

Preliminary contamination assessment

Daisy Hill Estate

Proposed subdivision of Lot 200 DP825059, Lots 661 and 662 DP565756, Lots 64 and 65 DP754287, Lots 316 and 317 DP754308 Eulomogo Road, Dubbo NSW



Ref: R13365c.2

Date: 23 February 2015



Prepared by: Envirowest Consulting Pty Ltd
9 Cameron Place
Orange NSW 2800

Client: George Rice
Bourke Securities Pty Ltd
Firgrove Homestead
30R Eulomogo Road
Dubbo NSW 2830

Assessor: Leah Desborough BNatRes (Hons)
Environmental Scientist

Authorising Officer: Greg Madafiglio PhD
Senior Environmental Scientist

Interested authorities: Dubbo City Council

Report number: R13365c.2

Date: 23 February 2015

Executive summary

Background

A rural-residential subdivision is proposed for *Daisy Hill Estate* Lot 200 DP825059, Lots 661 and 662 DP565756, Lots 64 and 65 DP754287, Lots 316 and 317 DP754308 Eulomogo Road, Dubbo NSW. Total development area is approximately 430 hectares. The subdivision plan has not been finalised but will include lots with a minimum lot size of 0.6ha to a minimum lot size of 3ha resulting in approximately 284 rural-residential lots. Boundary fencing, access roads and driveways will be constructed.

An investigation is required to determine potential for contamination from past activities.

Objectives

A preliminary site investigation was conducted in accordance with the contaminated land management planning guidelines State Environmental Planning Policy No. 55 (SEPP 55) to determine the potential for soil contamination of Lot 200 DP825059, Lots 661 and 662 DP565756, Lots 64 and 65 DP754287, Lots 316 and 317 DP754308 Eulomogo Road, Dubbo NSW.

Investigation and conclusions

The site comprised seven rural lots located approximately 2km east of Dubbo in a developing rural-residential area. The current and historical land-use of the site is grazing of sheep and cattle. Four dwellings are located on the site.

The contamination status of the site was assessed from a desktop study, site inspection and review of previous reports. No soil samples were collected for as part of the Daisy Hill investigation. Soil samples have previously been collected from Lot 64 as part of a previous investigation.

A detailed soil contamination investigation was undertaken of a rural-residential subdivision of Lot 64 DP754287 which forms part of the site (Envirowest Consulting Pty Ltd report number R10297-1c.1). Analysis of soil samples collected from the field area of Lot 64 indicated the field area was suitable for residential land-use. The results are considered indicative of the field area across the investigation area.

Potential contamination sources associated with the historic land-use of the site includes:

- Agriculture in all paddocks comprising grazing and cereal cropping
- Minor fuel stains under AST in Lot 64
- Backfill material used in the quarry on Lot 200

Residential land-use is expected to be suitable on the site. Additional investigations including a site inspection and soil sampling of potential areas of contamination are required to confirm suitability.

Location	Potential contaminants sources	Area	No of sampling locations	Pattern	Depth	Contaminants of concern
All grazing paddocks across the site	Agriculture	Approximately 300 hectares (not required in Lot 64)	64 discrete sampling locations (4 per paddock) combined to form 16 composite samples for analysis	Systematic	0-0.1m	Heavy metals, organochlorine pesticides (OCP)
Lot 64	Hydrocarbons	1m ²	1	Judgemental	Base	TRH (C6-C40)
Lot 200	Backfill	Quarry	2 samples	Systematic	-	Arsenic, cadmium, chromium, copper, lead, zinc, mercury, OCP, polycyclic aromatic hydrocarbons (PAH), total recoverable hydrocarbons (TRH C10-C40), benzene, toluene, ethylbenzene, xylenes (BTEX), electrical conductivity, pH

The additional investigations should be undertaken in accordance with the contaminated land management planning guidelines State Environmental Planning Policy No. 55 (SEPP 55) and include a sampling, analysis and quality plan.

Contents

	page
Executive summary.....	3
1. Introduction	6
2. Scope of work	6
3. Site identification	6
4. Site history	7
5. Site condition and environment.....	17
6. Sampling analysis plan and sampling methodology.....	18
7. Results and discussion.....	18
8. Conclusions and recommendations	19
9. Report limitations and intellectual property.....	21
10. References	22
Figures	23

Figure 1. Locality map

Figure 2. Aerial photograph of the site (2013)

Figure 3. Photographs of the site

1. Introduction

A rural-residential subdivision is proposed for *Daisy Hill Estate* Lot 200 DP825059, Lots 661 and 662 DP565756, Lots 64 and 65 DP754287, Lots 316 and 317 DP754308 Eulomogo Road, Dubbo NSW. Total development area is approximately 430 hectares. The subdivision plan has not been finalised but will include lots with a minimum lot size of 0.6ha to a minimum lot size 3ha resulting in approximately 284 rural-residential lots. Boundary fencing, access roads and driveways will be constructed. A detailed soil contamination investigation was undertaken of a rural-residential subdivision of Lot 64 DP754287 by Envirowest Consulting Pty Ltd in 2013.

A desktop study, review of the available history and site inspection were undertaken of the site to determine sources of potential contamination. No soil samples were collected for as part of the Daisy Hill investigation. Soil samples have previously been collected from Lot 64 as part of a previous investigation.

2. Scope of work

Envirowest Consulting Pty Ltd was commissioned by Bourke Securities Pty Ltd to undertake a preliminary contamination investigation of Lot 200 DP825059, Lots 661 and 662 DP565756, Lots 64 and 65 DP754287, Lots 316 and 317 DP754308 Eulomogo Road, Dubbo NSW. The objective was to identify past potentially contaminating activities, identify potential contamination types, provide a preliminary assessment of site contamination and assess the need for further investigation or suitability for the hospital land-use. The scope did not include soil sampling.

3. Site identification

Address	<i>Daisy Hill Estate</i> Lot 200 DP825059, Lots 661 and 662 DP565756, Lots 64 and 65 DP754287, Lots 316 and 317 DP754308 Eulomogo Road Dubbo NSW
Owner(s)	Bourke Securities Pty Ltd
Deposited plans	Lot 200 DP825059, Lots 661 and 662 DP565756, Lots 64 and 65 DP754287, Lots 316 and 317 DP754308
Australian Map Grid	UTM Zone 55H, E659323m, N6428205m
Locality map	Figure 1
Aerial photograph	Figure 2
Photograph(s)	Figure 3
Area	430 hectares

4. Site history

4.1 Zoning

The site is zoned R5 Large Lot Residential under the Dubbo Local Environmental Plan 2011.

4.2 Land-use

The land-use across the investigation area was grazing. This was also the historical land-use of the site.

Buildings including dwellings and agricultural infrastructure were located on Lots 64, 65, 662 and 200. A quarry was located in the south western section of Lot 200.

Land-use to the north, east and south was rural-residential. Land-use to the west was rural with the residential area of Dubbo at approximately 2km.

Pinedale Road was located along the northern boundary, Torwood Road along the eastern boundary and Eulomogo Road the southern boundary. Lot 200 was located on the southern side of Eulomogo Road.

No horticultural crops have been produced over the site.

4.3 Summary of council records

No information regarding contamination issues identified in Dubbo City Council records.

4.4 Sources of information

Topographic map of area (Eulomogo 1:25,000 CMA of NSW) 1986

NSW OEH records of public notices under the CLM Act 1997

Aerial photograph 1964, 1980, 1995, 2006, 2009, 2012 2013

Historical parish maps 1882, 1884, 1893, 1902, 1908, 1910, 1914, 1916, 1919, 1927, 1930, 1948, 1954, 1958

Envirowest Consulting Pty Ltd (2013) *Detailed Contamination Investigation, Lot 64 DP754287, 16L Eulomogo Road, Dubbo NSW* (Report number R10297-1c.1)

Current owner provided land-use history

4.5 Chronological list of site uses

4.5.1 Historical parish maps

A review of the 1882, 1884, 1893, 1902, 1908, 1910, 1914, 1916, 1919, 1927, 1930, 1948, 1954, 1958 historical parish maps indicate the individual lots within the investigation area were owner by numerous people including Edward White, FS Bell, JC White, AH Fitz Patrick, John Cleary, William Bailey, SL Tognetti, The Commercial Banking Company of Sydney Limited, EJ Logue and ER Hawke. The 1893 historical parish map indicates that Lots 316 and 317 were part of a larger lot which extended to the west and south and noted as Crown Reserve (C.R). Lots 661 and 662 were created from Lot 66 after 1954. Public roads are located to the north (Pinedale Road) and south (Eulomogo Road).

4.5.2 Aerial photographs

4.5.2.1 1964 aerial photograph

- Land-use was agriculture with grazing on cleared land. The investigation area comprised fenced paddocks.
- Three areas of buildings were identified on the current Lot 64, Lot 65 and Lot 200. Specific details of the buildings are not clear.

- Four dams are located across the investigation area. A drainage line was identified running north west-south east through the central section of the investigation area.
- Scattered trees occurred throughout the paddocks with a remnant patch located in the central section of the current Lot 64.
- A bare area expected to be the quarry on the current Lot 200 was identified.
- Unsealed roads occurred along the northern boundary (Pinedale Road), eastern boundary (Torwood Road) and southern boundary (Eulomogo Road). An unsealed road/track was visible in the road reserve between Lots 316 and 64.
- Surrounding land-use comprising grazing on cleared and semi-cleared land.

4.5.2.2 1980 aerial photograph

New features identified in the 1980 aerial photograph were:

- Two buildings are located on the current Lot 662. One is expected to be a dwelling. The use of the second building is not known.
- Eulomogo Road has been sealed.

4.5.2.3 1995 aerial photograph

New features identified in the 1995 aerial photograph were:

- The identified building located on Lot 662 has been removed.
- Rural-residential development has begun to the south.

4.5.2.4 2006 aerial photograph

No new features identified in the 2006 aerial photograph.

4.5.2.5 2009 aerial photograph

New features identified in the 2009 aerial photograph were:

- The dams on Lot 64 appeared to have been filled.
- The quarry on Lot 200 appeared to contain vegetation indicating it was not in use.

4.5.2.6 2012 aerial photograph

New features identified in the 2012 aerial photograph were:

- Rehabilitation of the quarry on Lot 200 has begun.
- Bare areas are located in the north eastern section of Lot 661. The bare areas appear to have resulted from removal of vegetation.

4.5.2.7 2013 aerial photograph

New features identified in the 2013 aerial photograph were:

- Bare areas in the north eastern section of Lot 661 have revegetated.

4.5.3 1986 topographic map (1980 aerial photograph, 1985 field revision)

A cluster of buildings were located in the southern section of Lot 64, central section of Lot 65 southern section of Lot 662 (indicated as Lot 2) and the central section of Lot 200 (indicated as Lot 101). Lot 200 was noted as Lot 101 which included land to the east. A wind pump, tennis court and yards were located on Lot 64, a hayshed on Lot 65, a shed on Lot 662 and yards on Lot 200.

Other infrastructure on the site included six dams, a transmission line and a 132kV power transmission line. Vehicular tracks were located on Lot 64, Lot 65, Lot 662 and Lot 200. A quarry or gravel pit was located in the south western section of Lot 200. Contour banks were present on Lot 65, Lot 661 and Lot 662.

Vegetation in the eastern and southern section comprised scattered timber. Dense timber is located in the road reserve between Lot 316 and Lot 64.

Loose surface one lane roads are located to the north (Pinedale Road), east (Torwood Road) and between Lots 316 and 64 (unnamed). A sealed two or more lane road (Eulomogo Road) is located to the south with Lot 200 located to the south of Eulomogo Road.

4.5.4 Land and Property Information

4.5.4.1 Lot 316 DP754308

Previous title reference – Volume 5191, Folio 127

The Certificate of Title dated 22 May 1975 indicated the land comprising 62.22ha was owned by Stewart Kelvin Moore of Eulomogo, Farmer and Grazier.

Previous title reference - Volume 5225, Folio 227

The Grant of Land Purchased by Conditional Sale indicated the land comprising 153a 3r was purchased on 22 April 1941 under the Crown Lands (Amendment) Act 1908 by The Commercial Banking Company of Sydney Limited.

The title was transferred to Wilfred Moore of Hurtsville, Farmer and Grazier on 17 February 1954 and leased to Kelvin George Moore of Dubbo, Farmer and Grazier on 27 May 1954. The title was transferred to Kelvin Moore on 22 July 1969 and transferred to Stewart Kelvin Moore of Eulomogo, Farmer and Grazier on 20 December 1974.

4.5.4.2 Lot 317 DP754308

Previous title reference – Volume 12788, Folio 74

The Grant of Land Purchased by Conditional Sale indicated the land comprising 153a 3r was purchased on 27 November 1940 under the Crown Lands (Amendment) Act 1908 by The Commercial Banking Company of Sydney Limited.

The title was transferred to Wilfred Moore of Hurtsville, Farmer and Grazier on 17 February 1954 and leased to Kelvin George Moore of Dubbo, Farmer and Grazier on 27 May 1954. The title was transferred to Kelvin Moore on 22 July 1969 and transferred to Stewart Kelvin Moore of Eulomogo, Farmer and Grazier on 20 December 1974.

Previous title reference – Volume 12788, Folio 75

The Certificate of Title dated 22 May 1975 indicated the land comprising 62.22ha was owned by Stewart Kelvin Moore of Eulomogo, Farmer and Grazier.

4.5.4.3 Lot 64 DP754287

Previous title reference – Volume 1727, Folio 236

The Grant of Land Purchased by Conditional Sale Without Competition indicated the land comprising 320ac was purchased on 27 September 1906 under the Crown Lands Alienation Act 1861 by Edward White, Frederick Samuel Bell and James Cobb White.

The title was transferred to Hugh Mark Matthews of Beni near Dubbo, Farmer on 24 October 1906 and transferred to Robert Alfred Moore of near Dubbo, Farmer on 21 July 1913.

The title was transferred to Ann Moore of Greenethorpe, Widow on 13 January 1944 and transferred to Wilfred Moore of Dubbo, Farmer on 22 January 1946.

Previous title reference – Volume 5575, Folio 195

The Certificate of Title dated 15 May 1946 indicated the land comprising 320ac was owned by Wilfred Moore of Dubbo, Farmer and Grazier.

The land was leased to Kelvin George Moore of Dubbo, Farmer and Grazier on 27 May 1954 and the title transferred to Kelvin Moore on 22 July 1969.

A notice of resumption was registered on 16 October 1970 for a transmission line.

4.5.4.4 Lot 65 DP754287

Previous title reference – Volume 1680, Folio 196

The Grant of Land Purchased by Conditional Sale Without Competition indicated the land comprising Portions 65 and 66 of 320ac was purchased on 27 February 1906 under the Crown Lands Alienation Act 1861 by Agnes Helen Fitz Patrick.

The title was transferred to Margaret Tognotti of Dubbo, Widow on 28 March 1907 and leased to John Gillis Tresillian of Dubbo, Farmer on 16 December 1907. The title was transferred to James Augustus Crowley of near Dubbo, Farmer on 2 February 1912 and transferred to Helene Elsie Crowley, date not known.

Previous title reference – Volume 5230, Folio 155

The Certificate of Title dated 9 May 1944 indicated the land comprising Portions 65 and 66 of 320ac was owned by Helene Elsie Crowley of Eulomogo near Dubbo, Widow.

Portion 66 was transferred on 19 November 1964 and Portion 65 on 27 June 1968 to James Mervyn Crowley.

Previous title reference – Volume 10908, Folio 177

The Certificate of Title dated 23 October 1968 indicated the land comprising 160ac was owned by James Mervyn Crowley of Dubbo, Farmer and Grazier.

A notice of resumption was registered on 16 October 1970 for a transmission line.

4.5.4.5 Lot 661 DP565756

Previous title reference – Volume 1680, Folio 196

The Grant of Land Purchased by Conditional Sale Without Competition indicated the land comprising Portions 65 and 66 of 320ac was purchased on 27 February 1906 under the Crown Lands Alienation Act 1861 by Agnes Helen Fitz Patrick.

The title was transferred to Margaret Tognotti of Dubbo, Widow on 28 March 1907 and leased to John Gillis Tresillian of Dubbo, Farmer on 16 December 1907. The title was transferred to James Augustus Crowley of near Dubbo, Farmer on 2 February 1912 and transferred to Helene Elsie Crowley, date not known.

Previous title reference – Volume 5230, Folio 155

The Certificate of Title dated 24 March 1965 indicated the land comprising Portion 65 of 160ac was owned by James Mervyn Crowley of Dubbo, Farmer.

A notice of resumption was registered on 16 October 1970 for a transmission line.

Two new Certificates of Title were issued on 16 January 1974 for Lots 661 and 662.

Previous title reference – Volume 12318, Folio 8

The Certificate of Title dated 16 January 1974 indicated the land comprising Lot 661 DP565756 of 54.63ha was owned by James Mervyn Crowley of Dubbo, Farmer.

4.5.4.6 Lot 662 DP565756

Previous title reference – Volume 1680, Folio 196

The Grant of Land Purchased by Conditional Sale Without Competition indicated the land comprising Portions 65 and 66 of 320ac was purchased on 27 February 1906 under the Crown Lands Alienation Act 1861 by Agnes Helen Fitz Patrick.

The title was transferred to Margaret Tognotti of Dubbo, Widow on 28 March 1907 and leased to John Gillis Tresillian of Dubbo, Farmer on 16 December 1907. The title was transferred to James Augustus Crowley of near Dubbo, Farmer on 2 February 1912 and transferred to Helene Elsie Crowley, date not known.

Previous title reference – Volume 5230, Folio 155

The Certificate of Title dated 24 March 1965 indicated the land comprising Portion 65 of 160ac was owned by James Mervyn Crowley of Dubbo, Farmer.

A notice of resumption was registered on 16 October 1970 for a transmission line.

Two new Certificates of Title were issued on 16 January 1974 for Lots 661 and 662.

Previous title reference – Volume 12318, Folio 9

The Certificate of Title dated 16 January 1974 indicated the land comprising Lot 662 DP565756 of 10.11ha was owned by James Mervyn Crowley of Dubbo, Farmer.

The title was transferred to Stewart Kelbin Moore of Dubbo, Farmer and Grazier on 1 April 1974 and transferred to Maxwell Valentine Green of Dubbo, Welder and Coral Anne Green his wife, joint tenants on 8 July 1976.

The title was transferred to Maurice John Isaacs and Coleen Margaret Isaacs as joint tenants on 15 January 1982 and transferred to Gregory John Morris and Kimberley Roberta Morris as joint tenants on 22 February 1988.

4.5.4.7 Lot 200 DP825059

Previous title reference – Volume 1681, Folio 233

The Grant of Land Purchased by Conditional Sale Without Competition indicated the land comprising Portion 26 of 183ac was purchased on 22 March 1906 under the Crown Lands Alienation Act 1861 by John Cleary of Eulomogo near Dubbo.

The title was transferred to Peter Frances Cleary of Ulamogo (Eulomogo), Farmer on 16 June 1926 and transferred to Harold Robinson Batten of Dubbo, Farmer on 13 January 1936. The title was transferred to Laura Clara Braid and Alexander Loral Braid on 1 February 1950.

Previous title reference – Volume 6401, Folio 38

The Certificate of Title dated 31 October 1951 indicated the land comprising Portion 26 of 183ac was owned by James Alexander Smith of Dubbo, Farmer and Grazier.

The title was transferred to Hifo Pty Ltd on 4 April 1977.

Previous title reference – Volume 6401, Folio 39

The Certificate of Title dated 31 October 1951 indicated the land comprising Portion 26 of 183ac was owned by Wilfred Bruce Smith of Dubbo, Farmer and Grazier.

The title was transferred to Hifo Pty Ltd on 4 April 1977.

Previous title reference – Volume 13327, Folio 86

The Certificate of Title dated 27 May 1977 indicated that Portion 26 of 74.06ac was owned by Hifo Pty Ltd.

The title was transferred to Branwood Park Pastoral Co. Pty Limited on 22 April 1983 and transferred to Bourke Securities Pty Ltd on 4 November 1985.

Previous title reference – Volume 6662, Folio 77

The Certificate of Title dated 4 May 1953 indicated the land comprising Portions 31, 28, 27, 101, 32, 33, 12, 30, 96, 67, 7, 170 and 29 was part owned by James Alexander Smith of Eulomogo, Farmer and Grazier.

A notice of resumption was registered on 16 October 1970 for a transmission line.

Previous title reference – Volume 6662, Folio 78

The Certificate of Title dated 4 May 1953 indicated the land comprising Portions 31, 28, 27, 101, 32, 33, 12, 30, 96, 67, 7, 170 and 29 was part owned by Wilfred Bruce Smith of Eulomogo, Farmer and Grazier.

A notice of resumption was registered on 16 October 1970 for a transmission line.

The title was transferred to Hifo Pty Ltd on 4 April 1977.

4.5.5 Other information

Application of persistent pesticides or biosolids is unlikely to have occurred on the site.

4.6 Buildings and infrastructure

4.6.1 Lot 316 DP754308

Infrastructure on the lot comprised boundary and internal fencing. Stock water troughs are also present. Sheep yards stockyards are located in the central eastern section of the lot (Figure 3.1). No dips are associated with the sheep yards.

4.6.2 Lot 317 DP754308

Infrastructure on the lot comprised boundary and internal fencing. Stock water troughs are also present.

4.6.3 Lot 64 DP754287

The majority of the infrastructure on the lot was concentrated around the homestead of *Peachville Park*. Infrastructure comprised:

- Dwelling – corrugated iron roof, concrete block walls
- Granny flat – corrugated iron roof, weatherboard walls
- Garage – corrugated iron
- Chook yard – corrugated iron
- Wood shed – corrugated iron
- Workshop – corrugated iron, concrete floor

- Welding shed – corrugated iron, concrete floor
- Stables/horse yard – corrugated iron, concrete floor
- Machinery shed – corrugated iron, concrete floor
- Hay shed – corrugated iron, earthen floor
- Shearing shed and yards – corrugated iron

Two above ground storage tanks (AST) were located to the north of the homestead. One tank was installed approximately 4 years ago for the storage of diesel and had a volume of approximately 2,000L (Figure 3.2). The ground surface around the tank was covered with basalt gravel. Minor staining was present on the gravel resulting from spills during refilling.

The second tank had not been used for over 20 years and was expected to have been historically used to store diesel. The ground surface around the tank was vegetated with grass and weed species. No significant soil contamination was expected to have resulted from the tank.

No oil staining was observed on the floor of the workshop or other areas of the lot. No pesticides or lubricant storage was observed. Storage of pesticides may have occurred in the machinery shed in the past.

A set of cattle yards were located in the central section of the lot. No dips are associated with the cattle or sheep yards.

A disused bore was located in the south western section of the lot. The bore is no longer used due to siltation. A second former bore was located in the north eastern section of the lot. A windmill was located in the south western corner and was used to pump water from a dam which was historically located in the area.

The site contained boundary and internal fencing. Stock water troughs are also present.

4.6.4 Lot 65 DP754287

The majority of the infrastructure on the lot was concentrated around the homestead of *Mt Olivetta*. Infrastructure comprised:

- Dwelling – corrugated iron roof, mud brick walls (Figure 3.3)
- Garage – corrugated iron
- Shearing shed and yards – corrugated iron
- Wood shed – corrugated iron
- Milking shed – corrugated iron
- Tool shed – corrugated iron

An electrical switchboard is located on the dwelling (Figure 3.4). The backboard was suspected of being conducted of asbestos containing materials.

Old machinery and metal debris exists around the sheds on the site (Figure 3.5). No potential sources of contamination are associated with the material. No oil staining was observed on the floor of the workshop or other areas of the lot. No pesticides or lubricant storage was observed.

A set of stock yards were located to the north west of the dwelling. No dips are associated with the cattle or sheep yards.

A windmill, bore and associated water tank (Figure 3.6) were located east of the dwelling.

Three dams are located on the lot. The northern dam does not reportedly hold water.

A hay shed is located along the western boundary. The lot contained boundary and internal fencing. Stock water troughs are also present.

4.6.5 Lot 661 DP565756

Infrastructure on the lot comprised boundary and internal fencing. Stock water troughs are also present.

4.6.6 Lot 662 DP565756

Infrastructure comprised:

- Dwelling – corrugated iron roof, fibro walls (Figure 3.7)
- Tool shed – corrugated iron

The wall sheeting of the dwelling is suspected of containing asbestos.

No oil staining was observed on the floor of the tool shed or other areas of the lot. No pesticides or lubricant storage was observed.

One dam was located on the lot.

The lot contained boundary and internal fencing. Stock water troughs are also present.

4.6.7 Lot 200 DP825059

The majority of the infrastructure on the lot was concentrated around the homestead of *Firgrove*. Infrastructure comprised:

- Dwelling – corrugated iron roof, brick walls
- Garage – corrugated iron

No oil staining was observed on the floor of the garage or other areas of the lot. No pesticides or lubricant storage was observed.

A set of cattle yards and stables were located to the south of the dwelling. No dips are associated with the cattle yards.

Areas to the south west of the dwelling were used to store agricultural machinery and equipment. No oil staining was observed around the machinery.

A granite quarry was located in the south western section of the lot. The quarry was used by the Talbragar Shire for road material. The quarry was no longer used and is undergoing rehabilitation by backfilling (Figure 3.8).

The lot contained boundary and internal fencing. Stock water troughs are also present.

4.7 Previous investigations

4.7.1 *Preliminary contamination investigation, Lot 64 DP754287 Eulomogo Road, Dubbo NSW*

A rural-residential subdivision was proposed at Lot 64 DP754287 Eulomogo Road, Dubbo NSW. A preliminary contamination investigation of the site was undertaken by Envirowest Consulting Pty Ltd in November 2010 (Report number R10297c).

The investigation comprised a desktop study and a site walkover. Agricultural production of grazing, pasture hay and cropping had been undertaken on the site for over 50 years. The majority of the site had been cleared of native trees. Vegetation on the site at the time of inspection was exotic and native grasses, herbs and weeds with isolated paddock trees. A stand of remnant native trees are located in the central section of the site in an area with rock outcrops.

There was no evidence of mines, orchards, sheep yards or dips and structures on the site from the review of site history or site walkover. Dilapidated cattle yards were located in the central section of the site. Pesticide use was not associated with the yards. No use of persistent pesticides in agricultural production on the site had occurred.

Site history did not indicate contaminating activities occurring on the site. No evidence of contamination such as soil staining, plant stress or odours were identified on the site. The collection of soil samples was not required as historical land-use and site inspection did not identify past potential contaminating land-uses.

The investigation recommended that no further investigation was necessary and the site is suitable for residential activities. If potential contamination was discovered during site works, a soil sampling and analysis investigation should be undertaken by a suitably qualified person.

4.7.1 *Detailed contamination investigation, Lot 64 DP754287 16L Eulomogo Road, Dubbo NSW*

An audit of the preliminary contamination investigation by an EPA accredited auditor was required by Dubbo City Council as part of the development process. Tim Chambers of Environmental Strategies was engaged as site auditor. Consultation with the site auditor indicated collection and analysis of soil samples were required to confirm the contamination status of the site.

Soil samples were collected from each of the paddocks on the site and combined to form eight composite samples for analysis of contaminants of concern comprising heavy metals and organochlorine pesticides (OCP). A discrete soil sample was collected from a former dam.

Levels of contaminants in the soil of the field area and former dam were below the adopted human investigation levels (HIL) and ecological investigation levels (EIL) for residential land-use. The field and former dam were suitable for residential land-use.

No visual evidence of significant contamination was identified around the dwellings and sheds.

The investigation recommended that no further investigation was necessary and the site was suitable for residential activities.

4.8 Contaminant sources

The land-use over the majority of the site has an agricultural land-use history comprising grazing of sheep and cattle. Some pasture hay production has also occurred. No horticultural crops or intensive cropping are known to have been produced on the site. Analysis of samples collected from Lot 64 indicated the historical land-use had not impacted on the contamination status of the lot and

suitability for residential land-use. Management and historical land-use of Lot 64 is similar to the remainder of the investigation area and results from the detailed investigation of the field area are considered indicative of the remainder of the *Daisy Hill Estate* investigation field area. It is unlikely that agricultural pesticides were applied or are present on the paddocks.

Lot 662 was owned by a welder from 1976 to 1982. No suitable infrastructure is located on Lot 662 and it is unlikely welding activities occurred.

The quarry on Lot 200 is undergoing rehabilitation by backfilling. Source of the backfill material is soil from excavations at Holmwood Residential Estate located in south Dubbo. Land-use on the source site was agricultural comprising stock grazing with minimal amounts of cropping. No stock yards or dips were known to be present on the Holmwood Residential Estate site. Contamination with agricultural pesticides are unlikely.

4.9 Contaminants of concern

Contaminants of concern associated with the agricultural land-use across the site include:

- Heavy metals
- Organochlorine pesticides (OCP)

Contaminants of concern associated with the stained soil below the AST on Lot 64 are:

- Total recoverable hydrocarbons (TRH C6-C40)

Contaminants of concern associated with fill include:

- Heavy metals (arsenic, cadmium, chromium, copper, lead, zinc, mercury)
- Total recoverable hydrocarbons (TRH C10-C36)
- Benzene, toluene, ethylbenzene, xylenes (BTEX)
- Polycyclic aromatic hydrocarbons (PAH)
- Electrical conductivity
- pH
- OCP

4.10 Relevant complaint history

Nil

4.11 Contaminated site register

The investigation area is not listed on the NSW EPA Contaminated Land record or the list of NSW contaminated sites notified to the EPA (accessed 3 September 2013). Neighbouring properties are also not listed.

4.12 Neighbouring land-use (2010)

North – Pinedale Road, rural and rural-residential

South – Eulomogo Road, rural-residential

East – Torwood Road, rural-residential

West – Rural, rural-residential

The neighbouring land-uses are not expected to impact on the contamination status of the site.

4.13 Integrity assessment

The site history was obtained from a history review. The information is to the best of the assessor's knowledge is accurate.

5. Site condition and environment

5.1 Vegetation

The natural woodland has been cleared from most of the site. The site is dominated by introduced pasture species including ryegrass, lucerne, soft brome and oats. Native pasture species includes weeping grass, spear grass, native medics and naturalised clovers. Weed species included saffron thistle, sheep sorrel, Paterson's curse and medic.

A small stand of remnant native trees is located in a central section of Lot 64. Tree species consisted of Inland grey box and fuzzy box. White cypress pines are located around the boundary of the site and isolated white cedar, white cypress pines and kurrajong trees occur throughout the paddocks.

5.2 Topography

The site is located on a flat within a mid-slope. A low ridge is located through the central section of Lot 200 DP825059. Aspect is predominantly west with a southerly aspect in the southern section of Lot 200. Slopes are very gently inclined and generally <1%. Elevation ranges between 311 and 377 metres above sea level.

5.3 Soils and geology

The site is within the Eulomogo Soil Landscape (Murphy and Lawrie 1998). Topsoil consists of a dark reddish brown to light reddish brown sandy loam with a gradual boundary change to a dark reddish brown to light reddish brown fine sandy clay loam to 100cm over a mottled yellow and grey clay to 150cm. Soils have a low to moderate fertility and moderate erosion hazard. Soil salinity problems are absent over the site.

The geological unit is Piliga Sandstone and Ballimore Formation with lithology comprising massive to cross-bedded coarse pebbly lithic-quartz sandstone, minor lithic sandstone and siltstone (Colquhoun *et al.* 1997).

5.4 Surface water and groundwater

An intermittent drainage line is located through the central section of the site and runs south east to north west. Surface water over the majority of the site flows into intermittent drainage lines which empty into Troy Creek located approximately 900m north west of the site.

Surface water in the southern section of the site flows south and into Eulomogo Creek approximately 1km from the site.

No dams or permanent streams are located on or near the site.

The site is located within the Eastern Porous Rock: Macquarie-Castlereagh Groundwater Management Unit (Murray-Darling Basin Authority 2012). Groundwater salinity ranges from 1,500-3,000mg/L.

The Office of Environment and Heritage (OEH) NSW Natural Resource Atlas (2013b) identifies fifty seven bores within 1km of the site. These bores are licensed for domestic, stock and irrigation supplies. Eight are Dubbo City Council groundwater monitoring bores. Depth of the bores ranged from 9 to 107m. Water bearing zones were located generally deeper than 10m in basalt and sandstone. Standing water levels at the time of construction ranged between 5 to 50m.

Three operational bores are located on the site. One bore is located around the homestead of *Mt Olivetta*, one is located on *Peachville Park* and one is located in the south eastern section of *Peachville Park West*. The bores are licensed for stock and domestic supplies and monitoring. Water

bearing zones ranged from 14 and 90m and standing water levels of 12 to 52m. The bores were constructed between 1957 and 2012. These bores indicate shallow water does not occur on the site. Water description at the time of construction was good with water in one bore described as salty, brackish.

5.5 Evidence of contamination checklist

Site layout showing industrial processes	None identified
Sewer and service plans	Existing dwellings serviced by on-site effluent management systems.
Manufacturing processes	A welder inhabited Lot 662 from 1976 to 1982. No suitable infrastructure located on Lot 662 and it is unlikely that welding activities occurred.
Underground tanks	None identified
Product spills and loss history	None identified
Discharges to land, water and air	None expected
Disposal locations, presence of drums, wastes and fill materials	Fill material identified within the quarry on Lot 200.
Soil staining	Minor hydrocarbon staining observed at the base of the above ground tank on Lot 64.
Visible signs of plant stress, bare areas	Nil
Odours	None identified
Ruins	The homestead of <i>Mt. Olivetta</i> has not been occupied for over 10 years and has become dilapidated.
Other	-

6. Sampling analysis plan and sampling methodology

No soil samples were collected for as part of the Daisy Hill investigation. Soil samples have previously been collected from Lot 64 as part of a previous investigation. The results were reviewed and a summary provided in Section 4.7.1.

7. Results and discussion

The site is private land with a land-use history of sheep and cattle grazing on cleared and improved pastures (Figure 2). Application of persistent pesticides is unlikely to have occurred on the site. Biosolids have not been applied to the site. All paddocks have undergone similar management. Analysis of soil samples collected from the paddocks of Lot 64 contained levels of potential contaminants below residential land-use thresholds. The results are considered indicative for the paddocks in the investigation area.

There was no evidence of sheep dips, orchards or other contaminating activities from the historical review. Above ground fuel storage tanks are located on Lot 64 and surface staining is present under one AST.

Four dwellings and associated infrastructure are located on the site. No potential sources of contamination are associated with the infrastructure or storage of farm machinery.

No disposal locations were identified from the aerial photographs.

Review of Land and Property Information indicated that Lot 662 was owned by a welder between 1976 and 1982. No suitable infrastructure is located on Lot 662 and it is unlikely welding activities occurred.

A quarry was located in the south western section of Lot 200. The quarry is undergoing rehabilitation by backfilling. The source of the backfill material is Holmwood Residential Estate in south Dubbo.

No other areas of fill were identified on the site.

8. Conclusions and recommendations

8.1 Summary

The site comprised seven rural lots located approximately 2km east of Dubbo in a developing rural-residential area. The current and historical land-use of the site is grazing of sheep and cattle. Four dwellings are located on the site.

The contamination status of the site was assessed from a desktop study, site inspection and review of previous reports. No soil samples were collected for as part of the Daisy Hill investigation. Soil samples have previously been collected from Lot 64 as part of a previous investigation.

A detailed soil contamination investigation was undertaken of a rural-residential subdivision of Lot 64 DP754287 which forms part of the site (Envirowest Consulting Pty Ltd report number R10297-1c.1). Analysis of soil samples collected from the field area of Lot 64 indicated the field area was suitable for residential land-use. The results are considered indicative of the field area across the investigation area.

Potential contamination sources associated with the historic land-use of the site includes:

- Agriculture in all paddocks comprising grazing and cereal cropping
- Minor fuel stains under AST in Lot 64
- Backfill material used in the quarry on Lot 200

8.2 Assumptions used in reaching the conclusions

An accurate history has been obtained and typical past farming practices were adopted.

8.3 Suitability of proposed use

Residential land-use is expected to be suitable on the site. Additional investigations including a site inspection and soil sampling of potential areas of contamination are required to confirm suitability.

8.4 Recommendation for further work

Additional investigations including a site inspection and soil sampling program is required to confirm the contamination status of the site.

Location	Potential contaminants sources	Area	No of sampling locations	Pattern	Depth	Contaminants of concern
All grazing paddocks across the site	Agriculture	Approximately 300 hectares (not required in Lot 64)	64 discrete sampling locations (4 per paddock) combined to form 16 composite samples for analysis	Systematic	0-0.1m	Heavy metals, organochlorine pesticides (OCP)
Lot 64	Hydrocarbons	1m ²	1	Judgemental	Base	TRH (C6-C40)
Lot 200	Backfill	Quarry	2 samples	Systematic	-	Arsenic, cadmium, chromium, copper, lead, zinc, mercury, OCP, polycyclic aromatic hydrocarbons (PAH), total recoverable hydrocarbons (TRH C10-C40), benzene, toluene, ethylbenzene, xylenes (BTEX), electrical conductivity, pH

The additional investigations should be undertaken in accordance with the contaminated land management planning guidelines State Environmental Planning Policy No. 55 (SEPP 55) and include a sampling, analysis and quality plan.

9. Report limitations and intellectual property

This report has been prepared for the use of the client to achieve the objectives given the clients requirements. The level of confidence of the conclusion reached is governed by the scope of the investigation and the availability and quality of existing data. Where limitations or uncertainties are known, they are identified in the report. No liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been predicted using the scope of the investigation and the information obtained.

The investigation identifies the actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing is interpreted by geologists, engineers or scientists who then render an opinion about overall subsurface conditions, the nature and extent of the contamination, its likely impact on the proposed development and appropriate remediation measures. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock or time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. It is thus important to understand the limitations of the investigation and recognise that we are not responsible for these limitations.

This report, including data contained and its findings and conclusions, remains the intellectual property of Envirowest Consulting Pty Ltd. A licence to use the report for the specific purpose identified is granted for the persons identified in that section after full payment for the services involved in preparation of the report. This report should not be used by persons or for purposes other than those stated, and should not be reproduced without the permission of Envirowest Consulting Pty Ltd.

10. References

Colquon GP, Meakin NS, Morgan EJ, Raymond OL, Scott MM, Watkins JJ, Barron LM, Cameron RG, Henderson GAM, Jagodzinski EA, Krynen JP, Pogson DJ, Warren AYE, Wyborn D and Yoo EK (1997) *Dubbo 1:250,000 Geological Sheet S1/55-04, Preliminary second edition* (Geological Survey of New South Wales, Sydney/Australian Geological Survey Organisation, Canberra)

CMA (1986) *Eulomogo Topographic Map 1:25,000* (Central Mapping Authority of New South Wales, Bathurst)

DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditors Scheme* (NSW Environment Protection Authority, Chatswood)

EPA (1995) *Contaminated sites: Sampling Design Guidelines* (NSW Environment Protection Authority, Chatswood)

Murphy BW and Lawrie JW (1998) *Soil Landscapes of the Dubbo 1:250 000 Sheet Report*, Department of Land and Water Conservation of NSW, Sydney

Murray-Darling Basin Authority (2012) *Groundwater Sustainable Diversion Limit Resource Unity Summary Report Cards* (Murray-Darling Basin Authority, Canberra City)

NEPC (2013) *National Environment Protection (Assessment of Site Contamination) Measure 2013* (National Environment Protection Council Service Corporation, Adelaide)

Figures

Figure 1. Locality map

Figure 2. Aerial photograph of the site (2013)

Figure 3. Photographs of the site

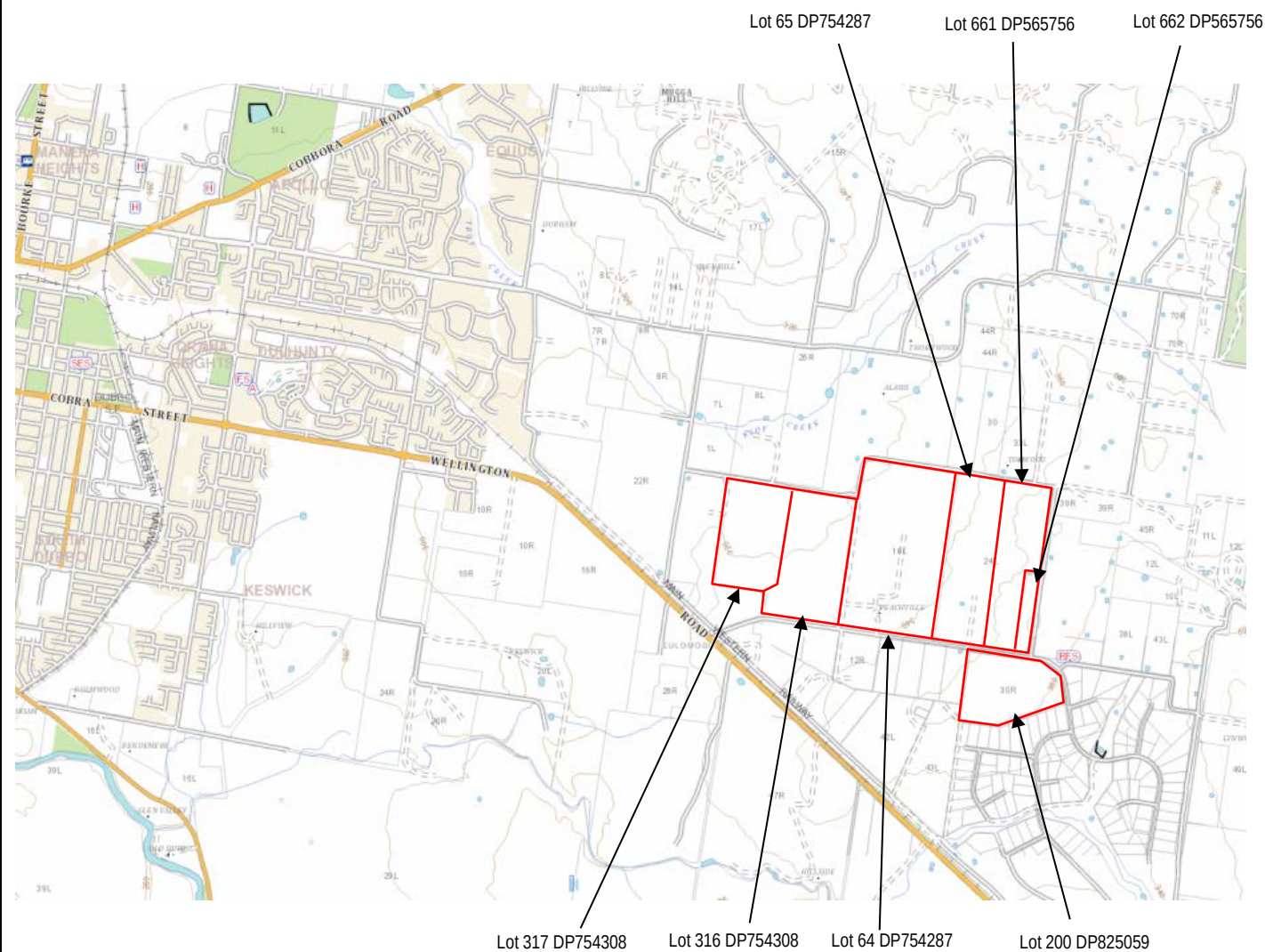
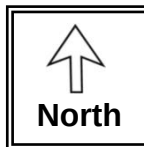
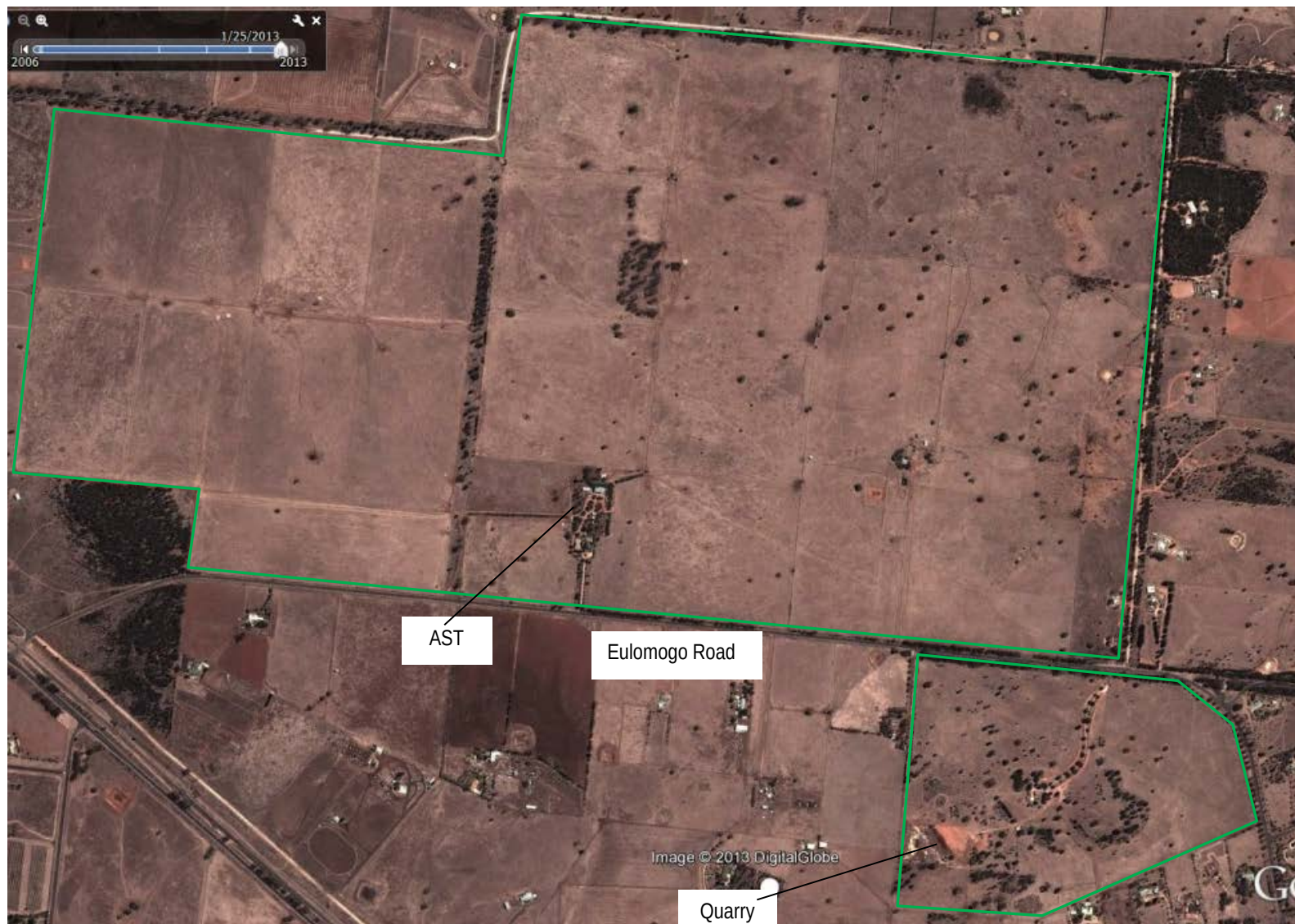


Figure 1: Locality map		
Daisy Hill Estate, Eulomogo Road, Dubbo NSW		
	Envirowest Consulting Pty Ltd	
Job – R13365c.2	Drawn by: LD	Date: 4/9/2013



Legend

— Investigation area

Figure 2. Aerial photograph of the site (2013)		
Daisy Hill Estate, Eulomogo Road, Dubbo NSW		
	Envirowest Consulting Pty Ltd	
Job – R13365c.2	Drawn by: LD	Date: 18/9/2013

Figure 3. Photographs of the site



Figure 3.1. Sheep yards on Lot 316



Figure 3.2. AST on Lot 64



Figure 3.3. Mt Olivetta homestead



Figure 3.4. Asbestos containing electrical backboard



Figure 3.5. Old machinery on Lot 65



Figure 3.6. Windmill on Lot 65



Figure 3.7. Dwelling on Lot 662



Figure 3.8. Rehabilitation of quarry on Lot 200



Field area



Field area