



APP Corporation Pty Limited
Phase 1 Environmental Site Assessment

Luddenham Road, Luddenham, NSW

13 December 2013
42811-55312
JBS&G

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List of Abbreviations

A list of the common abbreviations used throughout this report is provided below.

ACM	Asbestos containing material
AEC	Area of Environmental Concern
AHD	Australian Height Datum
AST	Above-Ground Storage Tank
As	Arsenic
Cd	Cadmium
COPC	Contaminant Of Potential Concern
Cr	Chromium
Cu	Copper
bgs	below ground surface
BTEX	Benzene, toluene, ethylbenzene and xylenes
DSI	Detailed Site Investigation
DQIs	Data Quality Indicators
DQOs	Data Quality Objectives
EPA	NSW Environment Protection Authority
ha	Hectare
Hg	Mercury
JBS&G	JBS&G (NSW & WA) Pty Ltd
Mn	Manganese
Ni	Nickel
OCP	Organochlorine Pesticides
OPP	Organophosphorus Pesticides
PAHs	Polycyclic aromatic hydrocarbons
Pb	Lead
PCBs	Polychlorinated biphenyls
PIL	Phytotoxicity based investigation level
TPH	Total Petroleum Hydrocarbons
Zn	Zinc

Executive Summary

JBS&G (NSW & WA) Pty Ltd (JBS&G) was engaged by APP Corporation Pty Limited (APP) to conduct a Phase 1 Environmental Site Assessment (ESA) at the land on Luddenham Road, Luddenham, NSW (the site) as shown on **Figure 1**. The Site has an approximate area of 288 hectares and is legally described as Lots 201 and part Lot 202 in DP1152191.

The site is currently used predominantly for rural/grazing purposes with some residential use adjacent to Luddenham Road. It is understood that the site is proposed to be rezoned for mixed uses including low, medium and high density residential, employment and education uses, open space and commercial/retail uses.

The scope of work comprised a review of the environmental setting and historical documentation to identify potential areas of environmental concern (AECs) and associated contaminants of potential concern (COPCs) and preparation of this ESA report.

The site comprised mostly agricultural and rural land with some residential structures, sheds and workshops located on the eastern boundary of the site. Rural land primarily used for livestock (cattle) grazing was characterised by undulating hills with numerous dams and creeks running throughout. Two significantly large dams are located in the eastern portion of the site as well as an oval track. There was no evidence of intensive agriculture such as orchards or market gardens.

Various above ground storage tanks (ASTs) for fuel and drums for oil were observed within the property, primarily where existing residences and other structures are located in the eastern portion of the site. Asbestos containing material (ACM) in the form of sheets and pipes was observed in stockpiles, storage areas, structures and for road drainage. At least one residence had peeling paint which may contain lead. General waste materials were also observed at various locations within the site.

An unsealed road bisects the entire site. The road is generally soil and igneous gravel, but building rubble and fill material was observed along the road at a number of locations, generally at causeways crossing creeks or dams, with ACM fragments noted on the road surface of the causeway crossing the main creek. Suspected ACM pipes were also present at intervals along the road for drainage purposes.

Adjacent landuses include similar rural land to the south, the Warragamba to Prospect water pipeline along the northern boundary, low-density rural residences to the west and northeast with air strip and poultry operation further northeast, and a golf club with residential areas to the east across Luddenham Road.

The potential AECs and associated COPCs that were identified as part of the site inspection and historical review are shown in **Table 1** below.

Table 1: Areas of Environmental Concern and Associated Contaminants of Potential Concern

Area of Environmental Concern	Contaminants of Potential Concern
Fill material at the site	Heavy metals, total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs) and asbestos
Contamination associated with agricultural landuse	Heavy metals, pesticides (OCPs), polychlorinated biphenyls (PCBs)
ASTs located around the site	Heavy metals, TPH/BTEX, PAHs and Volatile Organic Compounds (VOCs).
Hazardous material storage, within maintenance area/workshops with associated oil storage, staining, surface debris, stockpiles and burn pits.	Heavy metals, TPH/BTEX, PAHs, OCPs and asbestos.

Area of Environmental Concern	Contaminants of Potential Concern
Site Building Structures	Asbestos, lead paint
Pipeline corridor	Heavy metals, TPH/BTEX, PAHs, OCPs and asbestos.

On the basis of the results of this investigation, and subject to the limitations outlined in **Section 6**, there is potential for contamination to be present resulting from previous site and offsite activities associated with the identified AECs.

Based on the findings of the desktop investigation and a site inspection, potentially contaminated media present at the Site may include fill material, surface water, natural soils and groundwater.

It is considered unlikely that the AECs identified will have impacted the land to a degree that would prevent planning and development of the land for the intended use(s). It is recommended that a Detailed Site Investigation (DSI) be completed to assess the extent of contamination prior to future development.

It is also recommended that, based on the age of the structures as identified on-site, and the presence of suspected ACM, a hazardous materials building inspection be conducted for all structures located on the site to enable appropriate management during future development.

Consideration of potential air quality aspects from nearby poultry operations may be required to assess any potential impacts to future users of the site.

1 Introduction

1.1 Background

JBS&G (NSW & WA) Pty Ltd (JBS&G) was engaged by APP Corporation Pty Limited (APP) to conduct a Phase 1 Environmental Site Assessment (ESA) at the land on Luddenham Road, Luddenham, NSW (the site) as shown on **Figure 1**. The Site has an approximate area of 288 hectares and is legally described as Lots 201 and part Lot 202 in DP1152191.

The site is currently used predominantly for rural/grazing purposes with some residential use adjacent to Luddenham Road. It is understood that the site is proposed to be rezoned for mixed uses including low, medium and high density residential, employment and education uses, open space and commercial/retail uses.

The proposed investigation was developed in accordance with guidelines made or approved by the NSW Environment Protection Authority (EPA) and relevant Australian Standards.

1.2 Objectives

The objectives of the investigation were to:

- Identify all past and present potentially contaminating for widespread contamination;
- Identify potential contamination types;
- Discuss the site conditions;
- Provide preliminary conclusions of the potential contamination at the site; and
- Assess the need for further investigations.

1.3 Scope of Work

To achieve the objectives of the assessment, the following scope of works were undertaken:

- Review of the available documents provided by the client;
- Review of section 149 certificate obtained from council, aerial photographs, current and historical title information, EPA records and Heritage records to identify areas of environmental concern and associated contaminants of potential concern (COPCs);
- Review of site setting including topography, hydrology, hydrogeology and geology;
- Review of records of environmental incidents or former environmental licences held by the EPA;
- A detailed site inspection to identify potential areas of environmental concern (AECs) and COPCs not identified in the historical record review;
- Preparation of this Phase 1 ESA report in accordance with the requirements of DEC 2006 and EPA 1997.

2 Site Condition & Surrounding Environment

2.1 Site Identification

The location of the site is shown in **Figure 1**. The site is currently owned by E.J Cooper and Son Pty Limited.

The site details are summarised in **Table 2.1** and the site layout shown in **Figure 2** and described in detail in the following sections.

Table 2.1 Summary Site Details

Lot/DP	Lot 201, and part Lot 202 of DP 1152191
Address	Luddenham Road, Luddenham, NSW
Local Government Authority	Penrith City Council
Site Zoning	Zone RU2 Rural landscape Penrith Local Environment Plan 2010
Approximate co-ordinates of the centre of the site (MGA56)	E: 289560 N: 6253440
Current Use	Rural/Grazing
Previous Use	Rural/Grazing
Site Area	Approximately 288 ha

2.2 Site Description

A detailed site inspection was conducted by two of JBS&G's trained and experienced environmental consultants on the 15th and 16th August 2013. The site and Lot layout is shown in **Figure 2**. Details of features described herein are presented on **Figures 3 and 4**.

The site comprises mostly of agricultural and rural land, residential structures are located on the eastern boundary of the site. The site is comprised on Lots 201, and part Lot 202 in DP 1152191.

Site photographs as indicated herein, are presented in **Appendix A**.

2.2.1 Lot 201 (eastern portion)

The eastern portion of Lot 201 was where the majority of manmade structures were located at the site. This portion of the site consisted of residencies, sheds, livestock paddocks, chicken pens, grain silos, cattle yards, water tanks and above ground storage tanks (ASTs) (**Figure 3 and 4**). A cattle yard (**Photograph 1**) constructed of steel was located in the northern portion of the eastern portion of the site. Directly east of the cattle yard was a work area consisting of sheds constructed of metal, silos, huts constructed of timber, drums, containers and ASTs suspected to contain diesel (**Photographs 2 - 6**). Stained soil around drums, asbestos containing material (ACM) in the form of asbestos cement pipe and fill material was observed in this area.

Three small paddocks were located directly east of the previously described area (**Photographs 7 - 9**). Each paddock contained a small timber hut on its southern boundary. General rubbish such as tyres, bins, timber and oil drums were scattered throughout this area. The huts were generally used to store mowers, outdoor furniture and livestock feed. The middle paddock contained a fence that extended from the hut to form a chicken coup (**Photograph 9**), a small AST was also observed directly west, next to this hut. It was not determined what was stored within the AST (**Photograph 8**).

Directly southwest of the paddocks was an unsealed road and an area consisting of a small residential house (Residence 1) and a number of sheds and structures.

Residence 1 was a northward facing small structure constructed from timber, and a tile roof. The house was in fairly poor condition with its paint peeling (**Photograph 10**).

Suspected ACM was observed in the eaves of the house (**Photograph 11**). On the northern

side of the house a number of items including an outdoor barbeque, bins, a water tank and a shipping container were observed (**Photograph 12**). A garden was observed directly west of the house containing a septic tank (**Photograph 13**). Two ASTs were located to the rear of the house, which appeared to store diesel (**Photograph 14**).

A shed, possibly a former stable was observed south west of the house; the shed was divided into a number of stables (**Photograph 15**). Partially buried ACM drainage pipe was observed at the base of the rear of the shed (**Photograph 16**). A circular wooden structure was located north of the shed. Undulating ground in this area suggested that fill is likely to be present (**Photograph 17**). A number of other similar sheds and paddocks occupied this area.

The area west of the house comprised of grass paddocks with various scattering of stockpiles containing tyres, timber, stacked ACM sheets and ACM pipe in reasonable condition, steel and concrete (**Photographs 18 - 20**).

The southeastern portion of Lot 201 comprised a second residential complex (Residence 2). Residence 2 was surrounded by a steel mesh fence. Within the complex were two houses on the eastern side and a number of sheds, garages, tanks and an above ground swimming pool (**Photographs 22 - 24**). The complex also contained a well maintained garden and an entrance gate in its eastern portion (**Photograph 21**). The majority of the complex was built on hardstand concrete while the houses and structures were constructed from corrugated metal materials. The storage shed/building in the western portion of the complex was constructed from brick and contained ACM eaves (**Photograph 25**).

A steel and timber shed was observed approximately 50 m north, behind the residential complex (**Photograph 26**). The shed stored various tools, tractor parts, timber and steel (**Photograph 28**). Evidence of burning and ash was observed on the ground surface inside the shed. A small AST was also observed in front of the shed, believed to have been used to store diesel (**Photograph 27**).

North east of the second residential complex was a series of paddocks were characterised by feed lots in its centre (**Photograph 29**). Empty drums and containers were observed within the feed lot areas (**Photograph 30**).

2.2.2 Lot 201 (western portion)

The western portion of Lot 201 comprised the rural area of the Lot. A large triangular shaped dam was located in the central portion of the Lot; the dam was approximately 400 by 300 m (**Photograph 31 and 32**). A large bund formed the northern side of the dam (**Photograph 32**). On top of the bund was a pumping station, (**Photograph 33**) made from corrugated metal with PVC pipe running towards the residency area in the eastern part of the site. No hazardous materials were observed in the materials that made up the pumping station. Just north of the dam the soil was eroded with evidence of water possibly overflowing into this area preventing vegetation growth. (**Photograph 34**)

In the western portion of Lot 201 was a former horse track (**Photograph 35**). The track was oval shaped and red to brown clay soil was observed on the surface of the track.

2.2.3 Part Lot 202

The majority of the northern portion of part Lot 202 comprised of rural land with numerous dams and creeks running throughout the lot. The creek is dammed at the north eastern portion of the site (the dam wall located on the site's northern boundary) (**Photograph 36**).

An unsealed road bisects the entire site. The road is generally soil and igneous gravel, but building rubble and fill material was observed along the road at a number of locations, generally at causeways crossing creeks or dams, with ACM fragments noted on the road

surface of the causeway crossing the main creek (**Photographs 37 - 40**). A number of fibrous cement pipes were also observed at regular intervals along the road, the pipes are suspected to be ACM.

A cattle yard was observed in the western portion of part Lot 202 at the top of a hill adjacent to the main access road (**Photograph 41**). The yard was constructed from timber fencing and there were no signs of obvious contamination.

The residence for part Lot 202 was located on the eastern portion of the Lot fronting onto Luddenham Road (Residence 3). Residence 3 was surrounded by a steel mesh fence and gates to the property were locked so no access to the area was possible at the time of the site inspection (**Photograph 42**). The residential area comprised of the house which was rectangular and made of timber, a garage building west of the house and a number of small sheds, a water tank and a dog kennel (**Photograph 43**). Great detail into these areas could not be achieved as no access was available to the area.

Outside of the fenced off residential area was an unsealed igneous gravel road that ran from Luddenham Road to the garage west of the house. A small narrow paddock was north of the house and the main access road that bisected the site was south of the house. On the southern side of the road a stockpile consisting of timber and an oil drum was observed (**Photograph 44**). Further west along the southern side of the road was a large shed in poor condition constructed of timber and corrugated iron (**Photograph 47**). The shed was predominantly vacant, but contained disregarded items such as boxes, ACM sheeting, an old television, tarpaulins, a number of oil and grease drums and traffic cones. The surface under the shed was predominantly unsealed but some hardstand was noted in the northwestern portion and bare soil in the southeastern portion. General rubbish, ACM, ash and staining was observed throughout the ground surface of the shed (**Photographs 48 - 50**).

Directly north east and opposite the shed was an area of bare soil and litter that included bottles (**Photograph 45**). It appeared as though this was a storage area and possibly an area where soil was stockpiled. Small stockpiles containing oil drums, concrete and plastic were observed in this area (**Photograph 46**).

The northern area of part Lot 202 comprised of open grazing land. A small area of general rubbish was located in the mid to northern portion of the lot. The area contained timber, PVC, cotton, branches and scrap metal. A vacant metal storage shed was located further north of this area.

A hay storage area was located at the central to western portion of the lot, just north of the road (**Photograph 51**). The hay bales were bound with plastic and surrounded by soil stockpiles formed as bunding in a rectangle around the hay. The stockpiles or bunding forming the boundary of the area were characterised by brown topsoil consistent with that seen on the site. Stockpiles to the southwest of the hay bales comprised red to grey clay subsoil and shale (**Photograph 52**), some fragments of terracotta tile were observed within these stockpiles.

In the western portion of the lot two bare areas in close proximity to each other were observed (**Photograph 53**). These areas contained plastic packaging on the surface and represent a possible former storage area for hay bales or other material.

The southern portion of part Lot 202 comprised open rural/grazing land with a series of creeks, gullies and dams that are scattered throughout the area. The land generally sloped inward from north to south towards a creek which flowed to the north east. The creeks and gullies were largely undisturbed with the exception of bunding in some areas to form dams.

Two small stockpiles were observed in the western portion of part Lot 202 approximately 100 m south of the cattle station in the centre of the site. The stockpiles were approximately 5 m³ each and contained metal scraps, terracotta pipe, and concrete (Photograph 54).

2.3 Surrounding Landuse

The current land use of adjacent properties or properties across adjacent roads is shown in Figure 2 and summarised below.

- North – The site is bound to the north by the Warragamba to Prospect pipeline. The area contained bunded soil against the south boundary of the pipeline corridor and had various creeks and gullies running underneath the pipeline and onto the site. Further north of the pipeline is characterised by rural/grazing land. An air strip is also located on a property northeast of the site.
- East – The Twin Creeks Golf and Country Club is located directly east of the site on the eastern side of Luddenham Road. The Golf and Country Club not only consists of a golf course but has residential areas as well. Cosgrove Creek was located within the club and extend further south. What appears to be a poultry farm is located east of the site opposite the Twin Creeks Country Club and south of the air strip. Further beyond these properties Mamre Road is located. Industrial and residential land is located off Mamre road.
- South – Rural and/or agricultural land occupies the area south of the site.
- West – The remainder of Lot 202 DP 1152191 comprising rural land similar to the site, and then low density semi-rural/residential land is located further west of the site. The Northern Road is located further west along with a mixture of residential and rural land.

Based on the surrounding land uses identified during the site inspection and from a review of aerial imagery, there does not appear to be any significant potential for offsite sources of contamination at the site.

2.4 Topography

Review of the regional topographic data (NDE 1975¹) indicated that the site lies between 60 and 90 m Australian Height Datum (AHD). During the site inspection, the site was undulating in nature with many hills and low lying areas. The majority of Lot 201 and part Lot 202 sloped in toward the creek running through Lot 202. The eastern portion of Lot 201 sloped to the east/southeast toward Luddenham Road.

2.5 Hydrology

A number of dams varying in size were located within the site. A tributary is also located within the central portion of the site. The tributary appears to flow from south west to north east where it runs into the large dam in the northeastern portion of part Lot 202, the creek ceases to flow beyond this point.

The nearest surface water body to the site is Cosgrove Creek located approximately 500 m south east of the site. Cosgrove Creek appears to be a tributary of South Creek (located

¹ Penrith 1:100 000 Topographic Map Sheet Edition 1 9030 Commonwealth of Australia National Development and Energy, 1975 (NDE 1975)

approximately 2 km east of the site) South Creek and Cosgrove Creek are part of the Hawkesbury Nepean Catchment and flow north into the Hawkesbury River.

Surface water runoff at the site is likely to vary. Runoff on the western side of the site is likely to run east towards the creek that meanders through the site. While flow on the eastern side will run to the west and be caught in the same tributary which travels in a north eastern direction. Runoff on the very eastern portion of the site will run east towards Cosgrove creek.

2.6 Geology

Review of the 1:100 000 Penrith geological map, sheet series 9030 (DME 1991²) indicated the site is predominantly located on Triassic Bringelly Shale which consists of shale, carbonaceous claystone, laminate, fine to medium grained lithic sandstone, and rare coal and tuff. Geology adjacent to tributaries running through the site are characterised by Quaternary fine grained sand, silt and clay.

A review of the 1:100 000 Penrith regional soils map, sheet series 9030 (SCS 1989³) showed that the site was characterised by two soil groups. Residual soils of the Blacktown Group and fluvial soil from the South Creek Group. The Blacktown Group soils were shallow to moderately deep (<100 cm) with a hard setting mottled texture. They contrast from red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and in drainage lines. These soils are moderately reactive, have highly plastic subsoil, low soil fertility and drain poorly.

The South Creek Group soils are found adjacent to tributaries running through the site and consisted of very deep layered sediments over bedrock or relict soils. Where pedogenesis has occurred there are structured plastic clays or structured loams in and immediately adjacent to drainage lines, red and yellow podzolic soils on small terraces with small areas of minimal krasnozems, leached clays and yellow solodic soils. These soils flood frequently and are an erosion hazard.

2.7 Hydrogeology

Registered groundwater bore information obtained from the National Resource Atlas database completed on the 14 August 2013 is included in **Appendix B**. A review of the registered bore information indicated that one bore was located within a 1.5 km radius of the Site, with details summarised below.

Groundwater bore GW104135 is located approximately 1 km to the east of the site on the Twin Creeks Golf and Country Club. The bore is licensed for test purposes. The bore was drilled to a final depth of 366.00 m into clay, shale and sandstone material. The standing water level (SWL) was not recorded.

Shallow groundwater at the site is anticipated to be found in low lying areas especially within alluvial materials near creeks and gullies that run throughout the site. While on top of hills groundwater is expected to be deeper, with the potential for perched water at the interface of residual soils and bedrock.

Deeper bedrock aquifers could be located on the site given the results of the groundwater bore search.

² Penrith 1:100 000 Geological Series Sheet 9030 NSW Department of Mineral and Energy, 1991 (DME 1991)

³ Penrith 1:100 000 Soil Landscape Series Sheet 9030 Soil Conservation Service of NSW, 1989 (SCS 1989)

2.8 Acid Sulphate Soils

Review of the NSW Natural Resource Atlas (NRA 2013⁴) indicated that for the site, there are no known occurrences of acid sulphate soils.

⁴ New South Wales Natural Resource Atlas, <http://www.nratlas.nsw.gov.au/>. Accessed 14 August 2013. (NRA 2012).

3 Site History

3.1 Aerial Photographs

Copies of aerial photographs obtained from the Department of Lands are included in **Appendix C**. Relevant information from the aerial photograph review is summarised below.

- **1947:** The site appeared to be vacant land with a sparse covering of trees and a number of tributaries and creeks running through it. Luddenham Road was observed on the eastern portion of the site. Surrounding areas appear to be used for agricultural purposes, particularly land to the south of the site. A residential house was observed to the northeast of the site and the existence or construction of a single pipeline was observed north of the site within the existing water pipeline corridor.
- **1955:** The site is similar to the previous image, with the pipeline just north of the site appearing further developed.
- **1965:** The site had undergone significant change in this period, with the emergence of sheds and a small residential structure in the northeastern part of the site in Lot 201 and the eastern part of the site in part Lot 202. A number of roads, tracks and farm dams were also observed, including an access road that bisects the site and a number of dams in the eastern portion of the site which are no longer present. Most notably was the construction of an oval track, a square walled or fenced area in the eastern portion of the site and the beginning of the construction of a large dam also in the eastern part of the site, consistent with the north wall of the existing large triangular dam

The surrounding land saw an increased number of buildings and structures with developments being undertaken to the northeast of the site and to the west of the site. The construction of a second Warragamba to Prospect pipeline was also observed.

- **1978:** A further increase in houses and structures occurred in the eastern part of the site, including the construction of a third residential area consistent with the current layout. The dam under construction in the previous image had been completed and was full of water. The creek in the north of the site appeared more incised to features which is evidence of possible localised flooding. The oval track in the eastern portion of the site also appeared further developed than in the previous image. A number of dams visible in 1965 appear to have been filled in.

Surrounding areas had continued to undergo development particularly to the northeast and to the west of the site. An airstrip was constructed to the northeast of the site which is consistent with what is there at present. Agricultural practices appeared to be taking place west of the site.

- **1986:** The main change from the previous image is the emergence of the large dam in the north eastern section of part Lot 202. The wall for this dam was built on the northeastern boundary of the site. This dam appears to have slightly altered the creeks and gullies running through the site in this area. The construction of a shed in the northern to central portion of the site was also observed. The residences, paddocks and sheds in the eastern portion of the site appear as they are currently.

- **1994:** The site appeared similar from the previous image. A rectangular structure resembling a hay storage area was observed in the central portion of part Lot 202, on the northern side of the main access road bisecting the site. Water courses appeared to contain less water in this image.
- **2005:** The site appears similar from the previous image. Surrounding land has seen an increase in developments including the construction of a golf course east of the site.

3.2 EPA Records

A search of the EPA's public register under the *Protection of the Environment Operations Act 1997* was undertaken (**Appendix D**). The search identified that, for the site, there were:

- No prevention, clean-up or prohibition notices;
- No transfer, variation, suspension, surrender or revocation of an environment protection licence.

A search of the EPA's public contaminated land register was also undertaken (**Appendix D**). The search indicated that there have been no notices or reported sites at or within close proximity to the site under the *Contaminated Land Management Act 1997* (CLM Act).

3.3 Title Details

A historical title search was conducted for the Site, and results are summarised below in **Table 3.1**. Copies of title documentation are included in **Appendix E**.

Table 3.1 Summary of Historical Title Search

Year	Schedule of Registered Proprietors of Lot 201 - 202 DP 1152191
July 1934	Daniel Buffier of Coogee, a Grazier
March 1938	Norman Daniel Buffier of Coogee, a Grazier
July 1960	Ronald William James Croghan of Wentworthville, a green grocer.
October 2010	E.J. Cooper & Son Pty Limited acquires the site.

3.4 Council Records

3.4.1 Section 149 Certificate

A copy of the s149 Planning Certificate for Lots 201 and 202 of DP 1152191 was obtained from Penrith City Council, and is included in **Appendix F**. Relevant information for the Site summarised below.

- Lots 201 and 202 of the site are Zoned RU2 Rural Landscape in the *Penrith Local Environmental Plan (LEP) 2010*.
- Under the Penrith City Council LEP 2010, Lots 201 and 202 can be developed with consent for agricultural produce industries, animal boarding or training establishments, building identification signs, business identification signs, cellar door premises, cemeteries, community facilities, crematoria, dual occupancies, dwelling houses, environmental facilities, environmental protection works, farm buildings, flood mitigation works, forestry, funeral homes, helipads, home-based child care, home businesses, home industries, information and education facilities, places of public worship, public administration buildings, recreation areas, recreation facilities (outdoor), roads, roadside stalls, rural supplies, schools, secondary dwellings, stock and sale yards, tourist and visitor accommodation, veterinary hospitals.

- Under the Penrith City Council LEP 2010 the site is not identified as land including or comprising critical habitat.
- The land that the Site is situated on is not within a Heritage Conservation Area.
- The land is not affected by sections 38 or 39 of the *Coastal Protection Act 1979*.
- The land is not within a proclaimed Mine Subsidence District under the *Mine Subsidence Compensation Act 1961*.
- Some of the land in part Lot 202 is identified as bushfire prone land according to council records. Guidance as to restrictions that may be placed on the land as a result of the land being bushfire prone can be obtained by contacting Council. Such advice would be subject to further requirements of the NSW Rural Fire Services. Lot 201 is not considered to be bushfire prone land.
- The land is not affected by a policy adopted by the council that restricts the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).
- The land is not declared by the EPA to be significantly contaminated as defined in the CLM Act 1997.
- The land is not affected by road widening or road realignment under Div. 2 of Part 3 of the Roads Act 1993.

3.5 Australian and NSW Heritage Register

A search of the Australian Heritage Trust database and the NSW Heritage Inventory did not reveal any Heritage listed items at the Site. Heritage information is included in **Appendix G**.

3.6 Site History Summary

A summary of the Site history is provided in **Table 3.3**

Table 3.3 Summary of Site History

Period	Activity	Source
1934	Daniel Buffier of Coogee, a Grazier	Title Records
1947	There was little to no activity at the site, no buildings or structures observed. One of the Warragamba to Prospect pipelines was being constructed, or was recently completed, north of the site's northern boundary	Aerial Photograph
1955	The site is similar to the previous image.	Aerial Photograph
1960	Ronald William James Croghan of Wentworthville, a green grocer took ownership of the site.	Title Records
1965	Occupation and significant human impact occurred at the site. Features such as residential structures roads, tracks and farm dams were had been constructed. The most notable inclusions were an oval track in the eastern portion of the site and the beginning of construction of a large dam also in the eastern part of the site. The number of buildings and structures in land surrounding the site had increased also. A second pipeline appears within the water pipeline corridor north of the site.	Aerial Photograph

Period	Activity	Source
1978	A further increase in houses and structures occurred in the eastern part of the site, including the construction of a third residential area consistent with its current layout. The dam under construction in the previous image had been completed. The oval track in the eastern portion of the site also appeared further developed than in the previous image. Agricultural practices were possibly occurring in the property south west of the site. A number of dams visible in 1965 appear to have been filled in.	Aerial Photograph
1986	A large dam was constructed in the north eastern section of part Lot 202. The wall for this dam was built on the northeastern boundary of the site. This dam appears to have slightly altered the creeks and gullies running through this area of the site. The construction of a shed in the northern to central portion of the site was also observed. The residences, paddocks and sheds in the eastern portion of the site appear as they are currently.	Aerial Photograph
1994	The site appears similar from the previous image. A rectangular structure resembling a hay storage area was observed in the central portion of part Lot 202, on the northern side of the main access road bisecting the site. Water courses appeared to contain less water in this image.	Aerial Photograph
2005	Increase in development of land surrounding the site including the construction of a golf course east of the site.	Aerial Photograph
2010	E.J. Cooper & Son Pty Limited acquired the site.	Title Records

3.7 Integrity Assessment

The information obtained from the historical sources reviewed has been found to be in general agreement. It is therefore considered that the information provided in this historical assessment has an acceptable level of accuracy.

4 Assessment of Potential for Contamination

4.1 Potential Areas of Environmental Concern

Based on the history review and observations of the site, potential AECs and associated COPCs have been identified and are presented in **Table 4.1**.

Table 4.1 Areas of Environmental Concern and Associated Contaminants of Potential Concern

Area of Environmental Concern	Contaminants of Potential Concern
Fill material at the site	Heavy metals, total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs) and asbestos
Contamination associated with agricultural landuse	Heavy metals, pesticides (OCPs), polychlorinated biphenyls (PCBs)
ASTs located around the site	Heavy metals, TPH/BTEX, PAHs and Volatile Organic Compounds (VOCs).
Hazardous material storage, within maintenance area/workshops with associated oil storage, staining, surface debris, stockpiles and burn pits.	Heavy metals, TPH/BTEX, PAHs, OCPs and asbestos.
Site Building Structures	Asbestos, lead paint
Pipeline corridor	Heavy metals, TPH/BTEX, PAHs, OCPs and asbestos.

4.2 Potentially Contaminated Media

Potentially contaminated media present at the site include:

- Fill material;
- Natural soils; and
- Surface water;
- Shallow groundwater;

The site history and site inspection indicates the potential for fill material around;

- Anthropogenic structures such as sheds, workshops, houses etc.;
- In or around dams;
- On or near access roads throughout the site;
- In stockpiles around the site.

Based on the likelihood of the majority of the site consisting of natural soil there is potential for COPCs that may be present at the site migrating vertically or laterally onto natural soils nearby.

Due to the large amount of surface water on site and the potential for COPCs being in close proximity to dams and creeks, surface water is considered a potentially contaminated media.

Shallow groundwater in low lying areas and areas nearby surface water bodies are also considered a potentially contaminated media.

4.3 Potential for Migration

Contaminants generally migrate from site via a combination of windblown dusts, rainwater infiltration, groundwater migration and surface water runoff. The potential for contaminants to migrate is a combination of:

- The nature of the contaminants (solid/liquid and mobility characteristics);
- The extent of the contaminants (isolated or widespread);
- The location of the contaminants (surface soils or at depth); and
- The site topography, geology, hydrology and hydrogeology.

Due to the isolated nature of areas of COPCs and the inert nature of some COPCs (asbestos) potential for migration of contaminants is low.

There is however some potential for migration of COPCs:

- In or around surface water bodies through surface water runoff;
- Through windblown migration of ground surface contamination such as stockpiles and ACM;
- Infiltration through the ground surface and into shallow groundwater. This is possible where liquid or otherwise leachable contaminant sources (e.g. ASTs) are located.

In addition to the areas displaying potential for contamination, there is the potential aesthetic aspect relating to odours from possible poultry operations to the northeast.

5 Conclusions and Recommendations

Based on the findings of this investigation and subject to the limitations in **Section 6**, the following conclusions are made:

The site is dominated by rural areas with little or no potential for contamination. The areas where there was potential for contamination to be present included residential occupancies, sheds, workshops, livestock stables and storage areas all located in the eastern portion of the site. Small areas of fill material and stockpiles were also observed in a scattering of locations throughout the site.

ACM was observed on-site used in the construction of a number of buildings on site and in drainage pipes throughout the site and there is evidence of further asbestos contamination on-site such as fill areas and causeways.

Other potential contaminants sources are ASTs and various chemicals, such as oils and pesticides, stored on-site.

Potential offsite sources of contamination are low, however there is potential for contamination from offsite sources such as the pipeline corridor north of the site..

It is considered unlikely that the AECs identified will have impacted the land to a degree that would prevent planning and development of the land for the intended use(s). It is recommended that a Detailed Site Investigation (DSI) be completed to assess the extent of contamination prior to future development.

It is also recommended that, based on the age of the structures as identified on-site, and the presence of suspected ACM, a hazardous materials building inspection be conducted for all structures located on the site to enable appropriate management during future development.

Consideration of potential air quality aspects from nearby poultry operations may be required to assess any potential impacts to future users of the site.

6 Limitations

This advice is provided for use by the client who commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties. The advice has been prepared specifically for the client for the purposes of the commission. No warranties, express or implied, are offered to any third parties and no liability will be accepted for use or interpretation of this advice by any third party.

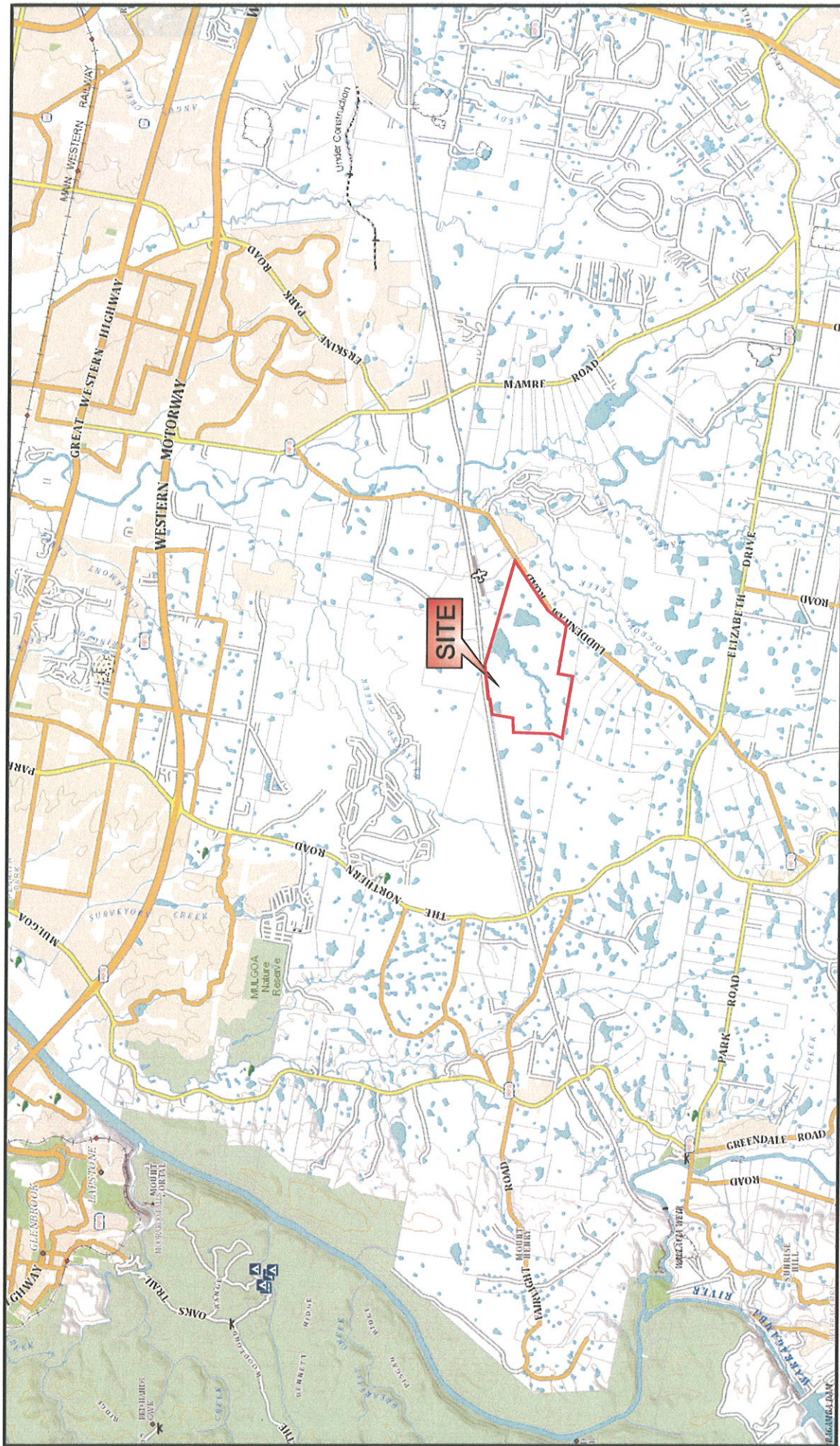
The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G.

Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, that were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the advice provided herein, through natural processes or through the intentional or accidental addition of contaminants. The advice is based on the information obtained or available at the time the advice is provided.

This advice is not a complete assessment of the status of the site, and it is limited to the scope of works commissioned. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the advice in the context of the additional information.

Figures



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Source: © SIX Maps www.maps.six.nsw.gov.au, imagery date 13-04-2011, accessed 28-5-2013

Legend:
 — Approximate Site Boundary

Scale: Approximate
 0 250 500 1000 m
 Datum: MGA94 Zone 56 - AHD

JBS&G Figure 1: Site Location

Client: APP Corporation

Project: Luddenham, NSW - PSI

Job No: 42811

File Name: 42811_01

Rev	Description	Dm.	Date
0	Original Issue - R01	LL	28-11-2013
A4			



Source: © SIX Maps www.maps.six.nsw.gov.au, Imagery date 13-04-2011, accessed 28-5-2013

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0	250	500	1000
m			
Scale: Approximate			
Datum: MGA94 Zone 56 - AHD			
A4			
0	Original Issue - R01	SE	29-11-2013
Rev	Description	Dm.	Date

Legend:
 --- Site Boundary
 --- Existing Lot Boundaries

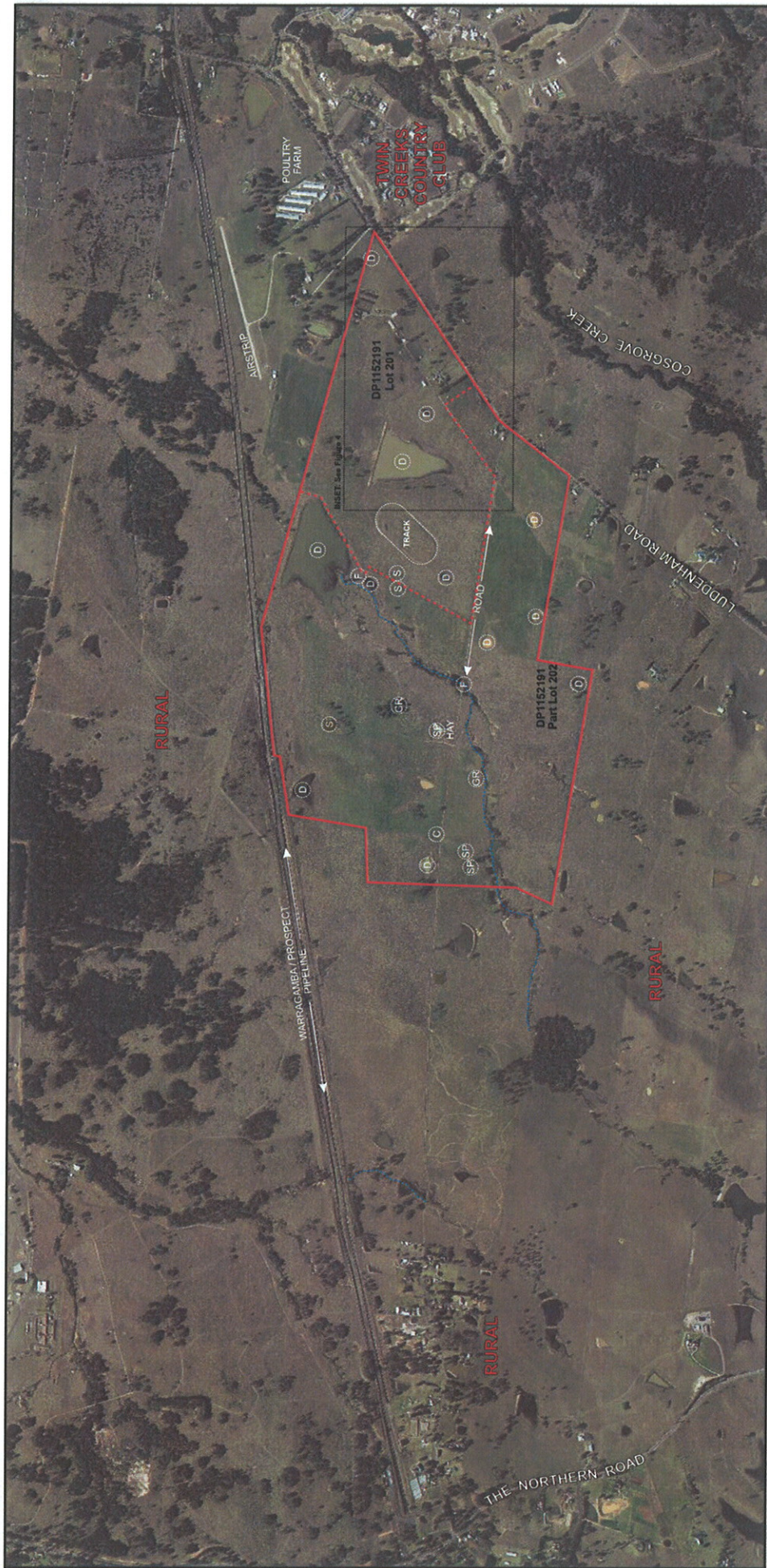
JBS&G Figure 2: Existing Site Layout & Lot Boundaries

Client: APP Corporation

Project: Luddenham, NSW - PSI

Job No: 42811

File Name: 42811_02



Source: © SAK Maps www.sakmaps.com.au, imagery date 13-04-2011, accessed 28-5-2013

Legend:

Approximate Site Boundary
Approximate Lot Boundary
Creek (outline)

F = FILL
SP = STOCKPILE
C = CATTLE YARD
D = DAM
S = SHED
GR = GENERAL RUBBISH

Scale: 1:750

0 187.5 375 750 m

Rev	Description	SE	28-11-2013	Date
0	Original Issue - R01			

JBS&G Figure 3: Areas of Environmental Concern

Client: APP Corporation
Project: Luddenham, NSW - PSI
Job No: 42811

File Name: 42811_03



Source: © GSK Maps www.maptac.com.au imagery date 15-04-2011, accessed 28-5-2013

Legend:

— Approximate Site Boundary
 - - - - - Approximate Lot Boundary

F = FILL
 SP = STOCKPILE
 C = CATTLE YARD
 D = DAM
 S = SHED
 FD = FORMER DAMS (Circa 1965)

ST = STAINING
 DR = DRUMS
 GR = GENERAL RUBBISH
 ACM = ASBESTOS CEMENT MATERIAL
 AST = ABOVE GROUND STORAGE TANK

Scale: Approximate
 Datum: MOAM Zone 50 - UTM
 A3

0. Original Issue - R01 LL 28-11-2013
 New Description Dm Date

JBS&G Figure 4: Areas of Environmental Concern - Lot 201 DP 1152191

Client: APP Corporation
 Project: Luddenham, NSW - PSI
 Job No: 42811
 File Name: 42811_04

Appendix A – Photographic Log

Site Photographs –15-16 August 2013



Photograph 1 – View of the cattle yard in Lot 201 looking north.



Photograph 2 – View of the work area of Lot 201 looking north



Photograph 3 – Discarded material such as steel and old oil drums, looking west



Photograph 4 – Suspected asbestos containing material (ACM) pipe