 1 (Feature 23a) south of the PSA (Feature 17).
- AST 2 (Feature 23b) adjacent to FLP (Feature 27)
- Existing FLP (Feature 27) and associated TIT
- SCA (Feature 44)
- PSA (Feature 17)

Buried Drums Assessment (Cardno Lane Piper, 2014c)

- DBA 1 (Feature 46)
- DBA 2 (Feature 47)
- DBA 3 (Feature 48)

- DBA 3a (Feature 48a)

Investigation of Risks at Former Landfills (Cardno Lane Piper, 2014e)

- Landfill 1 (Feature 42)
- Landfill 2 (Feature 43)

4 CONCLUSIONS

The following conclusions are made in relation to the objectives of this investigation which reviewed the site history to identify the potential for past and present activities to contaminate the site.

4.1 Potentially Contaminated Areas

The site history review identified several potential sources of contamination, some of which have been investigated and reported separately, and some areas which have not been investigated. The potential sources of contamination are presented on Table 3-4 and have been assigned a unique number as shown on the appended figures.

4.1.1 Areas Assessed By Cardno Lane Piper (2013)

The targeted areas assessed as per the recommendations of the IFI report and reported under separate cover are:

- Former areas where diesel and petrol USTs (Features 8a and 8b) were located near the Amenities Building (Feature 16a) and the Learning Centre (Feature 3).
- AST 1 (Feature 23a) located adjacent to the FMA (Feature 22), and AST 2 (Feature 23b) located adjacent to the FLP (Feature 27). AST 2 was removed after Cardno Lane Piper completed the field works for the targeted investigation.
- The former and current FLP (Feature 27), former FTPs (Feature 45), and other PADs, where fuels, oils, chemicals, solvents and foams for fire training drills have been burnt, stored and spilled.
- PSA (Feature 17) where flammable liquids were stored in drums or tanks.
- SCA (Feature 44) where approximately 4,200 to 5,300 m^3 of contaminated soil was remediated in 1999. Much of the remediated soil has since been moved. The location of the transferred soil is unknown, but is likely to be on-site.
- Two former landfills (Features 43 and 42) in the south-west corner of the site.
- Three areas possibly used to bury drums (DBA 1, DBA 2, DBA 3 and DBA 3a; Features 46 to 48, 48a). Two of these areas were reported as being remediated (probably DBA 1 and/or DBA 2), with a number of drums and associated contaminated soil removed.
- Water, sediments and Ecology of Lake Fiskville.
- Water and sediments of Dams 1 to 4.

4.1.2 Areas Not Yet Investigated

The areas with potential for contamination not yet assessed and which might require assessment, subject to the requirements of the EPA Environmental Auditor are:

- Areas of fill including the 4WD area also known as the DET PAD (Feature 21a), fill platform in the operational areas and beneath the FLP (Feature 27) which was backfilled as part of soil remediation.
- The STP (Feature 5) including the treated sewerage discharge area (Feature 40) located to the west of the administration building. Further assessment of the STP will need to investigate the quantity and quality of the treated wastewater, the piping infrastructure relating to transfer of treated wastewater to adsorption drains and the final destination of the effluent.

- Drum fire area (Feature 49) to the east of the Learning Centre (Feature 3).
- Maintenance workshop (Feature 6) near the Learning Centre (Feature 3), the garden and maintenance workshop (Feature 52) near the residential area and Amenities Building 2 (Feature 16b) where equipment and/or machinery are stored and/or maintained, and small volumes of fuels and chemicals may be stored.
- Airstrip (Feature 14) and associated hangar (Feature 13). CFA has advised that the hangar is not used for fuel or chemical storage.
- Drainage channels and pipes for PAD effluent located between Dams 1 to 4, including a crushed concrete pipe between Dams 1 and 2 which is likely to be leaking.
- AST 3 (Feature 23c) adjacent to Dam 2.
- VUT Building (Feature 31) where research is conducted on the flammability of materials used in buildings and effluent including foam waste is discharged to Dam 1.
- Other PADs around the site used for fire training including wildfire PAD (Feature 15), explosives PAD (Feature 21a), LPG PADs (Features 32a and 32b) and SFA PADs (Features 33a and 33b).
- Three former diesel powered generators associated with AWA/OTC site use which were probably located in the Learning Centre (Feature 3) and ceased operating in 1941.
- Off-site land use for farming which may include use of pesticides, although impacts to the site are considered unlikely.
- The area of stockpiles of unidentified soil/material (Feature 60) located off Deep Creek Road west of Beremboke Creek.

5 RECOMMENDATIONS

Following on from the conclusions reached in relation to the key objectives of this investigation, the following actions are recommended:

1. Investigation of the potentially contaminated areas identified in Table 3-4 of this report, if they have not already been assessed in other reports such as the *Surface Water & Sediment Contamination Assessment* (Cardno Lane Piper, 2014d), *Groundwater Contamination Assessment* (Cardno Lane Piper, 2014b), *Targeted Soil Assessment* (Cardno Lane Piper, 2014a), *Investigation of Risks at Former Landfills* (Cardno Lane Piper, 2014e)or *Buried Drums Assessment* (Cardno Lane Piper, 2014c) and subject to the requirements of the EPA Environmental Auditor.
2. The scope of this further investigation and assessment should be confirmed with the EPA Environmental Auditor and recorded in a Sampling and Analysis Quality Plan (SAQP) prior to commencement and should be undertaken at the same time as other assessment works to assist with the completion of the section 53X audit.
3. The volumetric balance of the soil windrows in the SCA should be assessed by a surveyor to confirm if it is all accounted for on-site (e.g. by comparing initial volume in windrows and current mounds in the DET PAD, also known as the 4WD area).
4. It is recommended in relation to the VUT facility that they should discontinue any effluent discharge to CFA property (including Dam 1) and be required to plan for management of their liquid effluent independently of CFA in the future.
5. An Environmental Management Plan should be prepared and implemented by VUT to control and minimise all impacts on the environment including land and water on and off-site from their facility and for management of solid and liquid wastes.

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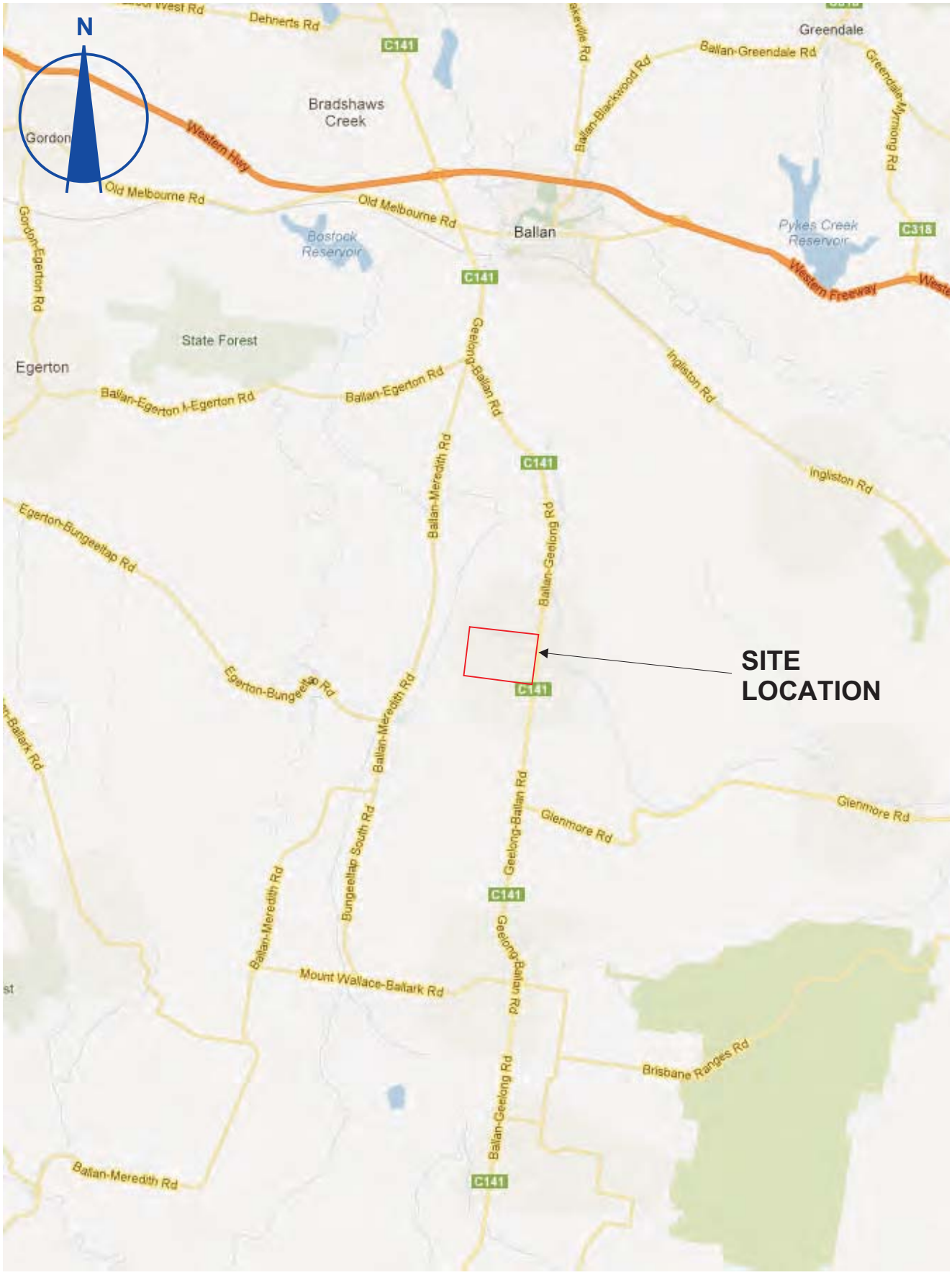
Appendix A
9 Pages

Figures

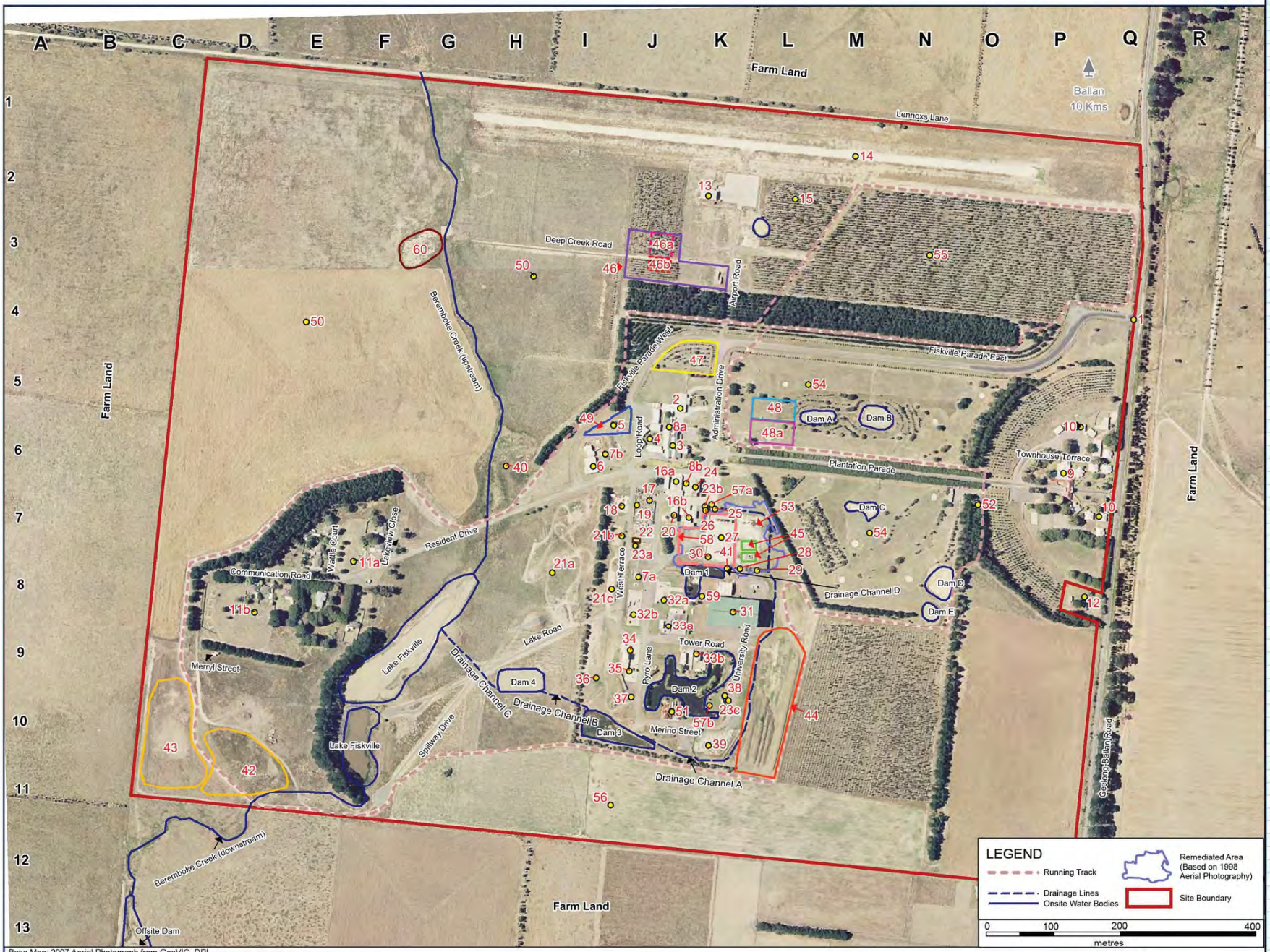


After Google Maps 2012

Approximate Site boundary

2km

Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College Geelong-Ballan Rd, Fiskville, VIC		TITLE: Site Locality
	SCALE(A4): As shown	DRAWN/ CHECKED: PAM/JCE	DATE: 10 Oct 2012	JOB No: 212163.1
	REF: 212163.1 Report 01.2		REV: 1	FIG: 1



Location_No	Location_Name
1	Main Entrance
2	Main Reception
3	Learning Centre
4	Classrooms
5	Sewerage Treatment Plant (STP)
6	Maintenace Workshop
7a	AST- Gas 1 (LPG AST 1)
7b	AST- Gas 2 (LPG AST 2)
8a	Former UST Area 1 (UST 1)
8b	Former UST Area 2 (UST 2)
9	Dining Room and Recreational Facilities
10	Temporary Accommodation (Cottages)
11a	Residential Area (Temporary)
11b	Residential Area (Permanent)
12	Former School Site
13	Airport Hangar
14	Airstrip
15	Wildfire PAD (WF PAD)
16a	Amenities Building 1
16b	Amenities Building 2
17	Prop Storage Area (PSA)
18	Fire Truck Storage (under construction)
19	Materials storage
20	Confined Space Rescue PAD (CSR PAD) + Rope Rescue PAD (RR PAD)
21a	Driver Education Training PAD (DET PAD), Explosives PAD (EX PAD)
21b	Water Crossing (DET PAD)
21c	Sand Crossing (DET PAD)
22	Fuel Mixing Area (FMA)
23a	AST- Diesel/Fuels 1 (AST 1)
23b	AST- Diesel/Fuels 2 (AST 2)
23c	AST- Diesel/Fuels 3 (AST 3)
24	Compressed Air Breathing Apparatus (BA PAD)/Fire Attack Building
25	Water Supply Pit (WSP)
26	Parade Ground Water Storage Tank and Pumphouse 1
27	Flammable Liquid PAD (FLP)
28	Triple Interceptor Trap (TIT)
29	Surge Basin
30	Tank (Former Fire Prop)
31	VUT Building
32a	Liquid Petroleum Gas PAD (LPG PAD) Standard
32b	Liquid Petroleum Gas PAD (LPG PAD) Advance
33a	Structural Fire Attack (SFA PAD) Single Storey
33b	Structural Fire Attack (SFA PAD) Double Storey
34	Great Southern Stand
35	Mess Hall
36	Trench Rescue PAD (TR PAD)
37	Road Accident Rescue PAD (RAR PAD)
38	Back Up Water Tank and Pumphouse 2
39	Urban Search and Rescue PAD (USR PAD)
40	Sewerage Release Point from Septic Tank
41	Water Storage Pump
42	Former Landfill 1 (AWA)
43	Former Landfill 2 (CFA)
44	Soil Composting Area (SCA)
45	Former Foam Training Pits (FTP)
46	Possible Drum Burial Area 1 (DBA 1)
46a	Inferred Area of Drum Removal
46b	Inferred Additional Area of Drum Removal
47	Possible Drum Burial Area 2 (DBA 2)
48	Possible Drum Burial Area 3 (DBA 3)
48a	Possible Drum Burial Area 3a (DBA 3a)
49	Former Drum Fire Area (DFA)
50	Vacant Land
51	Car Storage
52	Garden and Maintenance Shed
53	Remediated Area (1998)
54	Golf Course
55	Plantations
56	Leased Land for Farming
57a	AST Water Storage Tank 1
57b	AST Water Storage Tank 2
58	Former Flammable Liquid PAD
59	Shallow Spoon Drain
60	Area of Stockpiles of Unidentified Soil/Material

Base Map: 2007 Aerial Photograph from GeoVIC, DPI

Cardno LanePiper
Shaping the Future

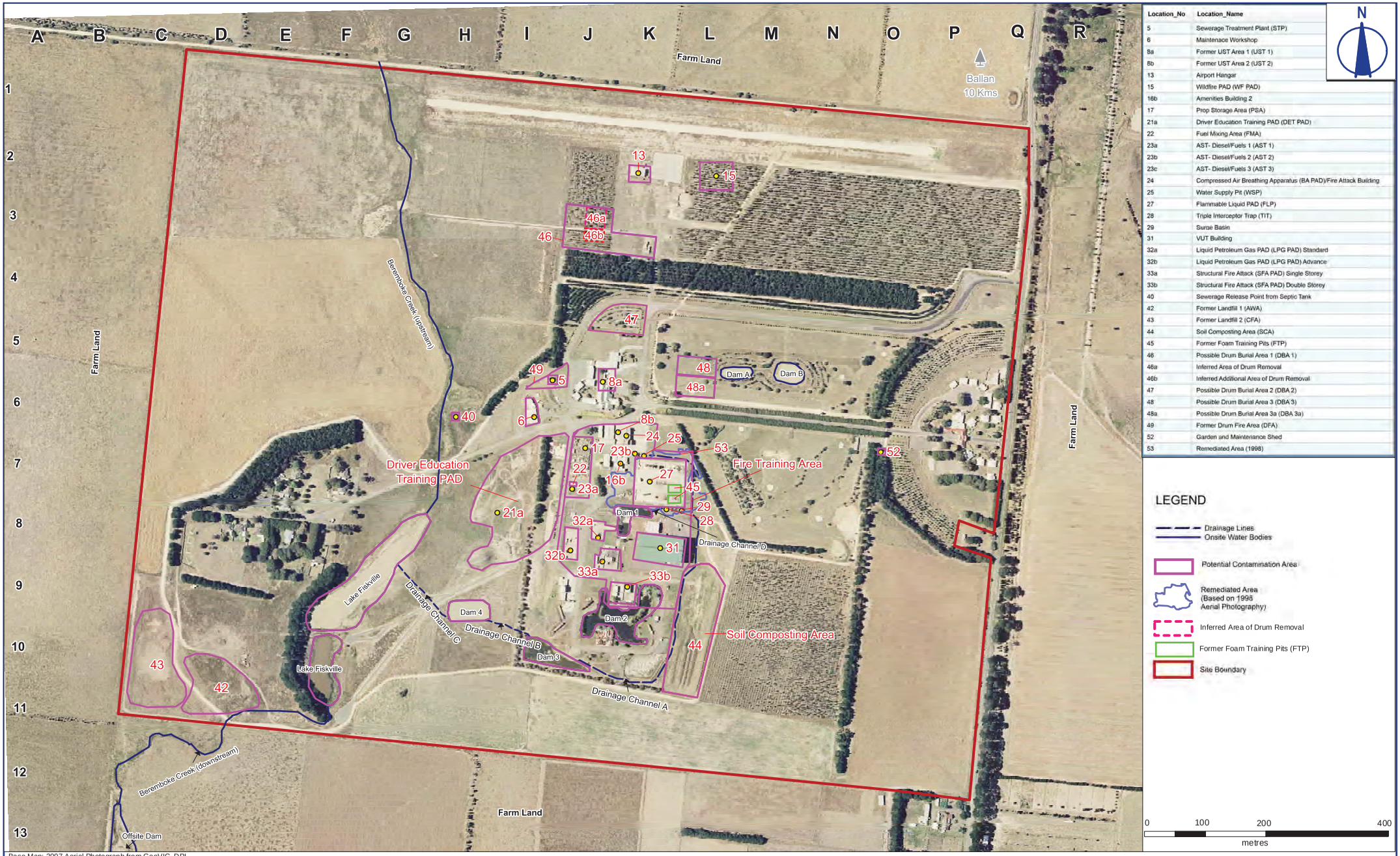
PROJECT:
Site History Review
Fiskville Training College,
Geelong-Ballan Road, Fiskville, Vic

SCALE:	As Shown	DATE:	14 OCT 2013
DRAWN/CHECKED:	PXT/ JCE	JOB NO.	212163.1
REF: 212163.1Report01.3			

TITLE:
SITE FEATURES PLAN

REV. NO. 1

FIG. NO. 2



Location_No	Location_Name
5	Sewerage Treatment Plant (STP)
6	Maintenace Workshop
8a	Former UST Area 1 (UST 1)
8b	Former UST Area 2 (UST 2)
13	Airport Hangar
15	Wildfire PAD (WF PAD)
16b	Amenities Building 2
17	Prop Storage Area (PSA)
21a	Driver Education Training PAD (DET PAD)
22	Fuel Mixing Area (FMA)
23a	AST- Diesel/Fuels 1 (AST 1)
23b	AST- Diesel/Fuels 2 (AST 2)
23c	AST- Diesel/Fuels 3 (AST 3)
24	Compressed Air Breathing Apparatus (BA PAD)/Fire Attack Building
25	Water Supply Pit (WSP)
27	Flammable Liquid PAD (FLP)
28	Triple Interceptor Trap (TIT)
29	Surge Basin
31	VUT Building
32a	Liquid Petroleum Gas PAD (LPG PAD) Standard
32b	Liquid Petroleum Gas PAD (LPG PAD) Advance
33a	Structural Fire Attack (SFA PAD) Single Storey
33b	Structural Fire Attack (SFA PAD) Double Storey
40	Sewerage Release Point from Septic Tank
42	Former Landfill 1 (AWA)
43	Former Landfill 2 (CFA)
44	Soil Composting Area (SCA)
45	Former Foam Training Pits (FTP)
46	Possible Drum Burial Area 1 (DBA 1)
46a	Inferred Area of Drum Removal
46b	Inferred Additional Area of Drum Removal
47	Possible Drum Burial Area 2 (DBA 2)
48	Possible Drum Burial Area 3 (DBA 3)
48a	Possible Drum Burial Area 3a (DBA 3a)
49	Former Drum Fire Area (DFA)
52	Garden and Maintenance Shed
53	Remediated Area (1998)

Base Map: 2007 Aerial Photograph from GeoVIC, DPI

Cardno LanePiper
Shaping the Future

PROJECT:
Site History Review
Fiskville Training Colledge
Geelong-Ballan Road, Fiskville, Vic

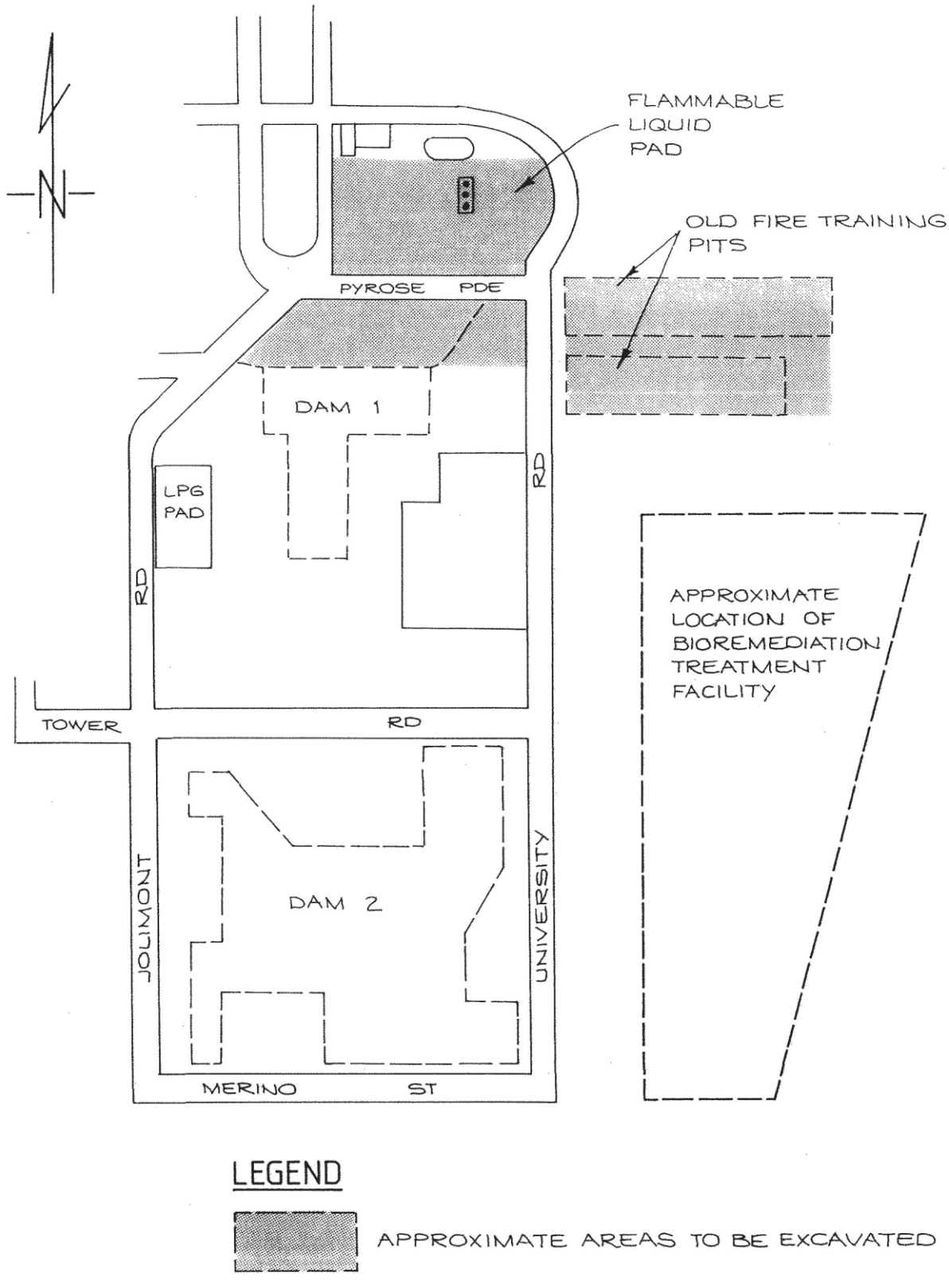
SCALE: As Shown	DATE: 20 MAR 2013	TITLE: KEY AREAS OF POTENTIAL CONTAMINATION	
DRAWN/CHECKED: PXT/ JCE	JOB NO. 212163.1		
REF: 212163.1 Report01.2		REV. NO. 1	FIG. NO. 3

Cardno LanePiper
Shaping the Future

PROJECT:

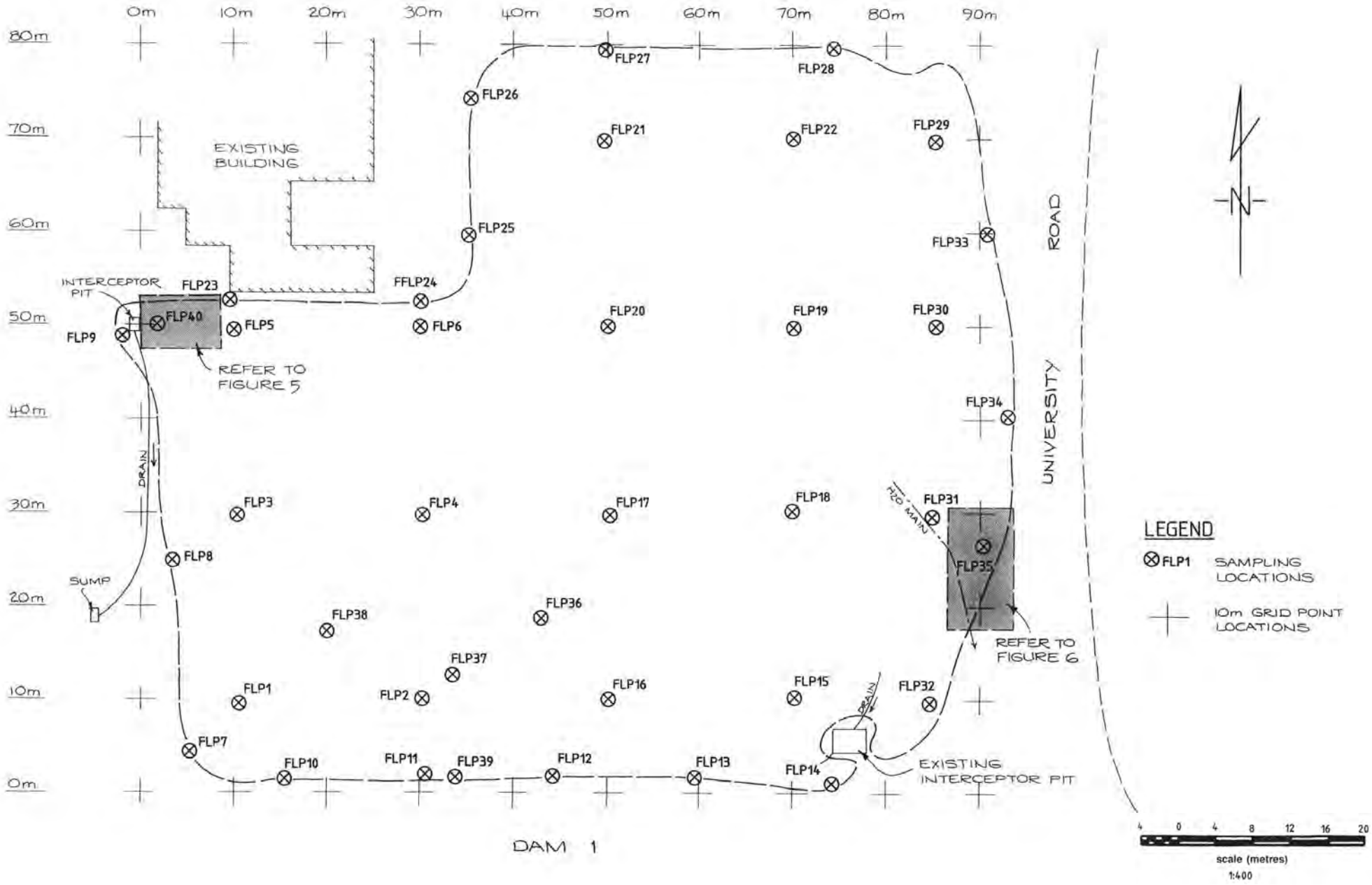
Site History Review
Fiskville Training College
Geelong-Ballan Road, Fiskville, Vic

SCALE: As Shown	DATE: 29 NOV 2012	TITLE: HISTORICAL SAMPLE LOCATIONS	
DRAWN/CHECKED: PXT/JCE	JOB NO. 212163.1		
REF: 212163.1Report01.2		REV. NO. 1	FIG. NO. 4



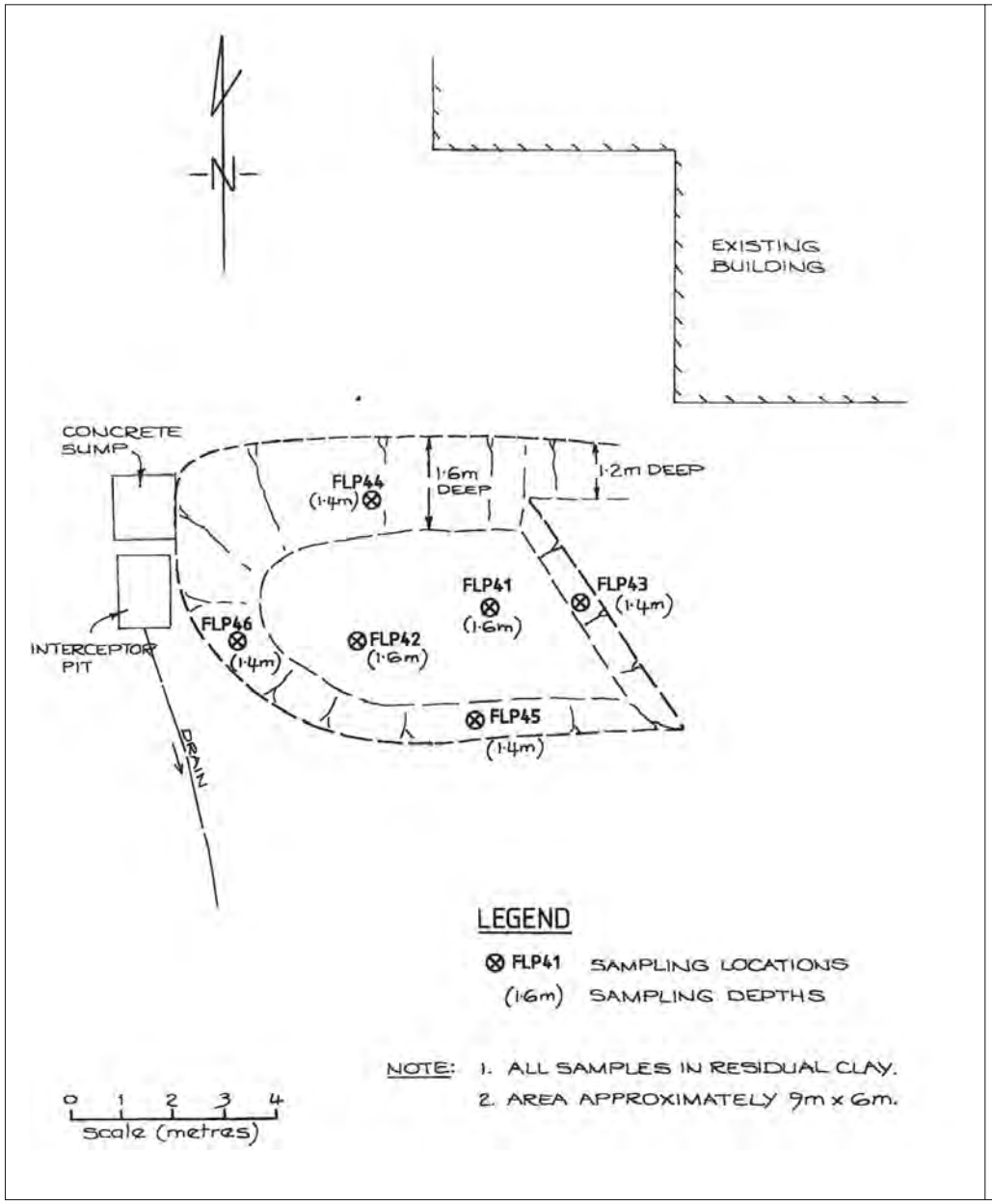
Base image source: Coffey (1998) Soil Remediation and Validation Program report

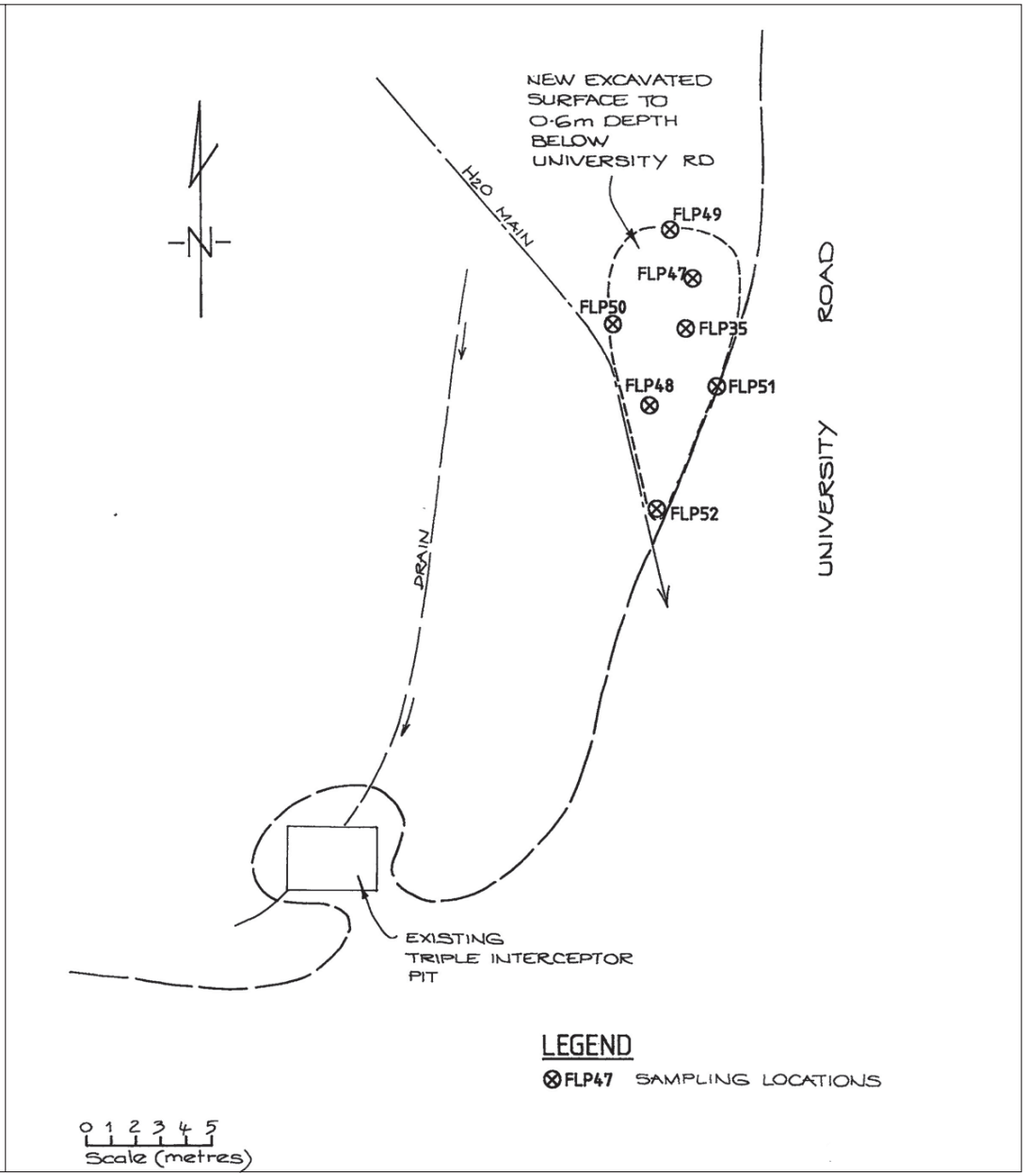
Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College, Geelong-Ballan Rd, Fiskville, VIC	SCALE (A3): As Shown	DATE: 23 Jan 2013	TITLE: FLP and FTP Remediation Areas	
		JOB No: 212163.1	DRAWN: PAM		
		REF: 212163.1 Report 01.2	CHECKED: JCE	REV: 01	FIG: 5



Base image source: Coffey (1998) Soil Remediation and Validation Program report

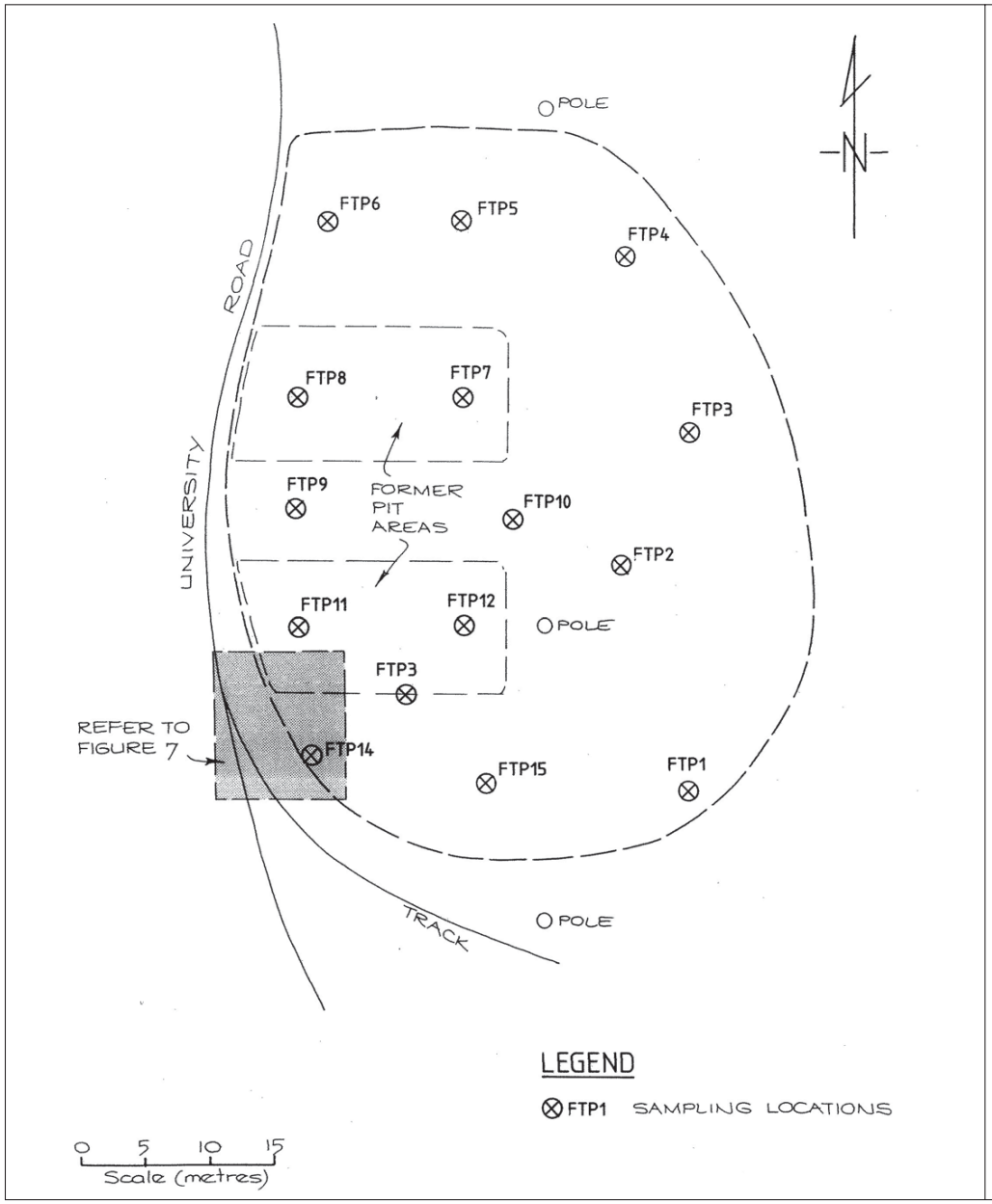
Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College Geelong-Ballan Rd, Fiskville, VIC	SCALE (A3): As Shown	DATE: 23 Jan 2013	TITLE: FLP Validation Sample Locations (Main Excavation)	
		JOB No: 212163.1	DRAWN: PAM		
		REF: 212163.1 Report 01.2	CHECKED: JCE	REV: 01	FIG: 6

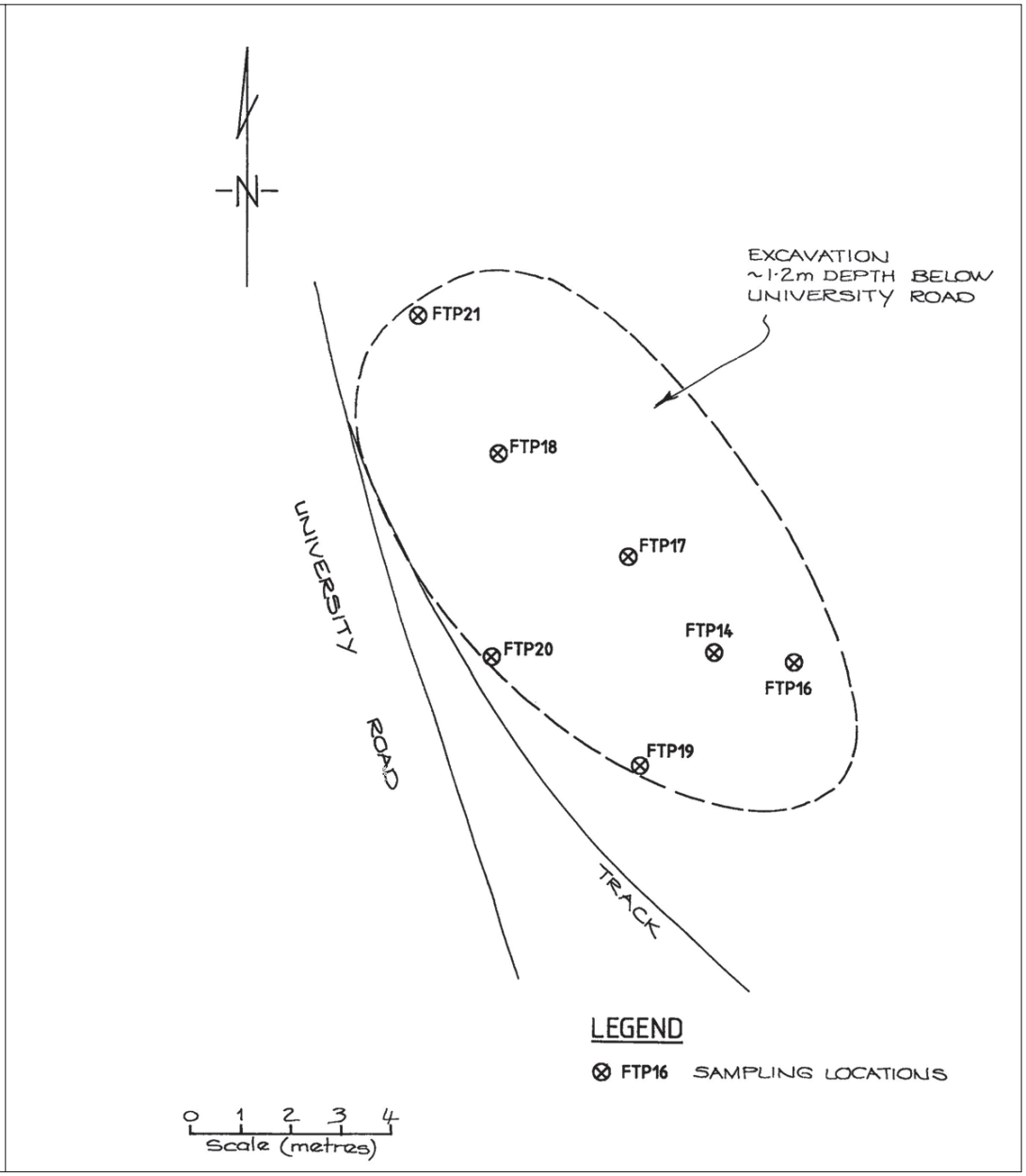




Base image source: Coffey (1998) Soil Remediation and Validation Program report

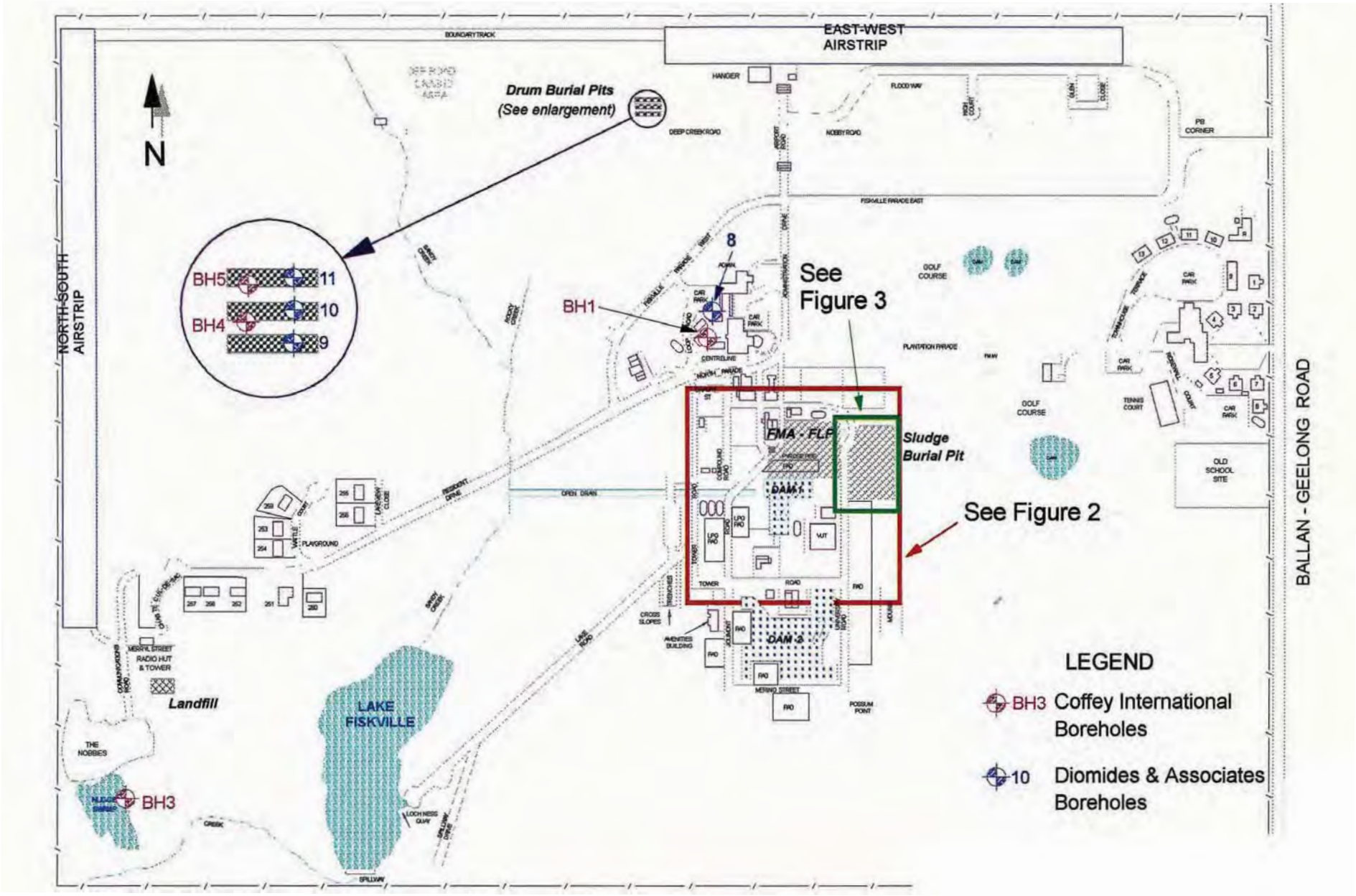
Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College Geelong-Ballan Rd, Fiskville, VIC	SCALE (A3): As Shown	DATE: 23 Jan 2013	TITLE: FLP Validation Sample Locations (Additional Excavations)	
		JOB No: 212163.1	DRAWN: PAM		
		REF: 212163.1 Report 01.2	CHECKED: JCE	REV: 01	FIG: 7





Base image source: Coffey (1998) Soil Remediation and Validation Program report

Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College Geelong-Ballan Rd, Fiskville, VIC	SCALE (A3): As Shown	DATE: 23 Jan 2013	TITLE: FTP Validation Samples	
		JOB No: 212163.1	DRAWN: PAM		
		REF: 212163.1 Report 01.2	CHECKED: JCE	REV: 01	FIG: 8



Base image source: CRA (1996) Fiskville Training College Review of Site Assessments and Remediation Options

Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College Geelong-Ballan Rd, Fiskville, VIC	SCALE (A3): Not to Scale	DATE: 7 Feb 2013	TITLE: CRA Siteplan 1996	
		JOB No: 212163.1	DRAWN: PAM		
		REF: 212163.1 Report 01.2	CHECKED: JCE	REV: 01	FIG: 9

Appendix B
9 Pages

Plates/Photographs

Plate 1: Underground Storage Tank Area 2 (Feature 8b) looking north

Plate 2: Car Storage (Feature 51) looking west

Plate 3: Aboveground Storage Tank Area 2 (Feature 23b) looking east

Plate 4: Flammable Liquid PAD (Feature 27) looking south-east

Plate 5: Dam 1 and VUT building (Feature 31) looking south-east

Plate 6: Aboveground Water Storage Tanks 1 (Feature 57a) looking north-east

Plate 7: Soil Composting Area (Feature 44) looking south

Plate 8: Fire Attack Building (Feature 24) looking north-west

Plate 9: Structural Fire Attack Building (Feature 33b) looking south-west

Site History Review
Plates/Photographs
Fiskville Training College, 4549 Geelong-Ballan Rd, Fiskville, Vic

PLATE 1 Underground Storage Tank Area 2 (Feature 8b) looking north

PLATE 2 Car Storage (Feature 51) looking west

PLATE 3 Aboveground Storage Tank Area 2 (Feature 23b) looking east

PLATE 4 Flammable Liquid PAD (Feature 27) looking south-east

PLATE 5 Dam 1 and VUT building (Feature 31) looking south-east

PLATE 6 Above ground Water Storage Tanks 1 (Feature 57a) looking north-east

PLATE 7 Soil Composting Area (Feature 44) looking south

PLATE 8 Fire Attack Building (Feature 24) looking north-west

PLATE 9 Structural Fire Attack Building (Feature 33b) looking south-west

Appendix C
11 Pages

Aerial Photographs

Aerial Photograph 1970
Aerial Photograph 1972
Aerial Photograph 1977
Aerial Photograph 1985
Aerial Photograph 1990
Aerial Photograph 1998
Aerial Photograph 2002
Aerial Photograph 2004
Aerial Photograph 2005
Aerial Photograph 2007
Aerial Photograph 2010

Cardno LanePiper
Shaping the Future
Cardno Lane Piper Pty Ltd

PROJECT: Site History Review
Fiskville Training College
4549 Geelong-Ballan Rd, Fiskville, VIC

SCALE (A3): as shown	DATE: 17 Oct 2012	TITLE: Aerial 1970	
JOB No: 212163.1	DRAWN: PAM		
REF: 212163.1 Report 03.1	CHECKED: JCE	REV: 1	FIG: C1

Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College 4549 Geelong-Ballan Rd, Fiskville, VIC	SCALE (A3): as shown	DATE: 17 Oct 2012	TITLE: Aerial 1972	
		JOB No: 212163.1	DRAWN: PAM		
		REF: 212163.1 Report 03.1	CHECKED: JCE	REV: 1	FIG: C2

Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College 4549 Geelong-Ballan Rd, Fiskville, VIC	SCALE (A3): as shown	DATE: 17 Oct 2012	TITLE: Aerial 1977	
		JOB No: 212163.1	DRAWN: PAM		
		REF: 212163.1 Report 03.1	CHECKED: JCE	REV: 1	FIG: C3

Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College 4549 Geelong-Ballan Rd, Fiskville, VIC	SCALE (A3): as shown	DATE: 17 Oct 2012	TITLE: Aerial 1985	
		JOB No: 212163.1	DRAWN: PAM		
		REF: 212163.1 Report 03.1	CHECKED: JCE	REV: 1	FIG: C4

Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College 4549 Geelong-Ballan Rd, Fiskville, VIC	SCALE (A3): as shown	DATE: 17 Oct 2012	TITLE: Aerial 1990	
		JOB No: 212163.1	DRAWN: PAM		
		REF: 212163.1 Report 03.1	CHECKED: JCE	REV: 1	FIG: C5

Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College 4549 Geelong-Ballan Rd, Fiskville, VIC	SCALE (A3): as shown	DATE: 17 Oct 2012	TITLE: Aerial 1998	
		JOB No: 212163.1	DRAWN: PAM		
		REF: 212163.1 Report 03.1	CHECKED: JCE	REV: 1	FIG: C6

Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College 4549 Geelong-Ballan Rd, Fiskville, VIC	SCALE (A3): as shown	DATE: 17 Oct 2012	TITLE: Aerial 2002	
		JOB No: 212163.1	DRAWN: PAM		
		REF: 212163.1 Report 03.1	CHECKED: JCE	REV: 1	FIG: C7

Cardno Lane Piper Pty Ltd

PROJECT: Site History Review
Fiskville Training College
4549 Geelong-Ballan Rd, Fiskville, VIC

SCALE (A3): as shown	DATE: 15 Oct 2013	TITLE: Aerial 2004	
JOB No: 212163.1	DRAWN: GGS		
REF: 212163.1 Report 03.1	CHECKED: JCE	REV: 1	FIG: C8

Cardno LanePiper Shaping the Future Cardno Lane Piper Pty Ltd	PROJECT: Site History Review Fiskville Training College 4549 Geelong-Ballan Rd, Fiskville, VIC	SCALE (A3): as shown	DATE: 17 Oct 2012	TITLE: Aerial 2005	
		JOB No: 212163.1	DRAWN: PAM		
		REF: 212163.1 Report 03.1	CHECKED: JCE	REV: 1	FIG: C9

Cardno LanePiper
Shaping the Future
Cardno Lane Piper Pty Ltd

PROJECT: Site History Review
Fiskville Training College
4549 Geelong-Ballan Rd, Fiskville, VIC

SCALE (A3): as shown	DATE: 17 Oct 2012	TITLE: Aerial 2007	
JOB No: 212163.1	DRAWN: PAM		
REF: 212163.1 Report 03.1	CHECKED: JCE	REV: 1	FIG: C10

Cardno LanePiper
Shaping the Future
Cardno Lane Piper Pty Ltd

PROJECT: Site History Review
Fiskville Training College
4549 Geelong-Ballan Rd, Fiskville, VIC

SCALE (A3): as shown	DATE: 17 Oct 2012	TITLE: Aerial 2010	
JOB No: 212163.1	DRAWN: PAM		
REF: 212163.1 Report 03.1	CHECKED: JCE	REV: 1	FIG: C11

Appendix D
19 Pages

Title Information

Basic Property Report

Planning Property Report

Extract of EPA Priority Site Register

Certificate of Title

Title Plan

Historical Certificates of Title Summary

Historical Certificates of Title

Property Report from **www.land.vic.gov.au** on 10 July 2012 01:55 PM

Address: 4549 GEELONG-BALLAN ROAD FISKVILLE 3342
Lot and Plan Number: This site has 4 parcels. See table below.
Standard Parcel Identifier (SPI): See table below.
Local Government (Council): MOORABOOL **Council Property Number:** 124720
Directory Reference: VicRoads 77 E4

This property is in a designated bushfire prone area.
Special bushfire construction requirements apply.

Further information about the building control system and building in bushfire prone areas can be found on the Building Commission website www.buildingcommission.com.au

Parcel Details

Lot/Plan or Crown Description	SPI
Lot 1 TP845669	1\TP845669
Lot 2 TP845669	2\TP845669
Lot 3 TP845669	3\TP845669
Lot 4 TP845669	4\TP845669

State Electorates

Legislative Council: WESTERN VICTORIA (2005)
Legislative Assembly: BALLARAT EAST (2001)

Utilities

Regional Urban Water Business: Central Highlands Water
Rural Water Business: Southern Rural Water
Melbourne Water: inside drainage boundary
Power Distributor: POWERCOR (Information about choosing an electricity retailer)

Planning Zone Summary

Planning Zone: FARMING ZONE (FZ)
SCHEDULE TO THE FARMING ZONE
Planning Overlays: DESIGN AND DEVELOPMENT OVERLAY (DDO)
DESIGN AND DEVELOPMENT OVERLAY - SCHEDULE 2 (DDO2)
ENVIRONMENTAL SIGNIFICANCE OVERLAY (ESO)
ENVIRONMENTAL SIGNIFICANCE OVERLAY - SCHEDULE 1 (ESO1)
Heritage Register: VHR H2277 - AUSTRALIAN BEAM WIRELESS TRANSMITTING STATION

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Land.vic.gov.au

Planning scheme data last updated on 6 July 2012.

A **planning scheme** sets out policies and requirements for the use, development and protection of land. This report provides information about the zone and overlay provisions that apply to the selected land. Information about the State, local, particular and general provisions of the local planning scheme that may affect the use of this land can be obtained by contacting the local council or by visiting Planning Schemes Online

This report is NOT a **Planning Certificate** issued pursuant to Section 199 of the Planning & Environment Act 1987. It does not include information about exhibited planning scheme amendments, or zonings that may abut the land. To obtain a Planning Certificate go to Titles and Property Certificates

For details of surrounding properties, use this service to get the Reports for properties of interest

To view planning zones, overlay and heritage information in an interactive format visit Planning Maps Online

For other information about planning in Victoria visit www.dpcd.vic.gov.au/planning

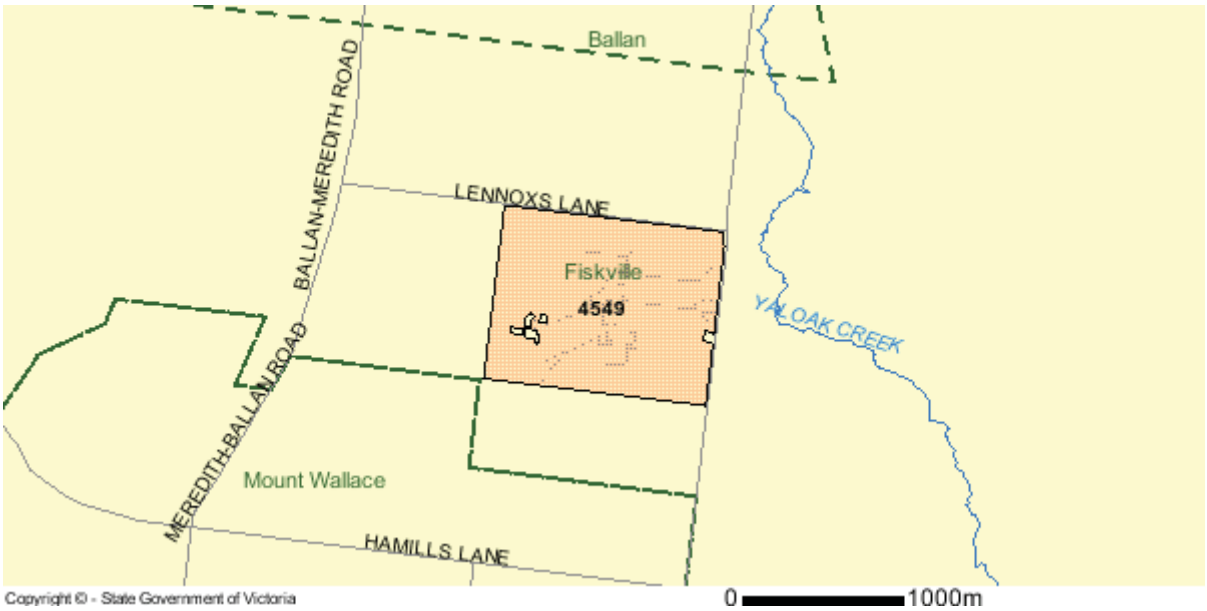
Heritage Register data last updated on 29 June 2012.

This report is NOT a **Heritage Certificate** issued pursuant to Section 50 of the Heritage Act 1995. It does not show places which may be under consideration for inclusion in the Victorian Heritage Register.

For more information on the **Victorian Heritage Register** go to Victorian Heritage Database

Other information about the heritage status of this property, how to obtain a Heritage Certificate, and any heritage approvals that may be required, may be obtained from Heritage Victoria

Area Map



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Planning Property Report

From **www.dpcd.vic.gov.au/planning** on 16 November 2012 03:16 PM

Address: 4549 GEELONG-BALLAN ROAD FISKVILLE 3342
Lot and Plan Number: Lot 1 TP845669
This property has a total of 4 parcels.
For full parcel details get the free Basic Property report at Property Reports
Local Government (Council): MOORABOOL **Council Property Number:** 124720
Directory Reference: VicRoads 77 E4

Planning Zone

FARMING ZONE (FZ)
SCHEDULE TO THE FARMING ZONE

Note: labels for zones may appear outside the actual zone - please compare the labels with the legend.

Zones Legend

- ACZ - Activity Centre
- B1Z - Business 1
- B2Z - Business 2
- B3Z - Business 3
- B4Z - Business 4
- B5Z - Business 5
- CA - Commonwealth Land
- CCZ - Capital City
- CDZ - Comprehensive Development
- DZ - Dockland
- ERZ - Environmental Rural
- FZ - Farming
- GWAZ - Green Wedge A
- GWZ - Green Wedge
- IN1Z - Industrial 1
- IN2Z - Industrial 2
- IN3Z - Industrial 3
- LDRZ - Low Density Residential
- MUZ - Mixed Use
- PCRZ - Public Conservation & Resource
- PDZ - Priority Development
- PPRZ - Public Park & Recreation
- PUZ1 - Public Use - Service & Utility
- PUZ2 - Public Use - Education
- PUZ3 - Public Use - Health Community
- PUZ4 - Public Use - Transport
- PUZ5 - Public Use - Cemetery/Crematorium
- PUZ6 - Public Use - Local Government
- PUZ7 - Public Use - Other Public Use
- R1Z - Residential 1
- R2Z - Residential 2
- R3Z - Residential 3
- RAZ - Rural Activity
- RCZ - Rural Conservation
- RDZ1 - Road - Category 1
- RDZ2 - Road - Category 2
- RLZ - Rural Living
- RUZ - Rural
- SUZ - Special Use
- TZ - Township
- UFZ - Urban Floodway
- UGZ - Urban Growth
- Urban Growth Boundary

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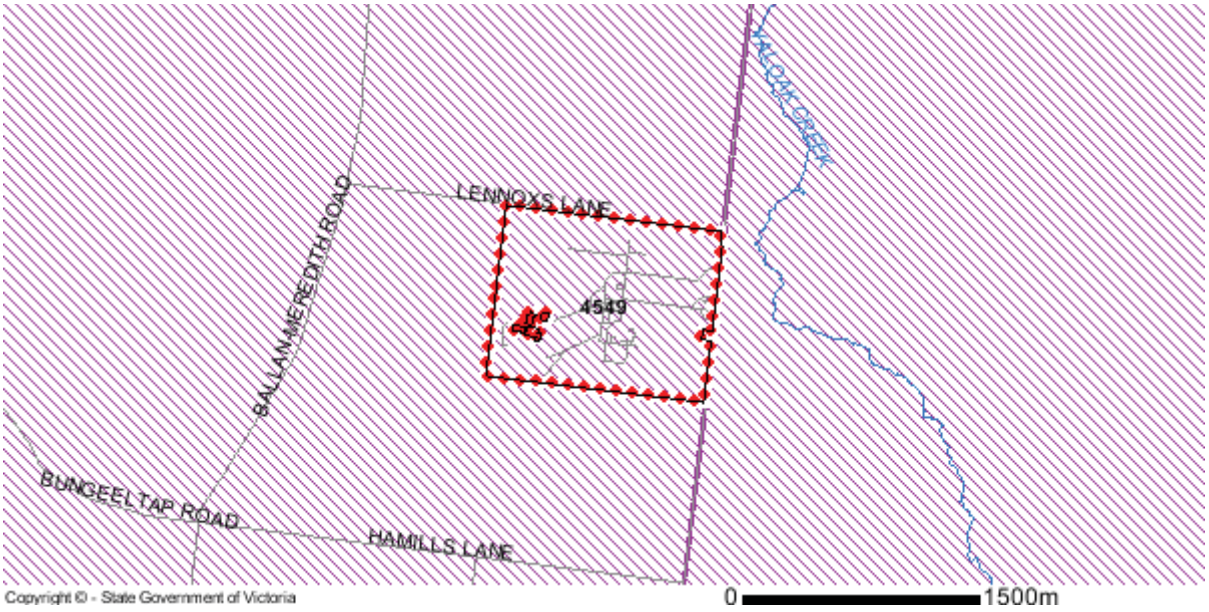
Planning Overlays

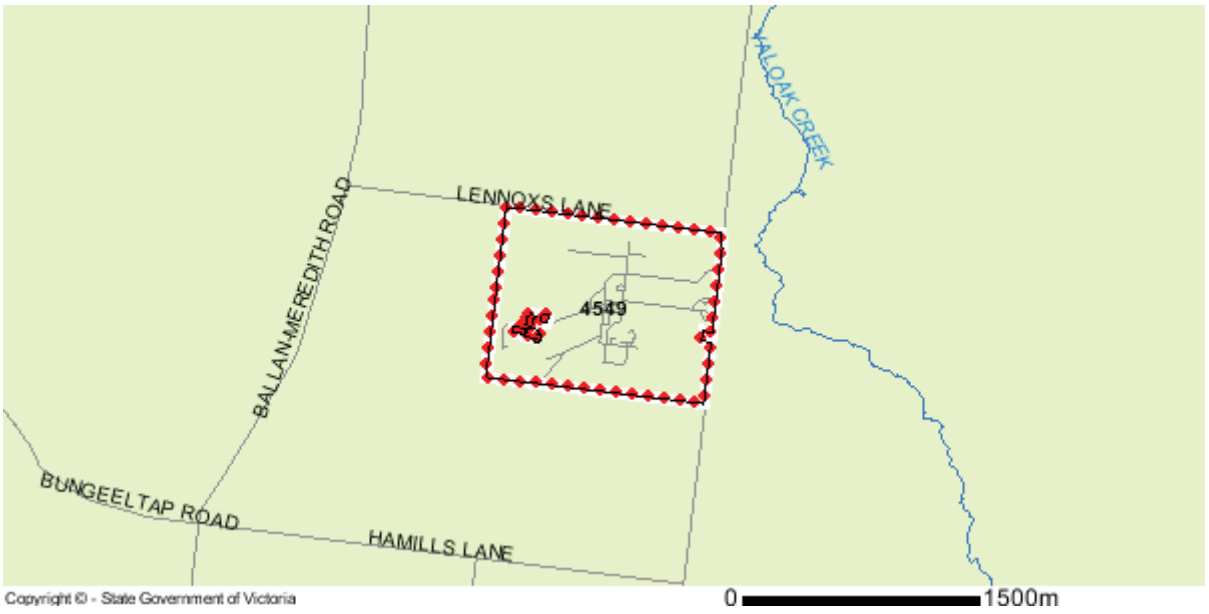
DESIGN AND DEVELOPMENT OVERLAY (DDO)

DESIGN AND DEVELOPMENT OVERLAY - SCHEDULE 2 (DDO2)



ENVIRONMENTAL SIGNIFICANCE OVERLAY (ESO)

ENVIRONMENTAL SIGNIFICANCE OVERLAY - SCHEDULE 1 (ESO1)



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Planning Overlays Legend

Note: due to overlaps some colours on the maps may not match those in the legend.

Heritage Register

This property is affected by an entry on the Victorian Heritage Register.

View information about VHR Number H2277 - AUSTRALIAN BEAM WIRELESS TRANSMITTING STATION

Heritage Register data last updated on 15 November 2012.

This report is NOT a **Heritage Certificate** issued pursuant to Section 50 of the Heritage Act 1995.
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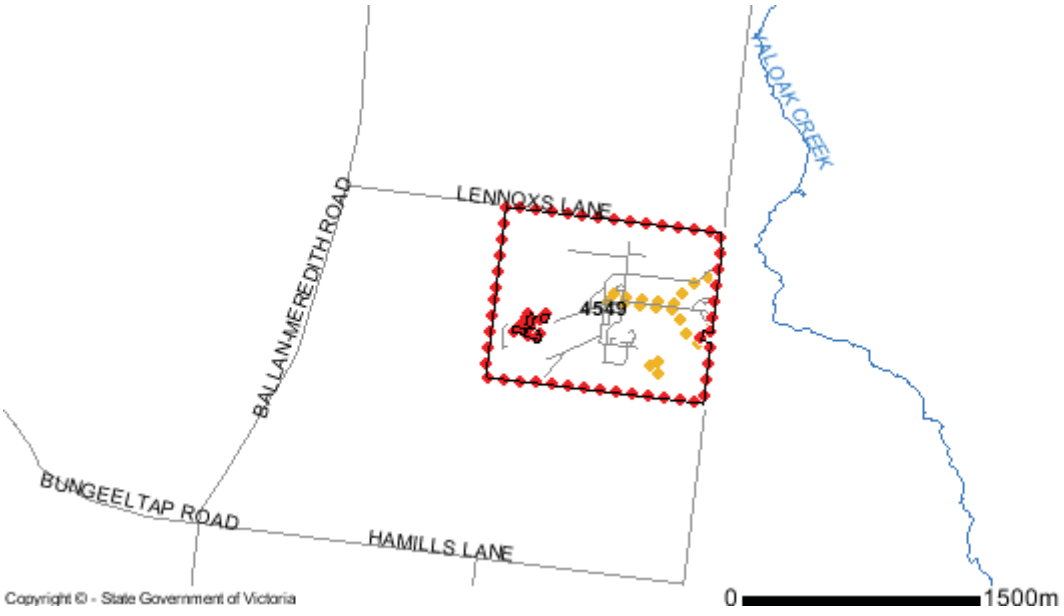

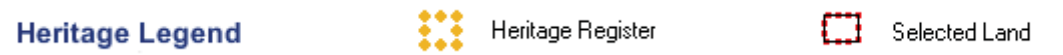

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Further Planning Information

Planning scheme data last updated on 15 November 2012.

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Extract of EPA Priority Site Register

**** Delivered by the LANDATA® System, Department of Sustainability and Environment ****

PROPERTY INQUIRY DETAILS:

STREET ADDRESS: 4549 GEELONG-BALLAN ROAD
SUBURB: FISKVILLE
MUNICIPALITY: SHIRE OF MOORABOOL
MAP REFERENCES: Vicroads Eighth Edition, State Directory, Map 77 Reference E5
Vicroads Eighth Edition, State Directory, Map 77 Reference E4

DATE OF SEARCH: 9th August 2012

PRIORITY SITES REGISTER REPORT:

A search of the Priority Sites Register for the above map references, 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] # 13190463 - 13190463125546 '212163.2-DJL'

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State Government Victoria
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LAND DESCRIPTION

Lots 1,2,3 and 4 on Title Plan 845669K (formerly known as part of Crown Allotment 2 Section 16, Crown Allotments 3 and 8 Section 16, part of Crown Allotment 9 Section 16 Parish of Yaloak).
PARENT TITLE Volume 03538 Folio 516
Created by instrument K206778 21/12/1982

REGISTERED PROPRIETOR

Estate Fee Simple
Sole Proprietor
COUNTRY FIRE AUTHORITY
K206778 21/12/1982

ENCUMBRANCES, CAVEATS AND NOTICES

Any encumbrances created by Section 98 Transfer of Land Act 1958 or Section 24 Subdivision Act 1988 and any other encumbrances shown or entered on the plan set out under DIAGRAM LOCATION below.

DIAGRAM LOCATION

SEE TP845669K FOR FURTHER DETAILS AND BOUNDARIES

ACTIVITY IN THE LAST 125 DAYS

NIL

DOCUMENT END

Imaged Document Cover Sheet

The document following this cover sheet is an imaged document supplied by LANDATA®, Land Victoria.

Document Type	**plan**
Document Identification	**TP845669K**
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Document Assembled	**09/08/2012 13:00**

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TITLE PLAN

EDITION 1

TP 845669K

LOCATION OF LAND

Parish: YALOAK
Township: -
Section: 16
Crown Allotment: 3, 8, 2 (PT) & 9 (PT)
Crown Portion: -

Last Plan Reference:-
Derived From: VOL. 9503 FOL. 693
Depth Limitation: NIL

Notations

ANY REFERENCE TO MAP IN THE TEXT MEANS THE DIAGRAM SHOWN ON THIS TITLE PLAN

Description of Land/Easement Information

THIS PLAN HAS BEEN PREPARED BY LAND REGISTRY, LAND VICTORIA FOR TITLE DIAGRAM PURPOSES

COMPILED: Date: 17/11/2005
VERIFIED: A. DALLAS
Assistant Registar of Titles

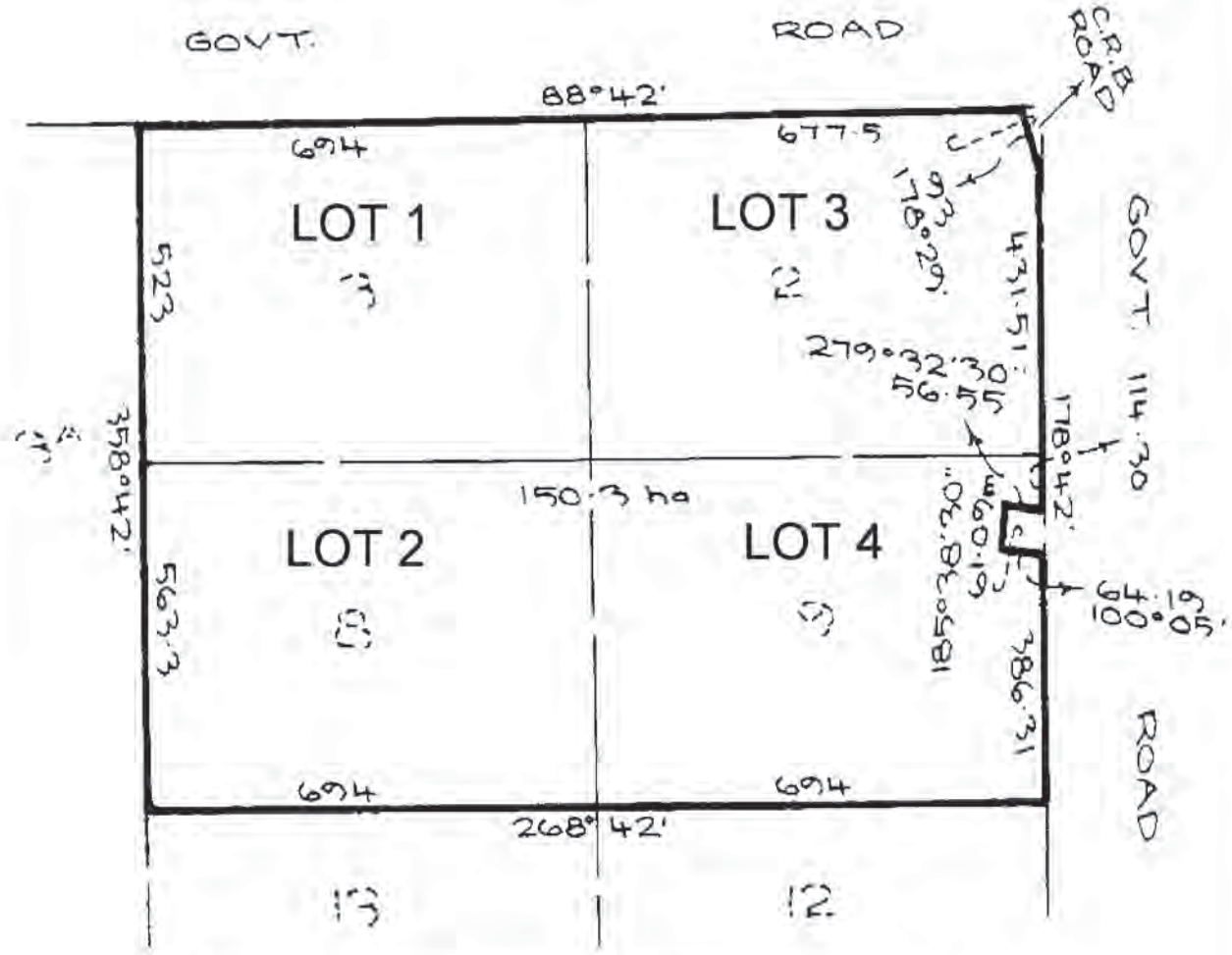

TABLE OF PARCEL IDENTIFIERS
WARNING: Where multiple parcels are referred to or shown on this Title Plan this does not imply separately disposable parcels under Section 8A of the Sale of Land Act 1962
LOT 1 = C.A.3 SECTION 16 LOT 2 = C.A.8 SECTION 16 LOT 3 = C.A.2 (PT) SECTION 16 LOT 4 = C.A.9 (PT) SECTION 16

LENGTHS ARE IN METRES	Metres = 0.3048 Feet Metres = 0.201168 x Links	Sheet 1 of 1 sheets

Historic Certificate of title

4598 Geelong-Ballan Rd, Fiskville

Certificates of Title Information

Certificate of Title	Date	Registered Proprietor
Vol. 03538 Fol. 516	21/12/1982	Country Fire Authority
Vol. 3390 Fol. 2157364	5/8/1948	Overseas Telecommunications (Australia) Commission.
Vol. 3390 Fol. 121375	5/5/1925	Amalgamated Wireless (Australasia) Ltd.
Vol. 3390 Fol. 971789	6/11/1920	George William Stead
Vol. 3390 Fol. 667672	11/10/1911	James Isaac Watson
Vol. 3538 Fol. 707516	02/10/1911	William Frederick Coltman and Frederick Edward Sides
Vol. 3538 Fol. 279412	29/01/1910	Edward Brown

[1]

[1] *Preliminary Site Assessment,* Golder Associates (June 2012)

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Volume 09503 Folio 693
Folio Creation: Created as paper folio continued as computer folio
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K206778

ORIGINAL

NOT TO BE TAKEN FROM THE OFFICE OF TITLES

REGISTER BOOK

VOL. 9503 FOL. 693

VICTORIA

Certificate of Title

UNDER THE "TRANSFER OF LAND ACT"

COUNTRY FIRE AUTHORITY is the proprietor of an estate in fee - - - - - - simple subject to the encumbrances notified hereunder in all that piece of land in the Parish of Yaloak County of Grant being Crown Allotments 3 and 8 part of Crown Allotments 2 and 9 Section 16 which land is shown -- enclosed by continuous lines on the map hereon - - - - - - - - - - - - - -

FOL.

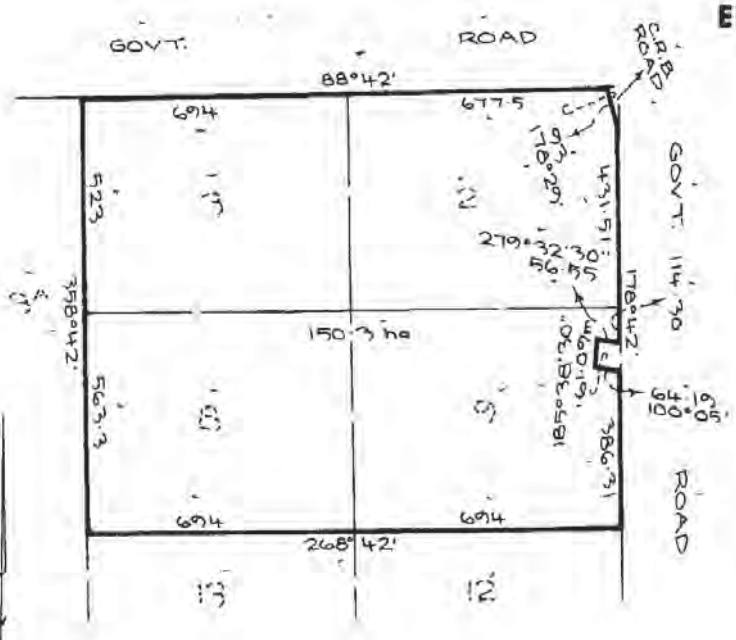
VOL.

DATED the 21st day of December 1982

Assistant Registrar of Titles

OFFICE OF TITLES VICTORIA

ENCUMBRANCES REFERRED TO



T09503-693-1-9

AREA IS IN HECTARES (ha)
MEASUREMENTS ARE IN METRES

Derived from Vol.3538 Fol.516
K206778

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VOL 9503 FOL 693 INSTRUMENT APPLICATION 5577T/82—1646(F4)

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F. D. Atkinson, Government Printer, Melbourne

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Volume 03538 Folio 516
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Parent title Volume 03390 Folio 975

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Entered in the Register Book,
Vol. 3538 Fol. 707516

VICTORIA.

Certificate of Title,

UNDER THE "TRANSFER OF LAND ACT 1890."

CANCELLED

WILLIAM FREDERICK COLTMAN of Creswick Road Timber Merchant and FREDERICK EDWARD SIDES of Ligar Street Grazier both of Ballarat are now the proprietors as Tenants in Common in equal shares - - - - - - - of an Estate in Fee-simple, subject to the Encumbrances notified hereunder in All that piece of Land, delineated and coloured red on the map in the margin containing Three hundred and seventy-two acres Two roods and Sixteen perches or thereabouts being Crown Allotments two, three, eight, and nine Section sixteen Parish of Yaloak County of Grant -

ORIGINAL CERTIFICATE.
Not to be dealt with outside the Titles Office.

Dated the Second day of October thousand nine hundred and eleven.

Assistant Registrar of Titles.

OFFICE OF TITLES VICTORIA

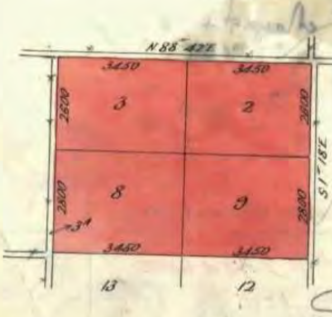
ENCUMBRANCES REFERRED TO.

SPECIAL RAILWAY CONDITION contained in Grants to John Dennis and John Osborne-

A MORTGAGE from Edward Brown to Hugh Wilson Morrow John Headen Cuthbert and The Union Trustee Company of Australia Limited registered 29th January 1910 and Nbd.279412 in the--- Register Book - - - - - - - - - - - - -

The above Mortgage is DISCHARGED

ASST. REGR. OF TITLES
11th October 1911



S1300

T03538-516-1-0

The Measurements are in Links

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Vol. 3390 Fol. 677975 Transfer. 663498 Application

Nature of Instrument.	Day and Hour of its Production.	Names of the Parties to it.	Number or Symbol thereon.

Caveat No 41626 lodged 5 October 1911 at 10 3 am

Caveat No 41626 lapsed 11 October 1911 at 11:39 a.m.

Assistant Registrar of Titles.

James Isaac Watson of St. Kilda Street Elsternwick Gentleman is now the proprietor of the within-described Estate and Land pursuant to a Transfer from within named William Frederick Coltman and Frederick Edward Sides registered on the 11th day of October 1911 at 11.39 o'clock in the fore noon and Numbered 663498

Assistant Registrar of Titles.

George William Stead of Ballan Farmer is now the proprietor of the within-described estate pursuant to a transfer from James Isaac Watson registered on the 6th day of November 1920 and numbered 971787

Assistant Registrar of Titles.

CAVEAT No 61335 LODGED 5 October 1923

CAVEAT No 61335 LAPSED 5th May 1925

COUNTRY ROADS BOARD has pursuant to section ... of Transfer of Land Act served a Notice of intention to compulsory acquisition of PART OF C/A 3 of the land comprised herein.

Dated 3rd JUNE 1963

Corres. No. 63/8850 (PLAN WITH LETTER)

Assistant Registrar of Titles.

Amalgamated Wireless (Australasia) Limited of 97 Clarence Street, Sydney, New South Wales is now the proprietor of the within described estate by transfer from George William Stead registered on 5th May 1925 and numbered 121375

Assistant Registrar of Titles.

TRANSFER AS TO PART No. B923943 registered 4th May 1964 CANCELLED AS TO PART See Vol. 8503 Fol. 980

M.A.

Assistant Registrar of Titles.

Overseas Telecommunications (Australia) Commission of 47 York Street Sydney in New South Wales is now the proprietor of the within described estate by transfer registered on 5th August 1948 and numbered 2157314

Assistant Registrar of Titles

8.10.48

CAVEAT No. E37053 LODGED 10 May 1971 CAVEAT WILL LAPSE ON REGISTRATION OF K206778 - 9 MAR 1983

TRANSFER AS TO PART No. E5772 registered 2nd April 1971 CANCELLED AS TO PART See Vol. 8879 Fol. 728

K.L.K.

Assistant Registrar of Titles

TRANSFER AS TO BALANCE No K206778 registered on 21st December 1982 CANCELLED See Vol. 9503 Fol. 693

CANCELLED

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SCALE 20 CHAINS. to one inch

Volume 3538 Folio 516

METRIC MEASUREMENTS SHOWN FOR K206 778

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0.0302
356°05'33"
0.1866 Acres
AB.

0.0890
154°11'13"
0.0130 Acres
AB 21/2/68

372 — 2 — 16

SK 2.9.64

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Appendix E
31 Pages

Environmental Inspection of VUT Facility

Cardno LanePiper

Shaping the Future

Privileged and Confidential

Environmental Inspection of VUT Facility Fiskville Training College

Doc Ref 212163.1

Prepared for Ashurst

October 2013

DOCUMENT CONTROL

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Report Title:	Environmental Inspection of VUT Facility Fiskville Training College	
Doc. Ref:	212163.1Report02.2	
Date	18 October 2013	
Client:	Ashurst	
Signatures:	**Prepared By:**  **Lauren McGloin** *BESci* Environmental Scientist	**Authorised By:** **Anthony P. Lane** *CEnvP* Senior Principal

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1	Electronic	File – Appendix E - 212163.1Report01.3	Cardno Lane Piper Pty Ltd

ENVIRONMENTAL INSPECTION OF VUT FACILITY

Fiskville Training College

EXECUTIVE SUMMARY

Cardno Lane Piper Pty Ltd was engaged by Ashurst ("the Client"), to conduct an environmental site inspection and review of information of the Victoria University of Technology (VUT) facility known as the "Green Building" at the Fiskville Training College (the "site"). The facility is used for research programs into various aspects of effects of fire on building materials. The location and features of the site are shown on Figures 1 and 2 presented in Appendix A. The investigation was carried out in accordance with the scope and limitations presented by Cardno Lane Piper on 7 December 2012 and accepted by Ashurst on the same day.

The objectives of the assessment are to:

- Assess the land for potential sources of contamination from site activities or potential contaminants of concern by conducting a site inspection and an interview.
- Identify water usage and pathways for water runoff containing chemicals (potentially into Dam 1, based on site observations).
- Provide information on the site uses and processes within the building, as observed by a site inspection and interview with VUT personnel.
- Identify any issues with potential to impact on current work on the feasibility and design of water treatments systems at CFA Fiskville.
- Any other environmental concerns relevant for CFA and an EPA Environmental Auditor recently engaged by CFA at the site.

To achieve the above objectives, Cardno Lane Piper undertook the following activities at the site:

- A site inspection with the aid of site plans in order to:
  - Record observations of facilities present, activities undertaken and materials used including site use, chemicals and fuels.
  - Identify potential sources of environmental contamination emitting from the site and identify pathways for water-borne discharges to leave the facility and enter CFA's operational areas.
  - Identify the areas of the CFA site where contamination of land and water could occur from the VUT facility.
- Site investigation was limited to inspections including interviews with VUT employees familiar with the site facilities and history and activities at the site. VUT personnel were also contacted to obtain a list of chemicals used and stored in the facility. Information was gathered in the form of field notes and photographs.

Summary of Facilities and Activities at VUT Site

Information provided by VUT indicates that they first developed a fire research facility at FTC in 1998. However, a site plan in a report on the PAD by Minenco in 1996 shows a smaller "VUT" building in a similar location. In 2005/2006 the current Green Building was constructed. Experiments are performed on building materials and treatments to evaluate their fire protection performance. A storage shed located adjacent to the Green Building is also leased by VUT to store chemicals, materials and equipment. Some materials are located just outside the shed. Chemical processes were identified to be used during experiments with chemicals and materials for fire performance in various test areas observed within the building. The actual experiments or processes were not observed at the time of the site visit but were described by VUT representatives as follows:

- **Main Test Area** (covers 50% of the building footprint): Simulation of a building floor level using fibres, wood at the base, metal/steel rods, drums filled with water to simulate weight on the floor similar to two or three level structures. Fires are not set in this area - only testing the strength of the materials.
- **ISO – Rooms & 3 level 'building'** (covers 25% of the building footprint): These are 'mock-up' rooms and building floors constructed with materials such as wood, carpet, and steel. See Plate 3, in Appendix B.
- **Smaller test and storage areas** (covers 25% of the building footprint in aggregate): These areas are used to conduct small controlled experiments with flammable chemicals for performance of the material when set on fire within a contained area.

The most common flammable liquid fuels used are diesel and foams. Refer to Appendix C for a list of chemicals used by VUT. Further storage of chemicals and flammable liquids at the time of the inspection (not included on the chemical list provided by VUT) included:

- 11x 200 L drums containing with 4 containing diesel in a darker blue coloured drums. The remaining grey coloured drums were empty and were used in experiments to hold water as weight ballast. All drums were situated within a temporary bunded system. Refer to Plate 9 in Appendix B.
- 12 x 30 L containers of AFFF (Angus FP70 Plus) - a fluoro protein foam concentrate.
- 20 x 25 Fire Extinguishers for a variety of fire types such as dry chemical powder, Carbon Dioxide, Water, Foam (type unknown) and wet chemical.
- Storage of chemicals including 200 L drums marked as "Jet A1 Aviation Fuel" was present outside the white shed during a site visit conducted on 13 July 2013. The drums were unbunded, however they have since been removed from this area prior to the second inspection of the site and completion of this report.

Therefore, from our inspection and limited site history, a variety of chemicals have been used, tested and/or stored on site for a period of time, including the use of PFC foams.

Potential for Contamination – Water Treatment Options or Land

The activities and experiments conducted within the building are within a controlled area on a concrete hardstand. Therefore, there is a low potential for impact to soils beneath the building from current activities. However, there is potential for contamination to land outside the building as result of VUT activities. A management plan is required to demonstrate the VUT commitment and awareness of potential contamination of the site by their activities.

Other potential impact to land includes historical fire training activities in the area prior to construction of the building. Further assessment may be required by the appointed environmental auditor to assess the potential for soil or groundwater contamination beneath the Green Building.

The water discharge from the VUT building, if not managed, has the potential to affect water treatment options currently being considered by CFA. VUT should be required to assess the quantity and quality of their effluent stream and identify means of operating independently of the CFA effluent system. There is potential for contamination of water bodies at the site due to the discharge of effluent from the building to Dam 1. However, there is no data available to indicate the quantity or quality of effluent from the VUT building to Dam 1, therefore it should be managed independently of the CFA water system.

Recommendations

Given the results of the site inspection, potential for water and land contamination and the uncertainty associated with use of chemicals at the site, the following is recommended:

1. It is recommended in relation to the VUT facility that they should discontinue any effluent discharge to CFA property (including Dam 1) and be required to plan for management of their liquid effluent independently of CFA in the future.
2. An Environmental Management Plan should be prepared and implemented by VUT to control and minimise all impacts on the environment including land and water on and off site from their facility and for management of solid and liquid wastes.

Environmental Inspection of VUT Facility

Fiskville Training College

Table of Contents

Text Tables

Appendices

LIST OF ABBREVIATIONS AND UNITS

Chemical Names

6:2 FtS	6:2 Fluorotelomer Sulfonate
BTEX	Benzene, Toluene, Ethylbenzene & Xylenes (subset of MAH)
MAH	Monocyclic Aromatic Hydrocarbons
OCP	OrganoChlorine Pesticides
OPP	OrganoPhosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	PolyChlorinated Biphenyls
PCDD	Polychlorinated dibenzodioxins
PCDF	Polychlorinated dibenzofurans
PFC	Perfluoro Compounds
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PHC	Petroleum Hydrocarbons
SVOC	Semi-Volatile Organic Compounds
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
VOC	Volatile Organic Compounds

Technical Terms

4WD	Four Wheel Drive
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ASC	Assessment of Site Contamination
AST	Aboveground Storage Tank
COC	Chain of Custody
CoEA	Certificate of Environmental Audit
COPC	Contaminants of Potential Concern
CUN	Clean Up Notice
DNAPL	Dense Non-Aqueous Phase Liquid
DSE	Department of Sustainability and Environment (now Department of Environment and Primary Industries)
EILs	Environmental Investigation Levels
EPA	Environment Protection Authority
ESA	Environmental Site Assessment

GCMS	Gas Chromatograph - Mass Spectrometer
GIS	Geographic Information System
GME	Groundwater Monitoring Event
GPR	Ground Penetrating Radar
HILs	Health Investigation Levels
LNAPL	Light Non-Aqueous Phase Liquid
LOR	Limit of Reporting
LPG	Liquefied Petroleum Gas
N/A	Not Applicable
NAPL	Non-Aqueous Phase Liquid
NEPM	National Environment Protection Measure
PID	Photo-ionisation detector (measures in ppm)
SAQP	Sampling and Analysis Quality Plan
SEPP	State Environment Protection Policy
SoEA	Statement of Environmental Audit
TIT	Triple Interceptor Trap
UCL	Upper confidence Limit ("95% UCL of the mean" is a value for the mean concentration from sampling which has only a 5% chance of being greater than the true mean value.)
UST	Underground Storage Tank

Units

ha	Hectares
mbgl	Metres Below Ground Level
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
ppm	Parts per Million
µg/kg	Microgram per Kilogram (approximately equivalent to ppb)

Site Specific

AWA	Amalgamated Wireless (Australasia) Ltd
BA	Compressed Air Breathing Apparatus
CFA	Country Fire Authority
CSR	Confined Space Rescue
DBA	Drum Burial Area
DFA	Former Drum Fire Area
DET	Driver Education Training

EX	Explosives
FLP	Flammable Liquid Practise Area for Drills or PAD
FMA	Fuel Mixing area
FTC	Fiskville Training College
FTP	Foam training pits
IFI	Independent Fiskville Investigation
OTC	Overseas Telecommunications (Australia) Commission
PAD	Practice Area for Drills
PSA	Props Storage Area
RAR	Road Accident Rescue
RR	Rope Rescue
RTG	Regional Training Ground
SCA	Soil Composting Area
SFA	Structural Fire Attack
STP	Sewage Treatment Plant
TR	Trench Rescue
USR	Urban Search and Rescue
VUT	Victoria University of Technology
WF	Wildfire
WSP	Water Supply Pit

ENVIRONMENTAL INSPECTION OF VUT FACULTY "GREEN BUILDING"

Fiskville Training College

1 INTRODUCTION

1.1 Background

Cardno Lane Piper Pty Ltd was engaged by Ashurst ("the Client"), to conduct an environmental site inspection and review of information of the Victoria University of Technology (VUT) facility known as the "Green Building" at the Fiskville Training College (the "site"). The facility is used for research programs into various aspects of effects of fire on building materials. The location and features of the site are shown on Figures 1 and 2 presented in Appendix A.

The investigation was carried out in accordance with the scope and limitations presented by Cardno Lane Piper on 7 December 2012 and accepted by Ashurst on the same day.

1.2 Purpose and Objectives

The purpose of this assessment is to provide the client with preliminary advice on the potential for the facility to be a source of contamination for water entering Dam 1 of the CFA site and to understand the uses and activities undertaken. The reason for this works was that no previous environmental assessment had considered this as a source of contamination.

The objectives of the assessment are to:

- Assess the land for potential sources of contamination from site activities or potential contaminants of concern by conducting a site inspection and an interview.
- Identify water usage and pathways for water runoff containing chemicals (potentially into Dam 1, based on site observations).
- Provide information on the site uses and processes within the building, as observed by a site inspection and interview with VUT personnel.
- Identify any issues with potential to impact on current work on the feasibility and design of water treatments systems at CFA Fiskville.
- Any other environmental concerns relevant for CFA and an EPA Environmental Auditor recently engaged by CFA at the site.

1.3 Scope of Assessment

Cardno Lane Piper undertook the following activities at the site:

- A site inspection with the aid of site plans in order to:
  - Record observations of facilities present, activities undertaken and materials used including site use, chemicals and fuels.
  - Identify potential sources of environmental contamination emitting from the site; identify pathways for water-borne discharges to leave the facility and enter CFA's operational areas.

  - Identify the areas of the CFA site where contamination of land and water could occur from the VUT facility.
- Site investigation was limited to inspections including interviews with VUT employees familiar with the site facilities and history and activities at the site. VUT personnel were also contacted to obtain a list of chemicals used and stored in the site. Information was gathered in the form of field notes and photographs.
- The information obtained during the site inspection was assessed and this report prepared.

1.4 Standard of Assessment & Limitations

This assessment has been undertaken in general accordance with the current "industry standards" for an ESA for the purpose, objectives and scope identified in this report. These standards are set out in:

- *National Environment Protection [Assessment of Site Contamination] Measure* (NEPM), December 1999, National Environment Protection Council (NEPC)

The agreed scope of this assessment has been limited for the current purposes of the client. The assessment may not identify contamination occurring in all areas of the site, or occurring after this investigation.

The site history is based predominantly on anecdotal evidence provided by VUT (Faculty Co-ordinator – VUT).

An overview of environmental site assessments is included in Appendix D.

2 SITE DESCRIPTION AND SETTING

2.1 Site Definition and Description

The key details defining the subject site are presented on Table 2-1. The location of the site is within the Fiskville Fire Training College as shown on Figure 1, Appendix A.

Table 2-1: Site Identification Details

Site Name	VUT Building "Green Building"
Site Address	Within the, CFA Fiskville Fire Fighting Training College, 4549 Geelong-Ballan Rd, Fiskville.
Site Area (VUT Green Building only)	3,036 m^2
Title Details	Lot 4 on Title Plan 845669K Volume 09503, Folio 693

2.2 Site Use and Infrastructure

The site is located within the CFA Fiskville Practical Area for Drills (PAD) where fire training occurs in the centre of the site. However it is not used by the CFA and is currently leased to VUT as a fire testing and experimental facility. The facility is not continuously operated and experiments occur intermittently as funding allows. No further experiments using fire and water are planned and none will be conducted without permission by CFA[1].

The facility is principally a large steel shed (the Green Building) with a small laydown area to the north-east of the building. The fire research activities are limited to the interior of the building. However, it is connected to CFA's Dam 1 into which effluent can discharge. Further details on site operations and facilities are presented in the following sections and in photographs presented in Appendix B, Figure 2 in Appendix A.

2.3 Surrounding Land Uses

The surrounding land uses, nearby to potential sources of contamination and sensitive receptors, are outlined in Table 2-2.

Table 2-2: Surrounding Land Uses

Direction	Land Use or Activity
North	• Dam 1, Flammable Liquid PAD (FLP), Triple Interceptor Trap (TIT),
West	• Dam 1
East	• Drainage channel • Open paddock on CFA site
South	• Soil composting area (SCA) to south-east • Further Practise Area for Drill (PAD) props and • Dam 2

[1] Verbal advice from CFA site management.

3 SITE INSPECTION AND OBSERVATIONS

3.1 Site Inspection

A detailed site inspection was carried out on 19 December 2012 by an experienced environmental scientist from Cardno Lane Piper. The scope of work outlined in Section 1.3 was undertaken including an interview with Mr Michael Rogerson, the VUT Faculty Co-ordinator. Cardno Lane Piper used a site inspection checklist to prompt for key environmental aspects normally considered during Phase 1 Environmental Site Assessments. Photographs were also taken and materials datasheets and other documents requested as evidence of the use of potential environmental contaminants.

3.2 Summary of Facilities and Activities at VUT Site

Information provided by VUT indicated that they first developed a fire research facility at FTC in 1998. However, a site plan in a report on the PAD by Minenco in 1996 shows a smaller "VUT" building in a similar location. In 2005/2006 the current Green Building was constructed.

The infrastructure at the VUT site includes a small entry room and kitchen. This common area then leads to a ramp inside the Green Building where experiments are conducted. The Green Building is a large warehouse of steel construction and cladding (see cover photograph).

Experiments are performed on building materials and treatments to evaluate their fire protection performance. Materials used in buildings including the floors and walls are set up to simulate rooms in houses and multi-storey. An area for storage of materials ready for use in experiments was also identified. The site is also used for smoke testing of chemicals and testing fire extinguishers with different chemical properties. A storage shed located adjacent to the Green Building is also leased by VUT to store materials and equipment. Some materials are located just outside the shed. Within the shed are computers, desks and cupboards and work areas to analyse data. A small tractor used to move building materials is also present (See site layout in Figure 2, Appendix A).

The pipe connecting water run-off along the eastern side of the Green Building as shown in Figure 2 (Appendix A) is on the roof of the building capturing rainwater run-off from the roof. It is not associated with contamination from fire-fighting activities.

3.3 Site Observations and Information Review

Table 3-1 summarises the observations and information recorded. Selected site photographs are presented in Appendix B.

Table 3-1: Site Inspection Observations and Interview Information

Item	Observations and Descriptions
Chemical Storage, processes & infrastructure	Chemical processes were identified to be used during experiments with chemicals and materials for fire performance in various test areas observed within the building. The actual experiments or processes were not observed at the time of the site visit but were described by VUT representatives as follows: **Main Test Area** (covers 50% of the building footprint):

Item	Observations and Descriptions
	Simulation of a building floor level. Using fibres, wood at the base, metal/steel rods, drums filled with water to simulate weight on the floor similar to two or three level structures. Fires are not set in this area - only testing the strength of the materials. See Plate 1, in Appendix B **ISO – Rooms & 3 level 'building'** (covers 25% of the building footprint): These are 'mock-up' rooms and building floors constructed with materials such as wood, carpet, and steel. See Plate 3, in Appendix B. Experiments are conducted in these rooms and building floors to monitor a specific material and assess the performance while on fire. **Smaller test and storage areas** (covers 25% of the building footprint in aggregate): These areas are used to conduct small controlled experiments with flammable chemicals for performance of the material when set on fire within a contained area. Materials not in use or props to be re-used are situated in this area. See Plate 2, in Appendix B. The most common flammable liquid fuels used is diesel and foams. Refer to Appendix C for a list of chemicals used by VUT. Further storage of chemicals and flammable liquids at the time of the inspection (not included on the chemical list provided by VUT) included : ● 11x 200 L drums containing with 4 containing diesel in a darker blue coloured drums. The remaining grey coloured drums were empty and were used in experiments to hold water as weight ballast. It is possible these drums contained flammable liquids due to hazardous chemical stickers present on the drums. All drums were situated within a temporary bunded system. Refer to photo 9 in Appendix B. ● 12 x 30 L containers of AFFF (Angus FP70 Plus) - a fluoro protein foam concentrate. A copy of the MSDS for Angus FP70 Plus is included in Appendix C. ● 20 x 25 Fire Extinguishers for a variety of fire types such as dry chemical powder, Carbon Dioxide, Water, Foam (type unknown) and wet chemical. The extinguisher store was partly bunded and stored adjacent to the ISO Rooms. No other chemical storage was identified within the Green Building or smaller white shed. However, during a previous site visit conducted on 13 July 2013 storage of chemicals including 200 L drums marked as "Jet A1 Aviation Fuel" was present outside the white shed. See Plate 10 & 11 in Appendix B The drums were unbunded, however they have since been removed from this area prior to the second inspection of the site and completion of this report. Therefore from our inspection and limited site history a variety of chemicals have been used, tested and/or stored on site for a period of time, which includes the use of PFC foams.
Water Source and Storage	Water supply to the buildings is from the two rain water tanks situated on the western side of the building (See Plate 5, in Appendix B). The volume of these tanks is 25,000 L each.

Item	Observations and Descriptions
Effluent from VUT Building (Trade waste)	Excess water from experiments, drains to the southern and western side of the building. Effluent pipes pass beneath the building to a pair of effluent pits located on the western side of the building. According to VUT representative, these pipes discharge to Dam 1. There is no treatment of this effluent stream. Refer to Figure 2 in Appendix A.
Quality of trade waste discharge	There is no monitoring or data available on the quality or contamination levels in the effluent leaving the building.
Surface coverings	The Green Building, Shed and kitchen areas are all constructed on concrete slabs. Surrounding these buildings is gravel and small patchy areas of grass.
Site slope and drainage features	The VUT site is generally a flat area within the footprint of the building and directly to the north, south, and east. Directly to the west of the building, the site slopes toward Dam 1 located only a few meters from the building. A shallow spoon drain runs parallel to the effluent lines from the effluent pits apparently conducting excess stormwater from the VUT building to Dam 1. This is shown in Figure 2 (Appendix A).
Nearby water bodies	Dam 1 located immediately adjacent to the western side of the VUT building. Dam 2 is located approximately 20 m to the south of the building.
Solid waste deposition	Burnt materials and most props are reused on the site. It could not be confirmed with VUT how solid waste is removed from the site; however it is likely to have occurred by VUT staff to landfill. Records of disposal of empty drums used to store flammable liquid flues were identified (see Appendix C).
Evidence of previous site contamination investigations	Evidence of previous site contamination investigations can include groundwater well covers; soil bore plugs and disturbed ground. None was observed therefore it is unlikely any investigations had occurred in this area.
Evidence of land contamination (staining or odours)	No staining or odours indicative of petroleum hydrocarbon contamination was observed in the warehouse or on the ground surrounding the building.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 Potential for Contamination of Water

There is potential for contamination of water bodies at the site due to the discharge of effluent from the VUT building to Dam 1. However, there is no data available to indicate the quantity or quality of effluent from the VUT building to Dam 1. Given the scale of the VUT operation, it is likely that the loading of flammable liquid and PFC contamination to Dam 1 from this source would be small. Nevertheless it should be managed independently of the CFA water system.

The potential for contamination of groundwater from the VUT activities is considered to be negligible due to the small quantity of effluent and materials used and the great depth to groundwater (over 60 m). The potential for the effluent from VUT building to impact on perched water is also negligible due to the small volumetric load relative to the large volume of saturated fill forming the "perched aquifer" around Dam 2 (Dam 1 was not constructed with scoria fill). Further the perched water referred to is not related to any other bodies of perched water that might occur at other locations on the FTC site - see Cardno Lane Piper's *'Groundwater Contamination Assessment – Fiskville Training College'* report for further information on perched water at the site.

No further planned experiments using fire and water will be conducted without permission by CFA or when a water treatment plant is in place.

4.2 Potential for Contamination to Land

The activities and experiments conducted within the building are within a controlled area on concrete hardstand. Therefore there is a low potential for impact to soils beneath the building from current activities. However there is potential for contamination to land outside the building as result of VUT activities. A management plan is required to demonstrate the VUT commitment and awareness of potential contamination of the site by their activities.

Other potential impact to land includes historical fire training activities in the area prior to construction of the building.

Further assessment may be required by the appointed environmental auditor to assess the potential for soil or groundwater contamination beneath the Green Building.

4.3 Potential to Affect CFA Water Treatment Options

The water discharge from the VUT building has the potential to affect water treatment options currently being considered by CFA if not managed. VUT should be required to assess the quantity and quality of their effluent stream and identify means of operating independently of the CFA effluent system.

4.4 Recommendations

Given the results of the site inspection, potential for water and land contamination and the uncertainty associated with use of chemicals at the site, the following is recommended:

1. It is recommended in relation to the VUT facility that they should discontinue any effluent discharge to CFA property (including Dam 1) and be required to plan for management of their liquid effluent independently of CFA in the future.
2. An Environmental Management Plan should be prepared and implemented by VUT to control and minimise all impacts on the environment including land and water on and off site from their facility and for management of solid and liquid wastes.

Appendix A
2 Pages

Figures

Figure 1: Site Locality

Figure 2: VUT Site Features

N

LEGEND

- Shallow Spoon Drain
- VUT Green Building
- Dams 1 & 2
- Flammable Liquid Pad
- Shed
- Site Boundary

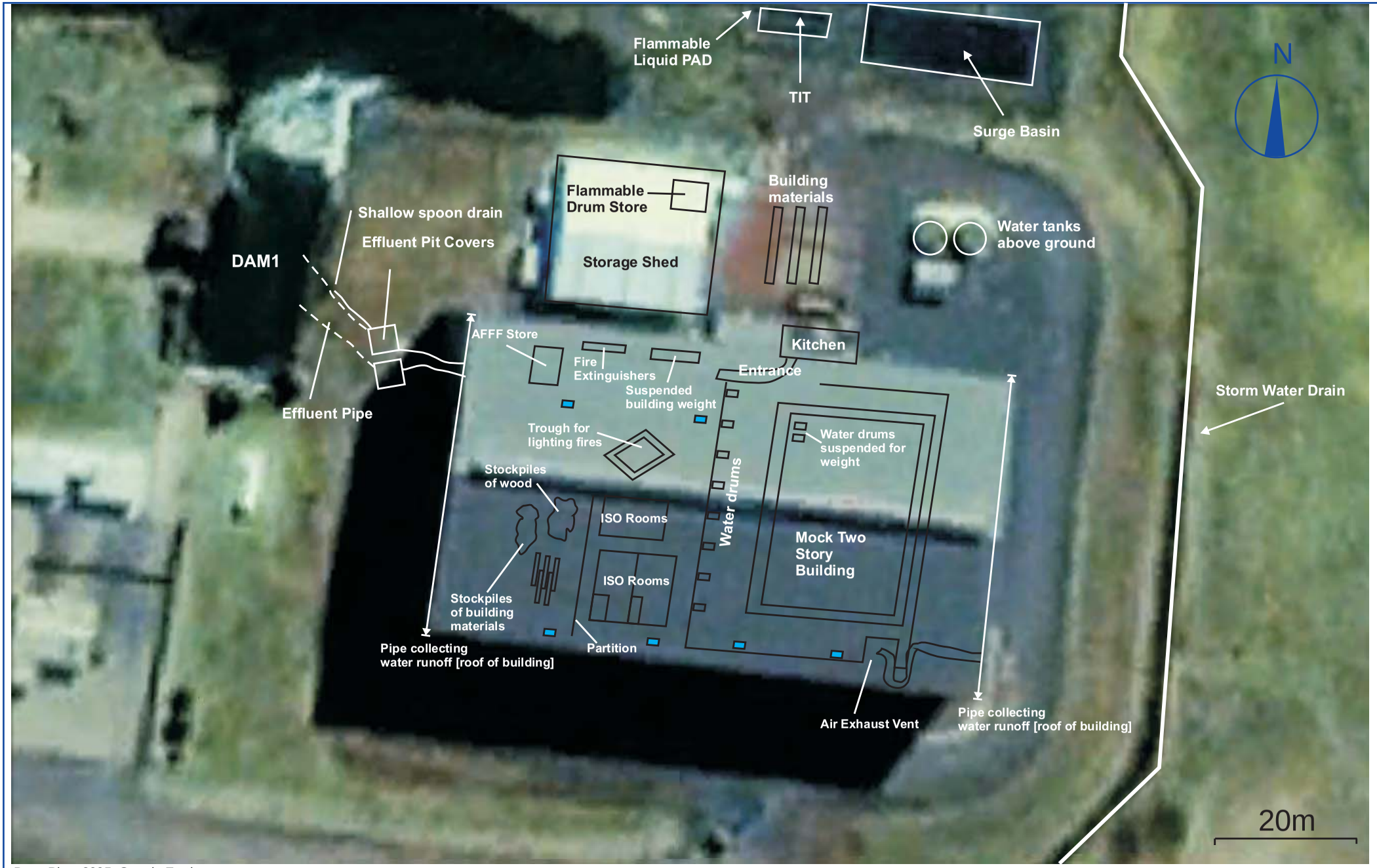
0 100 200 400
metres

Base Map: 2007 Aerial Photograph from GeoVIC, DPI

Cardno LanePiper
Shaping the Future

PROJECT:
Environmental Inspection of VUT Facility
Fiskville Training College

SCALE: As Shown	DATE: 14 OCT 2013	TITLE: **SITE LOCALITY**	
DRAWN/CHECKED: PXT/SYS	JOB NO. 212163.1		
REF: 212163.1Report02.2		REV. NO. 2	FIG. NO. 1



Base Plan: 2005 Google Earth

Cardno LanePiper Shaping the Future	PROJECT: Environmental Inspection of VUT Facility Fiskville Training College	SCALE: As Shown	DATE: 30 Jan 2013	TITLE: VUT Site Features
		DRAWN: PAM	JOB No: 212163.1	
		REF: 212163.1 SiteFeatures.cdr	REV: 0	FIG: 2

Appendix B
6 Pages

Plates/Photographs

Appendix B Plates/Photographs
Environmental Inspection of VUT Facility
Fiskville Fire Training College

PLATE 1 Main Testing Area

PLATE 2 Smaller Testing and Storage Area

PLATE 3 ISO Rooms and 2 level building – Drums containing water

PLATE 4 Storage Shed & Flammable Goods Store

PLATE 5 Rain Water Tanks

PLATE 6 Effluent pit inspection covers between Dam 1 and the VUT building

PLATE 7 Foam concentrate in bunded Storage area -

PLATE 8 Dry chemical fire extinguishers

PLATE 9 Storage of liquid fuel drums on bund

PLATE 10 Aviation fuels - unbunded outside VUT shed and building materials (13 July 2012)

PLATE 11 Drums containing Jet fuel – Unbunded (13 July 2013)

Appendix C
6 Pages

VUT Records

Table 1: Inventory of Chemicals Stored

MSDS Angus FP70 Plus

Chemical Name	Manufacturer	Location	Quantity	
Armor-all Protectant Original	Armor-all	Tool Shipping Container	1x 500ml	1
Trefolex	Beacon	Tool Shipping Container	1x 500ml + 1x 75g	2
Long Life Coolant	Burson	Tool Shipping Container	1x 5L	3
Chux Cleaning Wipes	Chux	Kitchen		4
Comweld GP Silver Brazing Flux	Cigweld	Tool Shipping Container	50g or 500g??	5
Nozzle Dip	Cigweld	Tool Shipping Container	1x 450g	6
Palmolive Anti-bacterial Dishwashing Liquid	Colgate	Kitchen		7
Ajax Spray and Wipe (apple and citrus)	Colgate	Bathroom		8
(2-26)	CRC	Tool Shipping Container	1x 500g	9
Hot Shot Engine Degreaser	CRC	Tool Shipping Container	1x 500g	10
Methylated Spirit	Diggers	Red Flammables	1x 20L + 1x 20L partially full	11
Shellite	Diggers	Red Flammables	1x 4L	12
Mineral Turpentine	Diggers	Red Flammables	1x 4L	13
Ener Foam	Dow	Tool Shipping Container	1x 908g	14
Mine Marking (Marking Out Paint)	Dy-Mark	Tool Shipping Container	1x 350g	15
Rust paint Epoxy Finish	Galmet	Tool Shipping Container	2x 350g	16
Spray Paint Fast Dry Hi-gloss Enamel	Galmet	Tool Shipping Container	1x 350g	17
Duragal Silver Paint	Galmet	Tool Shipping Container	2x 350g	18
Plumbers mate	GE Plastics	Tool Shipping Container	1x 300g	19
Premixed Total Joint Cement	Gyprock	Tool Shipping Container	1x 15Kg	20
Lubricant MX3 Anti-corrosive	Inox	Tool Shipping Container	1x 300g	21
Angus Pine 3% FP-70 Plus	Kidde Australia	Green Shed	3x 20L	22
Angus Pine 6% Tridol-S	Kidde Australia	Green Shed	2x20L	23
Angus Fire Niagara 1-3	Kidde Australia	Green Shed	2x 20L	24
587 Flange Sealant	Loctite	Tool Shipping Container	1x 390g/300ml	25
Butane Gas Refill	Maquarie	Tool Shipping Container	1x 150g	26
Mortein Energy Ball	Mortein	Kitchen		27
Heptane	Oilchem	Green Shed	8x 200L	28
X55 Solvent	Oilchem	Red Flammables	1x 20L partially full	29
Brushable Waterproofer	Ormanoid	Tool Shipping Container	1x 1L	30
Bond and Seal	Parfix	Tool Shipping Container	1x 300g	31
Aviation Form-a-Gasket	Permatex	Tool Shipping Container	1x 50ml	32
Power Plus E85+	Powerplus Fuels	Green Shed	4x 200L	33
Pyropanel Multiflex	Pyropanel	Tool Shipping Container	2x 480g	34
Easy Oils Nail Gun Oil	Quick Smart Easy Oils	Tool Shipping Container	1x 250ml	35
Ultrafix Plus	Ramset	Tool Shipping Container	2x 435g/300ml	36
Harpic White and Shine Bleach Gel (citrus)	Reckitt and Benckiser	Bathroom		37
Methylated Spirit	Recochem	Red Flammables	1x 20L	38
Kerosene	Recochem	Red Flammables	1x 20L	39
Hydrex-AR FFFP Alcohol Resistant	Sabo Foam	Green Shed	2x 20L	40
AFFF (aqueous film forming foam) 6%	Seaguard Chemicals	Green Shed	2x 20L	41
Aquadhere PVA Wood Glue	Selleys	Tool Shipping Container	1x 4L + 1x 500ml	42
RP7	Selleys	Tool Shipping Container	1x 350g	43
Liquid Nails High Strength	Selleys	Tool Shipping Container	1x 320g	44
Kwik Grip Gel	Selleys	Tool Shipping Container	1x 400g	45
Retinax Grease	Shell	Tool Shipping Container	1x 2.5Kg	46
Decahydronapthalene mixture cis & trans reagent grade 98%	Sigma-Aldrich	Red Flammables	1x 2.5L	47
Singer Oil	Singer	Silver Shed	1x 100ml	48
Jointing Paste	Stag	Tool Shipping Container	1x 200g	49
Monograde SAE 30 4 Stroke Oil	Subaru	Tool Shipping Container	1x 1L	50
Jif Cream with Micro-particles	Unilever	Bathroom		51
Diesel	Unknown	Green Shed	2x 20L	52
T4 Enamel Thinners	Wagon Paints	Red Flammables	1x 4L	53
Butane Gas Refill	Weller	Tool Shipping Container	1x 200g	54
Squirts Quick Dry Gloss Enamel	White Knight	Tool Shipping Container	1x 310g	55
Homebrand Dishwashing Liquid (Lemon)	Woolworths	Bathroom		56
Woolworths Select Surface Wipes	Woolworths	Kitchen		57
Kaowool		Green Shed		58
Fiberfrax	Fiberfrax	Green Shed		59
Durablanket	Unifrax	Green Shed		60

Source: Dr Maurice Guerrieri from Victoria University of Technology

MATERIAL SAFETY DATA SHEET #AMS040

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product identifier: FP70 PLUS
Synonyms: Fluoroprotein
CAS #: Mixture, no single CAS number is available
Product use: Fire fighting foam concentrate
Product description: Hydrolized protein solution containing fluorosurfactants and glycol solvent.

Supplier name and address:

Angus Fire
180 Sheree Boulevard, Suite 3900 · P.O. Box 695
Exton, PA 19341 USA
Phone: (610) 363-1400 · Fax: (610) 524-9073
www.Kidde-Fire.com

Emergency Telephone #: 1-800-334-3156

SECTION 2 - CHEMICAL COMPOSITION/HAZARDOUS INGREDIENTS

Ingredients	CAS #	% (weight)	LD50 mg/kg (rat, oral)	LC50 ppm (rat, ihl)	OSHA PEL	ACGIH TLV
Hydrolized protein	None	15-45	N/Av	N/Av	None	None
Hexylene glycol	107-41-5	3-7	3700	>310 mg/m^3 /1H	N/Av	25 ppm (ceiling)
Surface active agents and fluorosurfactants	N/Av	1-5	N/Av	N/Av	N/Av	N/Av
Zinc oxide	1314-13-2	0.5-1.5	>8437	2500 mg/m3	None	None
Water	7732-18-5	Balance	190 gm/kg	N/Av	None	None

SECTION 3 - HAZARD IDENTIFICATION

POTENTIAL HEALTH EFFECTS

Target organs: Lungs, skin, eyes
Signs and symptoms of short-term (acute) exposure:

Inhalation: Inhalation of vapours may cause respiratory irritation.
Skin contact: Can cause skin irritation.
Eye contact: Can cause eye irritation.
Ingestion: It is not likely that this product will be swallowed if used as intended. It may cause nausea and vomiting if swallowed.

Effects of long-term (chronic) exposure:
None known.
Other important hazards: None

SECTION 4 - FIRST AID MEASURES

Inhalation: If someone feels ill after inhaling vapours, remove them to fresh air. Call a physician if symptoms do not go away quickly.

Skin contact: If product gets on skin, wash off with large amounts of water

Eye contact: If liquid is splashed in eyes, immediately flush eyes with lots of water for 15 minutes, including under the eyelids. Call a physician right away.

Ingestion: If swallowed, call a physician or Poison Control Centre. DO NOT induce vomiting unless directed to do so by a physician. If vomiting does occur, position victim so that fluid does not drain back into lungs.

SECTION 5 - FIRE FIGHTING MEASURES

Fire hazards/conditions of flammability: Not flammable under normal conditions of use.
Flash point (Method): >216°F (102°C) (Pensky Martens Closed Cup)
Lower/Upper flammable limit (% by volume): Product is not flammable.
Explosion data:
Sensitivity to mechanical impact: Not sensitive to mechanical impact.
Sensitivity to static discharge: Not sensitive to static discharge at temperatures below the flash point.
Oxidizing properties: Product is not an oxidizer
Auto-ignition temperature: N/Av
Suitable extinguishing media: Not applicable.
Special fire-fighting procedures/equipment: Not applicable.
Hazardous combustion products: Not applicable.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Personal precautions: Wear appropriate protective equipment (see Section 8).

Environmental precautions: If in doubt about proper disposal, contact local, state or federal EPA (in USA) or municipal or provincial environmental authorities (in Canada).

Spill response/Cleanup: Wear appropriate protective equipment to collect spillage with an absorbent material. Flush area with water until foaming ceases, using caution as area may be slippery. Prevent discharge of concentrate into waterways. Obtain prior approval before discharge into sewer treatment systems. Disposal must be in accordance with federal, state or provincial, and local regulations.

Prohibited materials: None.

SECTION 7 - HANDLING AND STORAGE

Safe handling procedures: Product is for industrial and municipal fire department use only. Consult product literature for appropriate handling during fires.

Storage requirements: Store at 25°F - 120°F (-4°C - 49°C).

Incompatible materials: As with all aqueous solutions, FP70 should not be put in contact with any materials which react violently with water.

Special packaging materials: Use original container or store in stainless steel, fibreglass or bitumen-lined tanks.

SECTION 8 - EXPOSURE CONTROLS AND PERSONAL PROTECTION

Ventilation and engineering controls:	Provide adequate levels of ventilation to prevent a build-up of vapours from the product.
Respiratory protection:	Not normally required under normal conditions of use. If vapours reach irritating levels, wear a NIOSH-approved respirator equipped with organic vapour cartridges.
Protective gloves:	Wear impervious gloves of an approved material, for example Neoprene.
Eye protection:	Wear safety glasses, chemical goggles or a face shield of an approved type.
Other protective equipment:	Body-covering clothing is recommended.
Permissible exposure levels:	See Section 2, Hazardous Ingredients.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical form, color and odor: Dark brown liquid, with an organic odor.
Odor threshold: Not available.
pH @ 68°F (20°C): 7
Boiling point: 212°F (100°C)
Melting/freezing point: 9°F (-13°C)
Vapour pressure: Not available.
Solubility in water: 100%
Coefficient of oil/water distribution: Not available.
Specific gravity (water = 1): 1.15 - 1.17
Vapour density: Not available
Volatile organic compounds (VOC's): Less than 20%
Viscosity: 10 cs
Evaporation rate: Not available

SECTION 10 - REACTIVITY AND STABILITY DATA

Stability and reactivity:	Stable. Hazardous polymerization will not occur.
Conditions to avoid:	None known.
Materials to avoid:	Contact with chemicals that react violently on contact with water, such as sodium metal.
Hazardous decomposition products:	None known.

SECTION 11 - TOXICOLOGICAL INFORMATION/HEALTH EFFECTS

LD_{50}: Not available for product.
LC_{50}: Not available for product.
Routes of exposure: Lungs, skin, eyes
Carcinogenicity: No ingredient classed as carcinogenic by OSHA, IARC, ACGIH or NTP
Teratogenicity, mutagenicity, other reproductive effects: None known.
Sensitization to material: Product is not known to cause allergies.
Conditions aggravated by exposure: None known.
Synergistic materials: None known.

SECTION 12 - ECOLOGICAL INFORMATION

Environmental effects: Readily biodegradable. Product is expected to have a relatively low risk to the environment.
Chemical Oxygen Demand: COD = 0.46 g/g
Biochemical Oxygen Demand: BOD_5 = 0.44 g/g (96% biodegraded)
Important environmental characteristics: None known.
Aquatic toxicity: LC_{50} (Rainbow trout [*Ocorhynchus mykiss*], 24 hours): 3860 ppm.
LC_{50} (Rainbow trout [*Ocorhynchus mykiss*], 48 hours): 3,400 ppm.
LC_{50} (Rainbow trout [*Ocorhynchus mykiss*], 72 hours): 3,220 ppm.
LC_{50} (Rainbow trout [*Ocorhynchus mykiss*], 96 hours): 2,5400 ppm.

EC_{50} (Water Flea [*Daphnia magna*], 24 hours): 8,906 ppm.
EC_{50} (Water Flea [*Daphnia magna*], 72 hours): 4,977 ppm.

SECTION 13 - WASTE DISPOSAL

Handling for disposal: Avoid contact with eyes and skin, and excessive inhalation. Do not ingest. Rinse skin and eyes thoroughly in case of contact.
Methods of disposal: If in doubt about proper disposal, contact local, state or federal EPA (in USA) or municipal or provincial environmental authorities (in Canada).

SECTION 14 - TRANSPORT INFORMATION

Transportation of Dangerous Goods (TDG) information:
Shipping description: Not regulated as dangerous goods according to TDG Regulations.
49 CFR information:
Shipping description: Not regulated as hazardous material according to 49 CFR Hazardous Materials Regulations.
International Dangerous Goods information:
IMO: Not regulated as dangerous goods according to IMDG Code.
ICAO: Not regulated as dangerous goods according to ICAO Technical Instructions or IATA Regulations.
Other information: None.

SECTION 15 - REGULATORY INFORMATION

WHMIS information: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and this MSDS contains all the information required by the CPR. WHMIS classification is D2B, Toxic and Infectious Substances, Toxic Material.
CEPA information: All ingredients are listed on the DSL.
SARA information: This product does not contain any SARA Title III Section 313 chemicals.
TSCA information: All ingredients are listed in TSCA
RCRA information: Not a regulated waste
CERCLA information: Under U.S. EPA CERCLA regulations, releases to air, land or water which exceed the reportable quantity must be reported to the National Response Center (1-800-424-8802). There is no reportable quantity (RQ) for this product. There are no reportable materials in this product.
California Proposition 65 Information: To the best of our knowledge, this product does not contain any California Proposition 65 designated chemicals.

SECTION 16 - OTHER INFORMATION

Prepared for: Angus Fire
Telephone number: (610) 363-1400
Preparation date/revision number: October 2, 2007

Additional notes or references:

Abbreviations:

ACGIH:	American Conference of Governmental Industrial Hygienists
CEPA:	Canadian Environmental Protection Act
CERCLA:	Comprehensive Environmental Response Compensation and Liability Act
DOT:	Department of Transport
DSL:	Domestic Substance List
IARC:	International Agency for Research on Cancer
IATA:	International Air Transport Association
ICAO:	International Civil Aviation Organization
IMDG:	International Maritime Dangerous Goods Code
OSHA:	Occupational Safety and Health Administration
N/Ap	Not applicable
N/Av:	Not available
NIOSH:	National Institute for Occupational Safety and Health
NTP:	National Toxicology Program
RCRA:	Resource Conservation and Recovery Act
TSCA:	Toxic Substances Control Act
WHMIS:	Workplace Hazardous Materials Information System

References:

1. Van Nostrand Reinhold, Dangerous Properties of Industrial Materials, Seventh Edition, N. Irving Sax.
2. Canadian Centre for Occupational Health and Safety. RTECS (Registry of Toxic Effects) and CHEMINFO databases.
3. ACGIH, Threshold Limit Values and Biological Exposure Indices for 1997.
4. International Agency for Research on Cancer Monographs.

Appendix D
3 Pages

Information About Environmental Reports

About Site Environmental Assessment Reports

1. Introduction

This document explains the Environmental Site Assessment (ESA) process and the context that applies to the use of Environmental Reports issued by Cardno Lane Piper.

2. What is an ESA?

Environmental Site Assessments (ESA) are undertaken for a range of purposes, specific to the brief issued by the client in each case. The scope may include one or a combination of any of the following:

- A factual report of the condition of a portion of the site or one aspect of an entire site.
- Assessment of the contamination levels in soil to be removed from a site – a waste classification assessment.
- Validation of the success of remediation of a site or a portion of a site.
- Provision of a professional opinion about the suitability of a site for one or more uses, in terms of its contamination status.

The scope of any ESA needs to be defined at the outset.

An ESA is not an Environmental Audit. Such audits are undertaken in accordance with the provisions of regulations enacted in various states of Australia, and are referred to as Site Audits in some jurisdictions. Statutory audits provide certification by EPA accredited auditors that a site is suitable for one or more uses. An ESA may provide similar advice but cannot be used in place of an audit if the latter is required by regulation in any instance. However in some circumstances and jurisdictions an ESA is sufficient to provide "environmental sign-off" of a site.

An ESA may be undertaken for due diligence purposes, to establish whether the site has been impacted to the extent that some beneficial uses of the site may be precluded. Due diligence audits in many cases may be completed as non-statutory Audits, although in some jurisdictions they can also be statutory audits, if defined as such at the outset.

3. The ESA Process

The Client generally initiates the ESA process by specifying a brief which identifies the specific objectives of the assessment. If not, it is the consultants' duty to so specify the ESA

In the case of an ESA to provide an opinion about the suitability of the site for use, it would be conducted in accordance with NEPM (Site Assessment). Such ESA would not commence until a thorough site history assessment (Phase 1 Assessment: to identify the potential for significant contamination at a site) is conducted. However, where the history is unclear, a broad screening of chemical parameters can be used to test environmental media. This normally includes a broad range of organic and inorganic compounds and elements, often referred to as an Environmental Screen.

(In the case of an ESA for a purpose other than to provide an opinion about the suitability of the site for use, it is not always necessary to undertake a Phase 1 assessment.)

The ESA requires sampling of soil at representative locations across the site. A NATA accredited laboratory performs the analysis of soil. It is impractical for all of the soil to be assessed. The ESA is often based on a statistical method of grid or random sampling, augmented by targeted sampling at locations known or suspected to be contaminated. Guidance on sampling strategy and density is provided in Australian Standard AS4482.1–2005. However, some considerable degree of judgement is still required in the application of any sampling and testing strategy. For example the blanket application of the "hot spot" method presented in this standard is often inappropriate given its limitations.

The field program also investigates the likelihood of contamination below the site surface. Field investigations must sample and test fill as well as the natural soils. If contamination is found then it is common for further work to be undertaken to characterise, to the extent practical, its vertical and horizontal extent. However, where fill is encountered and testing shows it to be uncontaminated, it must be realised that the heterogeneous nature of the material might mean that not all pockets of contaminated material can be detected using normal sampling regimes.

EPA guidelines for auditors, that may be relevant for an ESA, indicate the need in all cases to consider the potential for groundwater contamination in any site. This does not mean all sites need to be drilled to sample groundwater, but it is most often the case. Most hydrogeological settings and groundwater conditions are complex and vary in space and time. The condition of groundwater is investigated to identify if any beneficial use or environmental value of groundwater is precluded due to contamination.

As previously stated for soil, all groundwater at the site cannot be tested. The environmental investigations are conducted in accordance with industry standards and guidelines (e.g. EPA Vic Pub 668). This provides a level of confidence that a sufficiently comprehensive assessment of the groundwater at the site is achieved.

Where an investigation shows that groundwater is polluted, consideration should be given to assessing the risks and the need for and practicality of any clean up.

4. Environmental Assessment Report

The ESA Report details the findings of the ESA. It provides summary information on the site definition, the reasons for the assessment and other relevant facts. It reviews the scope and quality of the site investigations, laboratory testing and data analyses undertaken. These reports also present a review of the contamination status of the site, the need for any further clean up, and an opinion on the suitability of the site for a range of beneficial uses and land uses such as “residential – low density”, “commercial” etc, as appropriate.

However, as noted above, some ESA have a narrow scope such as for classification of waste soil for removal from site, and do not make conclusions on suitability of site for use.

The ESA Report generally includes copies of other documents and reports, necessary to support the assessment findings, presented as appendices. These can contain more detailed information than the body of the ESA Report. Care should be taken to also read the appended documents and the ESA report in full.

Cardno Lane Piper generally issues reports in electronic form (e-Report) on CD ROM. ESA Reports are issued in this format as Adobe Acrobat™ PDF files. However, a paper copy of the executive summary of the ESA Report is generally issued to the client, and others as required by the brief or by regulation.

5. Limitations of Environmental Assessment Report

The ESA Report is prepared in a manner that can be easily read by a lay person with a legitimate interest in the contamination status of the site, such as the site owner or occupier, EPA and Local Planning Authority. The ESA report is not intended for use by other parties or for other purposes. Anyone who uses the assessment report for purposes other than specified in the report, does so at their own risk.

The site should only be used for one or more of the beneficial uses and land uses identified in the ESA as suitable.

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The ESA is necessarily limited by constraints such as time, cost and available information; although normal professional practice at the time has been applied with all due care to prepare the report. A necessary requirement of this process is the horizontal and vertical interpolation of data from discrete locations. However, site conditions are generally not homogenous and some discrepancies will occur between the actual and predicted results at locations not directly sampled. There is a risk that contamination may occur at the site and not be identified by a competent investigation and assessment. The approach adopted in sampling (a combination of statistically based grid and judgmental sampling) seeks to reduce, but cannot eliminate, this risk.

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The ESA Report is not intended to be a comprehensive analysis of the presence and associated risk of asbestos in buildings and services. Where asbestos in buildings and services is known or likely, the report may only caution that an appropriately qualified person be engaged to undertake demolition to avoid contamination of the site.

Cardno Lane Piper Pty Ltd
1 July 2011

Appendix F
3 Pages

About Site Environmental Assessment Reports

About Site Environmental Assessment Reports

1. Introduction

This document explains the Environmental Site Assessment (ESA) process and the context that applies to the use of Environmental Reports issued by Cardno Lane Piper.

2. What is an ESA?

Environmental Site Assessments (ESA) are undertaken for a range of purposes, specific to the brief issued by the client in each case. The scope may include one or a combination of any of the following:

- A factual report of the condition of a portion of the site or one aspect of an entire site.
- Assessment of the contamination levels in soil to be removed from a site – a waste classification assessment.
- Validation of the success of remediation of a site or a portion of a site.
- Provision of a professional opinion about the suitability of a site for one or more uses, in terms of its contamination status.

The scope of any ESA needs to be defined at the outset.

An ESA is not an Environmental Audit. Such audits are undertaken in accordance with the provisions of regulations enacted in various states of Australia, and are referred to as Site Audits in some jurisdictions. Statutory audits provide certification by EPA accredited auditors that a site is suitable for one or more uses. An ESA may provide similar advice but cannot be used in place of an audit if the latter is required by regulation in any instance. However in some circumstances and jurisdictions an ESA is sufficient to provide "environmental sign-off" of a site.

An ESA may be undertaken for due diligence purposes, to establish whether the site has been impacted to the extent that some beneficial uses of the site may be precluded. Due diligence audits in many cases may be completed as non-statutory Audits, although in some jurisdictions they can also be statutory audits, if defined as such at the outset.

3. The ESA Process

The Client generally initiates the ESA process by specifying a brief which identifies the specific objectives of the assessment. If not, it is the consultants' duty to so specify the ESA

In the case of an ESA to provide an opinion about the suitability of the site for use, it would be conducted in accordance with NEPM (Site Assessment). Such ESA would not commence until a thorough site history assessment (Phase 1 Assessment: to identify the potential for significant contamination at a site) is conducted. However, where the history is unclear, a broad screening of chemical parameters can be used to test environmental media. This normally includes a broad range of organic and inorganic compounds and elements, often referred to as an Environmental Screen.

(In the case of an ESA for a purpose other than to provide an opinion about the suitability of the site for use, it is not always necessary to undertake a Phase 1 assessment.)

The ESA requires sampling of soil at representative locations across the site. A NATA accredited laboratory performs the analysis of soil. It is impractical for all of the soil to be assessed. The ESA is often based on a statistical method of grid or random sampling, augmented by targeted sampling at locations known or suspected to be contaminated. Guidance on sampling strategy and density is provided in Australian Standard AS4482.1–2005. However, some considerable degree of judgement is still required in the application of any sampling and testing strategy. For example the blanket application of the "hot spot" method presented in this standard is often inappropriate given its limitations.

The field program also investigates the likelihood of contamination below the site surface. Field investigations must sample and test fill as well as the natural soils. If contamination is found then it is common for further work to be undertaken to characterise, to the extent practical, its vertical and horizontal extent. However, where fill is encountered and testing shows it to be uncontaminated, it must be realised that the heterogeneous nature of the material might mean that not all pockets of contaminated material can be detected using normal sampling regimes.

EPA guidelines for auditors, that may be relevant for an ESA, indicate the need in all cases to consider the potential for groundwater contamination in any site. This does not mean all sites need to be drilled to sample groundwater, but it is most often the case. Most hydrogeological settings and groundwater conditions are complex and vary in space and time. The condition of groundwater is investigated to identify if any beneficial use or environmental value of groundwater is precluded due to contamination.

As previously stated for soil, all groundwater at the site cannot be tested. The environmental investigations are conducted in accordance with industry standards and guidelines (e.g. EPA Vic Pub 668). This provides a level of confidence that a sufficiently comprehensive assessment of the groundwater at the site is achieved.

Where an investigation shows that groundwater is polluted, consideration should be given to assessing the risks and the need for and practicality of any clean up.

4. Environmental Assessment Report

The ESA Report details the findings of the ESA. It provides summary information on the site definition, the reasons for the assessment and other relevant facts. It reviews the scope and quality of the site investigations, laboratory testing and data analyses undertaken. These reports also present a review of the contamination status of the site, the need for any further clean up, and an opinion on the suitability of the site for a range of beneficial uses and land uses such as “residential – low density”, “commercial” etc, as appropriate.

However, as noted above, some ESA have a narrow scope such as for classification of waste soil for removal from site, and do not make conclusions on suitability of site for use.

The ESA Report generally includes copies of other documents and reports, necessary to support the assessment findings, presented as appendices. These can contain more detailed information than the body of the ESA Report. Care should be taken to also read the appended documents and the ESA report in full.

Cardno Lane Piper generally issues reports in electronic form (e-Report) on CD ROM. ESA Reports are issued in this format as Adobe Acrobat™ PDF files. However, a paper copy of the executive summary of the ESA Report is generally issued to the client, and others as required by the brief or by regulation.

5. Limitations of Environmental Assessment Report

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