Douglas Partners
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Integrated Practical Solutions

Report on
Updated Contamination Assessment

Jumping Creek Estate
Lot 5, DP1199045, Greenleigh, NSW

Prepared for
Spacelab Studio Pty Ltd

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature		Date
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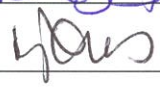
Reviewer		Michael Jones	22 March 2019

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1. Introduction

This report presents the results of an updated contamination assessment undertaken for the current development area of the Proposed Jumping Creek Estate at Lot 5, DP1199045, Greenleigh, NSW. The investigation was commissioned in an email dated 22 June 2018 by Geoff Bunnett of Spacelab Studio Pty Ltd (Spacelab) on behalf of PEET Limited (PEET) and was undertaken in accordance with Douglas Partners' proposal CAN180080 dated 11 April 2018.

DP understands that the site is intended for a subdivision to enable development of residential properties. DP is aware that several phases of environmental investigation works have been completed by other Consultants and that the site was subject to a non-statutory audit, it is understood that the most recent intrusive environmental investigation works, including a site audit report prepared by the Site Auditor, date from 2010.

PEET are currently preparing a development application (DA) for submission to Queanbeyan Palerang Regional Council (QPRC) and DP understands that an updated contamination assessment is required to support the DA assessment.

The objectives of the updated site contamination assessment include:

- Review previous environmental reports for the site provided to DP and provide comment on the adequacy and status of works undertaken to date;
- Research the historical use of the site and report on any matters that could prevent the site from being developed with reference to soil and groundwater contamination;
- Inspect the site to assess the current site condition with reference to site contamination; and
- Advise on the potential of contamination and the need, if any, for additional investigation or on-going site management.

This report must be read in conjunction with the notes *About this Report* which are included in Appendix A.

2. Scope of Works

The following scope of works was undertaken to meet the project objectives:

- Review of existing reports made available to DP;
- A search through the Contaminated Land Register for notices issued under the CLM Act;
- A review of available historical aerial photography;

- A search of the NSW Office of Water's registered groundwater database;
- A site inspection visit was undertaken to confirm the current state of the site. During the site inspection, areas of environmental concern previously identified were inspected and additional areas of environmental concern were recorded.
- Preparation of this site contamination assessment report, detailing the review of existing report, results of the site inspection visit and assessing the need for further field-based environmental investigations or remediation works.

3. Site Identification and Description

3.1 Site Identification

Site information is summarised in Table 1 below.

Table 1: Site Identification Details

Item		Details
Site Owner		PEET Limited
Site Address		30 Lonergan Drive, Greenleigh, NSW 2620
Current land use		Open land
Registered Lot and Plan		Lot 5, DP1199045
Current Zoning		E2: Environmental Conservation E4: Environmental Living RE1: Public Recreation (extract of Queanbeyan-Palerang Regional Council Local Environment Plan 2012 is presented in Appendix C.
Council		Queanbeyan-Palerang Regional Council
Approximate Site Area		95 ha
Proposed future land-use		Residential
Surrounding Land Use	**North:**	Ellerton Drive Extension construction site with low density residential properties beyond
	South:	Undeveloped woodland
	East:	Undeveloped woodland
	West:	Queanbeyan River with low density residential and undeveloped woodland beyond

3.2 Site Layout and Description

The overall site comprises an irregularly shaped, but roughly square parcel of land covering approximately 95 ha. The site measures approximately 1.1km and 1.2km in maximum east-west and north-south dimensions. The site is bounded to the west by the Queanbeyan River, to the north by the Ellerton Drive Extension construction works and to the east and south by undeveloped woodland.

The site lies within an enclosed valley within the Queanbeyan River corridor and is moderately to highly undulating and includes ridgelines and steep sided valleys. Valley Creek flows through the site from south-east to the north-west before meandering through a narrow gorge to join the Queanbeyan River. A high ridge line is present in the east of the site and other ridges are present in the north-west, south-east and south- west.

The elevation of the site ranges from approximately 580 m Australian Height Datum (AHD) in the west of the site to 690 m AHD in the north-east corner of the site.

The site is partially cleared of trees and moderately to heavily grassed with a variable tree and weed density. Weeds, including blackberry and bramble are generally located within valley or gully areas and were dense. Extensive rock outcropping and/or cobbles/boulders sub cropping were noted across most of the sites. Uncontrolled filling was limited to existing access tracks and previous site disturbance (including motor bike mounds that appeared to be mounds created from site soils). Several areas were noted to contain scrap metal and dumped car bodies.

The site location and currently layout is presented in Drawing 1, Appendix B.

4. Proposed Development

The proposed development at the site will involve subdividing the site to allow for low density residential development. The development will include the installation of roads and services and the creation of a stormwater retention pond in the lower slopes of the Valley Creek valley.

It is understood development was proposed for the south-western corner of the site but is currently a deferred matter and is subsequently referred as the ‘deferred areas’. The proposed indicated site layout for the current development area is presented in Drawing 2, Appendix B.

This report provides an updated contamination assessment for the current development area of the proposed Jumping Creek Estate at the site.

5. Soil Landscape, Regional Geology and Hydrogeology

5.1 Geology and Hydrogeology

Reference to the Canberra Geology Sheet (Ref 1) indicates that the sites are underlain by several rock units.

The north-eastern corner of the site is mapped as being underlain by the Pitman Formation of Ordovician age. The Pitman Formation typically comprises interbedded sandstone, siltstone shale and minor black shale.

The eastern part of the site is mapped as being underlain by a subgroup of the Colinton Volcanics and two subgroups of the Cappanana Formation both of late Silurian age. These rock subgroups typically comprise:

- dark green dacitic ignimbrite and minor volcaniclastic sediments;
- shale, siltstone and minor quartzite and tuff; and
- limestone.

The western part of the site is mapped as being underlain by 3 subgroups of the Colinton Volcanics of late Silurian age. These rock subgroups typically comprise:

- dark green dacitic ignimbrite and minor volcaniclastic sediments;
- tuffaceous shale; and
- limestone and dolomitic limestone.

Reference to the Hydrogeology of the Australian Capital Territory and Environs Map (Ref 2) indicates that the site is located on fractured aquifers of late Silurian age. Based on the hydrogeology map the yield of aquifers increases from the east to the west from less than 0.5 l/s to 0.5 – 1.0 l/s. Total dissolved solids (TDS) are mapped as increasing from the west to the east from between 500-1000 mg/l close to the Queanbeyan River to greater than 1000 mg/l further to the east.

Surface water was not observed during the site inspection with the exception of ponded water from recent rain fall. The sites are traversed by numerous intermittently flowing water courses and gully lines which run in variable directions, but ultimately water flows are to the north and north-west towards Jumping Creek and the Queanbeyan River.

5.2 Soil Landscape

Reference to the Canberra Soil Landscape Sheet (Ref 3) indicates the site is mapped as being underlain by the Burra soil group.

The Burra soil group is characterised by undulating to rolling low hills and alluvial fans on Silurian Volcanics of Canberra Lowlands, which are generally characterised by waning and gently to moderately inclined hill slopes, foot slopes and fans. Soils are shallow, well drained earthy sands on crests and upper slopes, and are moderately deep, moderately well drained red podzolic soils on mid slopes and most lower slopes. Moderately deep, moderately well drained yellow podzolic soils are present along minor drainage lines and on some lower slopes. The Landscape Sheet lists this soil group as characterised by its strong acidity and low water holding capacity, its low permeability, sheet erosion risk, run-on and localised shallow soil.

5.3 Groundwater Bore Search

A search of the groundwater bore database was conducted through the NSW Department of Primary Industries. Based on the database, there are 11 groundwater bores registered within a 1 kilometre

radial search area of the boundary of the site (Table 2). Further information was available through the database for the bore as shown in Appendix C.

Table 2: Groundwater Bores Attribute Data

Groundwater Bore Number	Date	Approximate Distance to site (m)	Private/Public	Groundwater Usage	Depth to base (m)	Depth to standing water level (m)	Yield (L/s)
GW402778	02/10/2003	890 NE	Private	Domestic	36	19	3.37
GW402771	03/10/2003	890 NE	Private	Domestic	66	22	1.06
GW402842	30/11/2004	890 NE	Private	Domestic	60	24	2.25
GW416490	04/01/2012	890 NE	Private	Domestic, Irrigation	66	-	1.0
GW4400875	30/07/1997	890 NE	Private	Domestic	36.6	16.0	0.25
GW403165	13/07/2005	890 NE	Private	Stock, Domestic	78.00	29.0	3.25
GW401615	06/12/2000	600 E	Private	Domestic	73	41.0	0.2
GW416092	31/10/2007	600 E	Private	Stock, Domestic	102	32.0	0.63
GW416069	19/07/2004	440 N	Private	Domestic	113	74.0	-
GW402365	21/05/2003	220 NE	Private	Stock, Domestic	79	18.0	0.25
GW404162	23/05/2005	220 NE	Private	Domestic	100	22.00	4.5

Groundwater flow direction is inferred to be towards the west towards the Queanbeyan River.

6. Previous Environmental Works

6.1 Stage 3 Contamination Assessment, Coffey (2010, Ref 4))

Coffey Environments Pty Ltd (Coffey) was commissioned by Canberra Investment Corporation Pty Ltd (CIC) to conduct a Stage 3 Contamination Assessment of the proposed Jumping Creek Residential Estate. The objective of the assessment was to undertake supplementary contamination assessment to information remediation and management planning for the proposed residential estate.

During the assessment, Coffey reviewed previous reports undertaken by IT Environmental (Australia) Pty Ltd (1999), Egis Consulting (2001) and Parsons Brinckerhoff (2007). The site history review indicated that the site had been used for a variety of potentially contaminating activities including the mining of metal ores, limestone quarrying and associated lime kiln, possible on-site processing of mineral ores and pastoral activities including one sheep dip complex.

Coffey reported that use of the site dated back to the 1840s and that mining activities were believed to have occurred between the 1850s and early 1900s. The scope of work for the assessment included the development of a sampling analysis and quality plan (SAQP) to target the identified the areas of environmental concern, focusing particularly on the mining activities. In addition, sample locations were selected in areas of the site where residential blocks were proposed to be located and sediment samples, surface water samples and groundwater samples were proposed. It was noted that the SAQP was approved by a site auditor as part of the assessment.

Following review of previous reports and site inspections, Coffey identified three remnant mining sites were present at the site. These were named Mine Site 1, Mine Site 3 and Mine Site 4, and the locations of these areas are presented in Drawing 1, Appendix B. It should be noted that Mine Site 3 is located in deferred areas that are not currently proposed for development, however, at the time of the Coffey investigation, Mine Site 3 was within an area of the site that was proposed for development. In addition, a possible mineral processing area was located to the north-west of Mine Site 4. Mine sites 1 and 3 were described to comprise single mine shafts and associated stockpiles. Mine Site 4 was described as comprising an area of open cut pits, several shallow trench excavations and an open adit. The mineral processing area was described as containing the remnants of several structures, including several water troughs, open drains and drainage sump areas. Reference was made to two additional mine sites previously encountered by IT Environmental, however, at the time of investigation, Coffey was unable to locate these.

Sampling targeted the above areas associated with mining activities and the kiln area. In addition, systematic sampling was undertaken of areas of the site that were, at the time of the assessment, proposed to be located in residential and open space areas. Soil sampling was not undertaken in the area of the sheep dip as part of the assessment. Reference was made to the existence of a remediation action plan (RAP) specifically for the sheep dip area, this RAP was not made available to DP.

The assessment also included the installation and sampling of eight groundwater monitoring wells, the wells were installed in the vicinity of the sheep dip, the possible mineral processing area and Mine Sites 3 and 4.

Laboratory results from soil samples submitted for analysis were compared against Health-based soil investigation levels (HILs) and ecological investigation levels (EILs) published in the National Environment Protection (Assessment of Site Contamination) Measure 1999[1]. HILs for residential land use with garden/accessible soil and EILs for urban land use setting were used to screen the results. Results from groundwater samples were compared against values published in the National Water Quality Management Strategy,

The results of the laboratory indicated that concentrations of metals in soil samples were detected above the laboratory practical quantification limit (PQL).

Areas of elevated metal concentrations within soil and rocks were identified within Mine Sites 3 and 4.

At Mine Site 3, the range of reported concentrations for selected metals was:

- Arsenic – 22 mg/kg to 2,900 mg/kg;

[1] The ASC NEPM was amended in May 2013 and revised HIL and EIL were published.

- Cadmium – <PQL to 47 mg/kg;
- Copper – 1.6 mg/kg to 260 mg/kg;
- Lead – 3 mg/kg to 5,200 mg/kg; and
- Zinc – 100 mg/kg to 4,500 mg/kg.

At Mine Site 4, the range of reported concentrations for selected metals was:

- Arsenic – 4 mg/kg to 200 mg/kg;
- Cadmium – <PQL to 350 mg/kg;
- Copper – 4.1 mg/kg to 530 mg/kg;
- Lead – 15 mg/kg to 54,000 mg/kg; and
- Zinc – 48 mg/kg to 130,000 mg/kg.

In samples collected from areas of the site where proposed development comprised residential or open space use the range of reported concentrations for selected metals was:

- Arsenic – <PQL to 130 mg/kg;
- Cadmium – <PQL to 0.7 mg/kg;
- Copper – 1 mg/kg to 40 mg/kg;
- Lead – 3 mg/kg to 85 mg/kg; and
- Zinc – 17 mg/kg to 1,100 mg/kg.

Whilst it was considered that the elevated concentrations were associated with natural mineralisation within local geological formations, it was considered that Mine Sites 3 and 4 were not suitable for standard residential or recreational use.

It was recommended that a capping layer with appropriate management plan be implemented as a remediation strategy however, should such a strategy be implemented Coffey did not consider that Mine Sites 3 and 4 would be suitable for residential use. Areas of the site outside of Mine Sites 3 and 4 were considered to be suitable for either residential use or for parks and recreational open space.

Concentrations of metals in groundwater were reported to be elevated and for some monitoring wells were above the adopted criteria. The range of reported concentrations for selected metals was:

- Arsenic – <PQL to 0.038 mg/L;
- Cadmium – <PQL to 0.0001 mg/L;
- Copper – <PQL to 0.005 mg/L;
- Lead – <PQL to 0.2 mg/L; and
- Zinc – 0.003 mg/L to 0.016 mg/L.

Coffey concluded that groundwater across the site had elevated metal concentrations, however, following evaluation of the Conceptual Site Model, Coffey considered that the risk of exposure of site users to elevated metal concentrations was low considering the depth to groundwater under the site.

It was recommended that a remediation action plan (RAP) and site environmental management plant be implemented prepared for mine sites 3 and 4 to address the contamination identified at these areas of the site. It was noted that Coffey had prepared a separate RAP for the sheep dip area of the site, however, this was not available for review by Douglas Partners.

6.2 Site Audit Report, Environmental Strategies (2010, Ref 5)

Environmental Strategies Pty Ltd (ES) were commissioned by Canberra Investment Corporation Pty Ltd to conduct a non-statutory site audit for the site. It should be noted during previous geotechnical works undertaken at the site by DP a copy of the Site Audit Report was provided to DP. It is understood to be a draft copy of the Site Audit Report (SAR). The Site Auditor was Mr Rod Harwood, ES reviewed several environmental reports for the site prepared by IT Environmental, Egis Consulting, Parsons Brinckerhoff and Coffey.

The objective of the audit was to determine whether the site conditions are protective of human health and the environment, and that the site can be made suitable for the intended land use. ES reviewed previous consultants' reports with a view to commenting on the adequacy of the investigation and assessment, whether any data gaps remained and to enable the auditor to make comment on the suitability of the site for the intended use.

It should be noted that the site audit report references two RAPs prepared by Coffey. A RAP for the sheep dip area and a RAP for the main site have been prepared. These reports were not made available to DP for review.

6.3 Site Audit Statement, Environmental Strategies (2010, Ref 6)

Mr Rod Harwood of ES prepared a Site Audit Statement (SAS) to accompany the SAR for the site, dated 25 August 2010. Under Part II, Section B of the site audit statement, it was stated that the site can be made suitable for the following uses:

- Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry;
- Day care centre, preschool, primary school;
- Secondary school; and
- Park, recreational open space, playing field.

The SAS required that the site must be remediated in accordance with the RAP prepared by Coffey. The following RAPs were referenced:

- Remediation Action Plan – Sheep Dip Area, Jumping Creek, Queanbeyan, NSW, Coffey Environments Australia Pty Ltd, dated 15 December 2009; and
- Remediation Action Plan – Jumping Creek, Queanbeyan, NSW, Coffey Environments Australia Pty Ltd, dated 4 June 2010.

The SAS was issued subject to compliance with the following conditions:

- Preparation of an Environment Management Plan for management of the Mine Site 3 and Mine Site 4 Areas following site remediation.

DP Comment: There was no evidence that any remediation works had been undertaken in the sheep dip, Mine Sites 1, 3 and 4 or Mineral Processing Area/Stockpile Holding Area.

6.4 Site Environmental Management Plan – Mine Site Area 4, Coffey (2015, Ref 7)

Coffey was engaged by CIC to prepare a site environment management plan (SEMP) for the area of the site known as Mine Site Area 4. The objective of the SEMP was to facilitate effective management of the capping structure installed on the Mine Site 4 area and was written to support the draft planning proposal for the development and to enable the local Council to appreciate the remediation and post remediation management requirements for the Mine Site Area 4.

The SEMP indicated that remediation including off-site disposal of loose demolition wastes, tree and weed removal, placement of a geofabric layer and capping of the area identified as exceeding the adopted site criteria had been undertaken.

The area of mine site 4 that was capped was indicated to be approximately 7,120 m^2. The capping was identified to have involved placement of a layer of geofabric material and a layer of 30 mm square barrier mesh, overlain with a 300 mm thickness layer of clean validated soil place at the site. The report also indicated that shallow root grasses and/or plants were used to landscape the area.

DP Comment: It is considered that the SEMP was prepared in order to comply with the conditions of the Site Audit Statement. The observations of the area of Mine Site 4 and neighbouring mineral processing area were similar to that described in Coffey's 2010 Stage 3 assessment report (Section 4.2.1) comprising an area of open cut pits, several shallow trench excavations and an open adit, remnants of several structures, including several water troughs, open drains and drainage sump areas, loose demolition wastes, trees and weeds and fencing. It is therefore considered that the remediation works detailed in the SEMP have not been undertaken.

7. Site History Review

7.1 Regulatory Notice Search under the CLM and POEO Acts

A search on 15 March 2018 for Statutory Notices issued under the *Contaminated Land Management Act 1997* and *Protection of the Environment Operation Act 1997* (POEO) available on the NSW Environment Protection Agency (EPA) website indicated that there have been no notices issued on the subject site.

The closest entry to the site on the List of NSW Contaminated Sites Notified to EPA was a Caltex Service Station located at 88 Macquoid Street, East Queanbeyan. The service station is located approximately 3.1 km north-west of the site. The contamination activity type was listed as "service station" and it indicated that regulation under the CLM Act was not required.

7.2 Historical Aerial Photography

Nine historical aerial photographs available from ACT Land and Property Information and two satellite images obtained from Google Earth were reviewed (refer to Aerial Photograph Plates D1 to D9 attached in Appendix D.

Table 3: Summary of Historical Aerial Photography Review

Aerial Photograph	On-site Conditions	Surrounding Area
1961 Photograph Run 18-0156 4 November 1955	The site was mostly undeveloped with the most predominant land used likely being used for grazing. The site was mostly grassed with sporadic stands of trees The site was bounded to the west by the Queanbeyan River. Jumping Creek entered the site in the south-east corner of the site and meandered through the central portion of the site before joining the Queanbeyan River. Several smaller tributaries and gully lines joined Jumping creek at various points. Several buildings were present in the north western part of the site, one of which appeared to be a homestead. The remnants of what appeared to be quarrying activity were present in the south-eastern corner of the site. Areas of bare ground were scattered across the site.	The site was surrounding by undeveloped dry sclerophyll forest to the north, east and south. The Queanbeyan forest was present immediately to the west of the site, beyond which was open grazing land.
1973 Photograph Run 73C13-85/86	Largely unchanged from the previous photograph. A large area of disturbed ground was present in the central portion of the site to the south of Jumping Creek. A group of small buildings was present to the north-west of the disturbed ground. One of the buildings in the north-eastern part of the site was no longer visible.	Largely unchanged from the previous photograph. A fire trail was present running along a ridge line to the east of the site, the fire trail entered the site in the north-east corner.
1978 Photograph Run 20-0196/0197	Largely unchanged from the previous photograph.	Largely unchanged from the previous photograph.
1984 Photograph Run 20-4942	Largely unchanged from the previous photograph. Several tracks were now present across the site.	Largely unchanged from the previous photograph.

Aerial Photograph	On-site Conditions	Surrounding Area
	The buildings in the north-eastern part of the site and to the north east of the disturbed area of ground were no longer present.	
1987 Photograph Run 20-2215	Many more tracks were present across the site. A larger proportion of the site was covered with bush and shrubs.	Rural residential properties had been developed to the north of the site. Some residential properties had been developed to the west of the site.
1995 Photograph Run 20-210/211	Largely unchanged from the previous photograph.	Additional residential properties had been developed to the west of the site.
1998 Photograph Run 10-16	Largely unchanged from the previous photograph but a greater area of the site was covered with bushes and shrubs.	Largely unchanged from the previous photograph.
2004	Largely unchanged from the previous photograph.	Additional residential properties had been developed to the west of the site.
2018	Largely unchanged from the previous photograph.	The Ellerton Drive Extension works had commenced and formed the northern boundary of the site.

8. Site Inspection

The site was inspected by a suitably qualified DP environmental scientist on 14 August 2018 to confirm the status of the site, confirm the status of the previously identified areas of environmental concern and identify any visible indications of contamination on site and off site. The following observations were made:

General Site Observations

- The site was accessed on the northern boundary via the construction site for the Ellerton Drive extension, which was underway at the time of the site visit. Access was via an unsealed “four wheel drive” track.
- The site generally comprises undulating to steeply undulating undeveloped land which was moderately to heavily grassed.
- Surface cobbles, boulders and rock outcrops were observed across the entire site.
- Areas of the site were extensively covered with thick stands of weeds (mainly bramble and blackberry).
- Semi-mature to mature trees were scattered across the site. The trees were a mixture of exotic and native species.
- An extensive network of tracks crossed the site. The tracks appeared to be used for unauthorised “four wheel driving” and motorbike riding.

- Anthropogenic wastes were scattered across most areas of the site. Wastes ranged from piles of building and demolition wastes, burned car bodies, small stockpiles of soil and general household wastes. A small stockpile located on the ridge-line in the north-west of the site was observed to contain pieces of asbestos containing material.

Sheep Dip Area

The sheep dip area identified in previous reports was identified in the north western part of the site, adjacent to the main access track. The following observations were made:

- The remnant sheep dip structure comprised the concrete sheep dip trough with small concrete pads present at each end of the trough.
- The trough was approximately 10 m long and 0.5 m wide. The area was heavily overgrown with the trough obscured by trees and shrubs.
- Building and demolition rubble comprised corrugated metal sheet, brick and concrete boulders was scattered on the ground surface.
- Low wooden posts were observed driven into the ground.
- Several pieces of fibrous cement sheeting i.e. potentially asbestos containing materials were observed on the ground surface to the north of the sheep dip.
- The sheep dip was located on a broad ridge line dropping to the north and south. Extensive weeds (brambles and blackberry) were present on the north slope of the ridge.
- A monitoring well was observed to the south-west of the sheep-dip. The location was consistent with that noted in the Coffey Stage 3 contamination assessment. The top of the well material was broken and no well cap was present.
- There was no evidence that any remediation works had been undertaken in this area.

Mine Site 1

Mine Site 1 identified in previous reports was identified in the north-eastern part of the site adjacent to an access track. The following observations were made:

- The mine site comprised an open shaft with stockpiled spoil present on the eastern, southern and western sides of the shaft.
- A wire gate and hi-vis marrier mesh had been placed over the open shaft in an attempt to make the shaft safe.
- The depth of the shaft was measured to be greater than 6 m deep.
- Sparse grass cover was present in the vicinity of the shaft.
- The mine shaft appeared in similar condition to that noted in the Coffey Stage 3 assessment report.
- There was no evidence that any remediation works had been undertaken in this area.

Mine Site 3

Mine Site 3, identified in previous reports was identified in the south-western part of the site. It should be noted that this area is outside of the current development area, but still within the boundary of the site. It is understood this mine site is within the deferred areas. The following observations were made:

- The mine site comprised an open shaft with stockpiled spoil present on the eastern, southern and western sides of the shaft. The shaft had not been in-filled.
- Trees and weeds were observed to be growing out of the shaft.
- The depth of the shaft was measured to be greater than 6 m deep.
- Weeds (bramble) were present on the stockpiled spoil.
- Three monitoring wells were observed, the locations of which were consistent with those detailed in the Coffey Stage 3 assessment report.
- The shaft had not been in-filled and there was no evidence that any remediation works e.g. a capping layer, had been undertaken in the area.

Mine Site 4

Mine Site 4, identified in previous reports, was identified in the central part of the site adjacent to an access track. The following observations were made:

- The mine site comprised a disturbed area of ground approximately 110 m long by 40 m wide and was located on a hillside that sloped down towards the north and east, on an inside bend of Jumping Creek.
- Two areas of open cut excavation and stockpiles of mining spoil were located in the north-western part of the area of disturbed ground.
- Several smaller stockpiles were located in the eastern part of the disturbed ground sloping towards the east along with two short open trenches. The stockpiles and trenches were overgrown with weeds and bushes
- An adit was located in the eastern part of the disturbed ground on the lower eastern slope. The opening of the adit was overgrown, but it was observed that the adit opened into a passage, however, it was not possible to ascertain the length of the adit. It should be noted that the entrance to the adit was similar in appearance to a photograph of a mine shaft presented in the Coffey Stage 3 assessment report.
- Two monitoring wells were present in the eastern part of the disturbed ground area. The monitoring well locations appeared consistent with the locations of monitoring wells MW5 and MW6 identified in the Coffey Stage 3 assessment report.
- No evidence of any remediation works was evident, stockpiled spoil was still present in the area and no evidence of any capping material having been placed at the site was observed.

Mineral Processing Area/Stock Holding Area

The mineral processing area/stock holding area was identified to the north-west of Mine Site 4. The following observations were made:

- The area was heavily overgrown with trees, bushes and bramble present limiting access to the area and reducing areas of the area that could be directly observed.
- Evidence of former structures was observed including concrete slabs and low courses of brickwork. Several reinforced concrete troughs were observed throughout the area. The troughs were approximately 1.5 m long and 0.5 m wide. Building and demolition rubble was present throughout the area, including brick, metal, concrete and timber fragments. Timber posts driven into the ground were also present. Remnants of an above ground storage tank were also present, which appeared to be filled with waste materials.
- An open concrete drain was present leading to a concrete sump. It was not possible to closely observe the concrete lined drainage sump due to dense overgrowth.
- A monitoring well was present to the north east of the Mineral Process/Stock Holding Area. The monitoring well was located in a position consistent with the location of monitoring well MW7 identified in the Coffey Stage 3 assessment report.
- The remaining features of the former structures appeared generally consistent with the photographs of the area provided in the Coffey Stage 3 assessment report.
- No evidence of any remediation works having been undertaken in the area was noted.

Kiln and Limestone Quarry

The kiln and limestone quarry identified in previous reports was identified in the south-eastern corner of the site. The following observations were made:

- The remains of the kiln building were heavily overgrown with weeds and only parts of the structure could be observed.
- The parts of the structure observed appeared consistent with photographs presented in the Coffey Stage 3 assessment report.
- No evidence of any remediation works having been undertaken in the area was noted.
- The limestone quarry was noted in the south-east corner of the site on the lower eastern slopes of the Jumping Creek valley.
- The quarry was approximately 60 m, 15 m wide and 5 m deep. A car body was present within the quarry area.
- Large stockpiles of spoil were present to the west of the quarry.

Additional Mine and Quarry Site

- A previously unidentified mine shaft and small quarry site were present in the north- western part of the site, located to the south-west of the sheep dip area, on the north-eastern slope of a ridgeline.
- The small quarry site was approximately 20 m wide and 20 m long and was cut into the slope. Stockpiled spoil consisting of boulder sized fragments of rock was present to east of the quarry area.
- The mine shaft was located to the south-west of the small quarry. The mouth of the shaft was heavily overgrown and it was not possible to assess the depth of the shaft. Stockpiled spoil was present on the northern, eastern and southern sides of the shaft.

During the site inspection, DP observed no evidence that the remediation works described in the SEMP (Section 6.4) had been undertaken, as previously claimed.

Photographs from the site inspection are presented in Appendix E.

9. Potential for Contamination and Areas of Environmental Concern

Review of historical aerial photographs and previous environmental reports indicate that the site has been used for mining activities, limestone quarrying, possible on-site mineral ore processing and pastoral activities, including sheep dipping. The use of the site for these activities is understood to date from the 1840s when pastoral use of the site was undertaken with mining activities occurring between the 1850s and early 1900s. The above uses are considered to be potentially contaminating activities.

The following areas of environmental concern (AECs) associated with the above potentially contaminating activities were identified during previous works undertaken at the site:

- Mine Site 1;
- Mine Site 3;
- Mine Site 4
- Former Possible Mineral Processing Area;
- Former Kiln; and
- Former Sheep Dip

Intrusive investigations undertaken by Coffey indicated reported concentrations of contaminants of concern from Mine Site 1 and the Former Kiln were below the adopted site assessment criteria and contaminants of concern did not present a risk to human health or environmental receptors.

Concentrations of contaminants of concern in samples collected from Mine Site 3, Mine Site 4, and the possible mineral processing area were identified to exceed the adopted site criteria. Table 4 below outlines the justification behind the identification of AECs that DP considers are currently active.

Table 4: Summary of Areas of Environmental Concern

AEC Description	Justification	Contaminants of Concern*	Comments
AEC 1: Mine Site 4	Identified area of former mining activities, including open pits, stockpiled spoil and open adit	Lead, cadmium copper, zinc, arsenic	Mine Site 4 was identified by Coffey (2010) as requiring remediation. The proposed remediation is understood to have consisted of capping the area with imported material. The SEMP prepared for the area by Coffey (2015) indicated that the capping layer had been installed. However, the site inspection by DP during this assessment indicated that it was likely that remediation works in this area of the site had not been undertaken. There was no evidence that a capping layer had been installed, the area appeared consistent with photos included in the Stage 3 assessment by Coffey (2010). DP understands that Coffey prepared a RAP for the main site area detailing the remediation actions required, however, this RAP was not made available to DP for review. Therefore, it is considered that the remediation in this area is outstanding.
AEC 2: Former Possible Mineral Processing Area	Identified area of former possible mineral processing	Arsenic, cadmium and zinc	Inspection of historical aerial photographs indicated that the buildings present within the mineral processing area were constructed between 1961 and 1973. The historical aerial photographs indicate the buildings were demolished prior to 1984. Given that mining activities were understood to have taken place between the 1850s and the early 1900s, it is considered unlikely that the remnant structures observed in this area were associated with mineral processing activities. Nevertheless, Coffey indicated that concentration of selected metals were above adopted site criteria in an area associated with 2 drainage sump structures and recommended that this contaminated be removed off-site with the demolition of those structures. Inspection by DP indicated that the condition of the area of the possible mineral processing area was similar to that encountered by Coffey in 2010 and that no evidence of any remediation works in the area was observed and the recommended remediation works in this area is considered to be outstanding.

AEC Description	Justification	Contaminants of Concern*	Comments
AEC 3: Former Sheep Dip	Sheep dip site.	Arsenic, organochlorine pesticides	DP understands that Coffey prepared a RAP for the sheep dip area. DP has not been provided with the RAP for review. However, the site inspection indicated that the sheep dip structure was still in place. Therefore, it is considered that the remediation works recommended in this area are outstanding.
AEC 4: Additional Identified Mine site	During the DP site inspection, an additional mine site comprising a shaft and stockpiled spoil was identified in the north-west of the site	Lead, copper, zinc, arsenic, chromium, cadmium, nickel, mercury, sulphate, acid generating potential, pH	During site the site inspection, an additional mine site consisting a shaft and quarry area were encountered in the north-west part of the site, within the Stage 1 development area. Review of the Coffey Stage 3 Contamination area indicates that no intrusive investigation was undertaken in this area of the site. Therefore, DP considers that the potential for contamination in this area of the site has not been adequately characterised and that further assessment of the additional mine site is required.
AEC 5: Mine Site 3	Identified area of former mining activities	Arsenic, cadmium, lead, copper and zinc	Mine Site 3 is located in the south-west of the site. DP understands that Coffey prepared a RAP for the main site area detailing the remediation actions required for Mine Site 3. However, this RAP was not made available to DP for review. It is understood that remediation was required in this area. Inspection of Mine Site 3 undertaken by DP indicated that no remediation activities had been undertaken in this area and as such remediation is considered to be outstanding. This area is within a deferred area, outside of the current development area and hasn't been considered further in this assessment. Should development within this deferred area of the site be proposed, further assessment and remediation must be undertaken.

Notes

* Contaminants of concern for AEC 1, AEC 2, AEC 3 and AEC 5 based on laboratory results from previous investigations where concentrations were above adopted site criteria

10. Conclusions and Recommendations

Following review of previous environmental reports, review of available site history and site inspections, several sources of contamination were identified. The sources of contamination were associated with mining activities and pastoral use of the site.

DP understands that RAPs have been prepared for the site to manage the identified contamination in the sheep dip area, Mine Site 3 and Mine Site 4. The findings of the Site Audit Report and Site Audit Statement indicated that subject to the implementation of the remediation outlined in the RAPs, the site would be suitable for the following uses:

- Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry;
- Day care centre, preschool, primary school;
- Secondary school; and
- Park, recreational open space, playing field.

Inspection of the site by DP indicated that remediation activities had not yet commenced at the site. The AECs previously identified during previous investigations were inspection during the site visit and were found to be in a condition similar to that reported previously. At the Mine Sites, mine shafts were still present and unsecured and remnant infrastructure was still in place at the sheep dip site and the possible mineral processing area.

Inspection of the site identified an additional possible mine site, located on the slopes of the ridge-line located in the north-west of the site. With the exception of this area, no additional AECs were identified during the site inspection.

10.1 Recommendations

Following review of the Stage 3 Contamination Assessment (Coffey, 2010) and the Site Audit Report (ES, 2010), and given that there is no evidence that the required remediation has been completed, DP generally agrees with the recommendations made by Coffey (2010), mainly:

- *Avoid residential development of these areas by revising the development plan for the site, or alternatively conduct a site specific health risk assessment to confirm the risk for residential development of these areas;*
- *Restriction of access to the Mine Site 3 and Mine Site 4 areas in the short term to avoid unhealthy exposures to metal concentrations in these areas, as well as unsafe conditions associated with mine shafts, adits and other structures;*
- *The removal or management of physical hazards (such as mine shafts or other structures) associated with these areas;*
- *Removal and landfill disposal (or on-site management) of stockpiles of rock and soils and other loose potentially contaminated materials in the Mine Site areas; and*
- *Implementation of a landscape cap and vegetation in Mine Site 3 and Mine Site 4, so that these areas may be incorporated into the development as open space areas with adequate stabilisation and barrier to direct contact with rock and soils.*

DP notes that RAPs have been prepared for site (sheep dip area and mining sites). Whilst not having reviewed these reports, DP recommends that these reports be reviewed prior to remediation activities commencing and where appropriate the recommendations of the RAPs should be implemented. In addition it is recommended that an accredited site auditor be appointed to review all relevant documentation including the RAPs and their subsequent implementation.

Further intrusive investigation is also recommended, including assessment of the additional mine site identified in the north-western part of the site to assess the impacts from potential contamination resulting from mining activities in the site.

11. References

1. Bureau of Mineral Resources (1992): *Geology of Canberra Geological Series Sheet 8727, 1:100 000 scale map.*
2. Bureau of Mineral Resources, Geology and Geophysics (1984): *Hydrogeology of the Australian Capital Territory and Environs* 1:100,000 scale map.
3. NSW Department of Land and Water Conservation (2000): *Canberra Soil Landscape Series Sheet 8727* 1:100 000 scale map.
4. Coffey Environments Pty Ltd (2010) Stage 3 *Contamination Assessment, Jumping Creek, Queanbeyan*, NSW (Report ref ENVICANB00233AA-R01b, dated 16 June 2010).
5. Environmental Strategies Pty Ltd (2010) *Site Audit Report, Jumping Creek, Queanbeyan, NSW* (Report ref 9014SAR145, dated 20 August 2010).
6. Environmental Strategies Pty Ltd (2010) NSW Site Auditor Scheme, Site Audit Statement for Jumping Creek Site (dated 25 August 2010).
7. Coffey Environments Pty Ltd (2015) *Jumping Creek Development – Site Environmental Management Plan, Mine Site Area 4* (Report ref ENAURHOD04744AA-R02, dated 2 November 2015).

12. Limitations

Douglas Partners (DP) has prepared this report for this project at Lot 5, DP1199045, Greenleigh, NSW in accordance with DP's proposal dated 11 April 2018 and acceptance received from Spacelab Studio Pty Ltd dated 25 May 2018. The work was carried out under the term and conditions of the sub-consultants agreement, dated August 2018. This report is provided for the exclusive use of Spacelab Studio Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological

processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

About This Report

About this Report

Douglas Partners

Introduction

This Report has been prepared by Douglas Partners Pty Ltd on behalf of and for the exclusive use of the Client, and is subject to and issued in accordance with the agreement between the Client and Douglas Partners Pty Ltd. This Report is not to be used by any other person or entity or for any other purpose. No parties other than the Client should rely upon the information contained in this Report without the prior written consent of Douglas Partners Pty Ltd. Douglas Partners Pty Ltd will not be liable to any unauthorised recipient of this Report.

Scope and Limitations

This Report has been prepared in accordance with the Client's brief and the agreed scope of work. Any findings, conclusions or recommendations only apply to the aforementioned project and are based on the assumptions made by Douglas Partners Pty Ltd. The Client should not rely on this Report if any of the assumptions made by Douglas Partners Pty Ltd are not correct.

This Report is based on the observations, findings and results of the investigation carried out by Douglas Partners Pty Ltd and is current as of the date of this Report. The scope of this Report does not include any assessment of the possible impact on the project of subsequent events or any changes in the site or its surrounds outside the site boundaries.

Reliance on Data

Douglas Partners Pty Ltd has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in this Report. Douglas Partners Pty Ltd has not verified the accuracy or completeness of the data and other information except to the extent stated in this Report. Douglas Partners Pty Ltd will not be liable in relation to incorrect conclusions or recommendations made by Douglas Partners Pty Ltd which are based on incorrect data or information that is not disclosed to Douglas Partners Pty Ltd.

Environmental Issues

Douglas Partners Pty Ltd has prepared this Report on the basis of investigations undertaken in accordance with the normal standards of the environmental consulting profession. No investigation undertaken can identify all aspects of a site and its surrounds due to the limitations of investigation programs and the inherent variability of environmental conditions. Douglas Partners Pty Ltd will not be liable to parties other than the Client for any matters arising from undisclosed or unidentified environmental issues.

Groundwater

Where groundwater has been encountered, Douglas Partners Pty Ltd has made comments on groundwater conditions based on its observations and experience. Unless otherwise stated, these comments are not based on any groundwater monitoring program. Douglas Partners Pty Ltd will not be liable for any claims relating to groundwater which are not based on groundwater monitoring data.

Interpretation of Data

- Douglas Partners Pty Ltd has made interpretations of data and other information provided by the Client and other individuals and organisations, most of which are referred to in this Report. Douglas Partners Pty Ltd will not be liable for any claims relating to interpretations of data and other information which are not based on data and information that is not disclosed to Douglas Partners Pty Ltd.
- Any interpretations of data and other information provided by Douglas Partners Pty Ltd are not to be relied upon by any other person or entity for any other purpose. No parties other than the Client should rely upon the interpretations of data and other information provided by Douglas Partners Pty Ltd without the prior written consent of Douglas Partners Pty Ltd. Douglas Partners Pty Ltd will not be liable to any unauthorised recipient of this Report.
- Douglas Partners Pty Ltd has made interpretations of data and other information provided by the Client and other individuals and organisations, most of which are referred to in this Report. Douglas Partners Pty Ltd will not be liable for any claims relating to interpretations of data and other information which are not based on data and information that is not disclosed to Douglas Partners Pty Ltd.

Misinterpretation of Report

Misinterpretation of this Report by other design and construction professionals can lead to inappropriate design and construction. Douglas Partners Pty Ltd will not be liable for any claims relating to misinterpretation of this Report.

Other Issues

Douglas Partners Pty Ltd has prepared this Report on the basis of investigations undertaken in accordance with the normal standards of the environmental consulting profession. No investigation undertaken can identify all aspects of a site and its surrounds due to the limitations of investigation programs and the inherent variability of environmental conditions. Douglas Partners Pty Ltd will not be liable to parties other than the Client for any matters arising from undisclosed or unidentified environmental issues.

Douglas Partners Pty Ltd has prepared this Report on the basis of investigations undertaken in accordance with the normal standards of the environmental consulting profession. No investigation undertaken can identify all aspects of a site and its surrounds due to the limitations of investigation programs and the inherent variability of environmental conditions. Douglas Partners Pty Ltd will not be liable to parties other than the Client for any matters arising from undisclosed or unidentified environmental issues.

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About this Report

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Appendix B

Drawings

Sheep Dip

Ellerton Drive

Mine Site 1

Unnamed Tributary

Unnamed Tributary

Queanbeyan River

Additional Mine Site

Valley Creek

Stockpile Containing Asbestos Material

Mineral Processing Area/Stockpile Area

Valley Creek

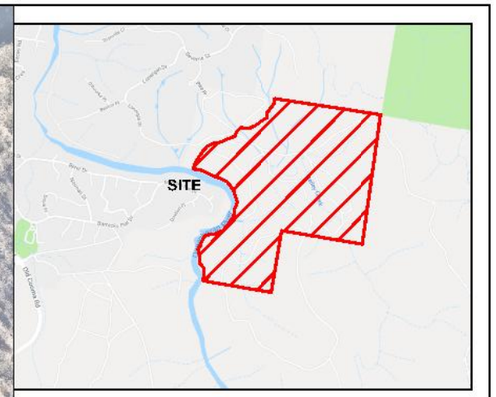
Kiln

Mine Site 4

Limestone Quarry

Queanbeyan River

Mine Site 3



Locality Plan

LEGEND

- Approximate Site Boundary
- Approximate Tributary Lines
- Approximate Mine Site Area
- Approximate Limestone Quarry Area
- Approximate Kiln Location
- Approximate Sheep Dip Location
- Approximate Stockpile with ACM Location

0 50 100 150 200 250

1:5000 @ A3

NOTE: Base drawing from nearmap.com.au (Dated 18 July 2018)

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Spacelab Studio Pty Ltd		TITLE: **Site Features Plan**
OFFICE: Canberra	DRAWN BY: SDG	**Jumping Creek Estate**
SCALE: As Shown	DATE: 21.03.2019	**Lot 5, DP1199045, Greenleigh**

N

PROJECT No:	88224.03
DRAWING No:	1
REVISION:	1

Sheep Dip

Ellerton Drive

Unnamed Tributary

Mine Site 1

Queanbeyan River

Additional Mine Site

Valley Creek

Stockpile Containing Asbestos Material

Mineral Processing Area/Stockpile Area

Valley Creek

Kiln

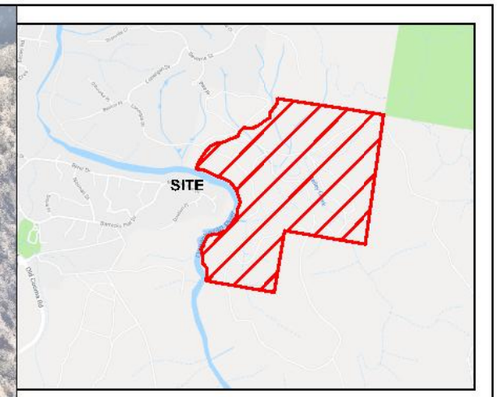
Mine Site 4

Valley Creek

Limestone Quarry

Mine Site 3

Queanbeyan River



Locality Plan

LEGEND

- Approximate Site Boundary
- Approximate Tributary Lines
- Approximate Mine Site Area
- Approximate Limestone Quarry Area
- Approximate Kiln Location
- Approximate Sheep Dip Location
- Approximate Stockpile with ACM Location

0 50 100 150 200 250

1:5000 @ A3

NOTE: Base drawing from nearmap.com.au (Dated 18 July 2018)

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Spacelab Studio Pty Ltd		
OFFICE: Canberra	DRAWN BY: SDG	
SCALE: As Shown	DATE: 21.03.2019	

TITLE: **Proposed Estate Development Plan**
Jumping Creek Estate
Lot 5, DP1199045, Greenleigh

N

PROJECT No:	88224.03
DRAWING No:	2
REVISION:	1

Appendix C

Site History Searches

Queanbeyan City Council

Queanbeyan Local Environmental Plan 2012

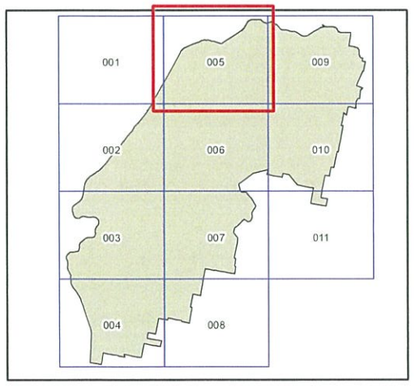
Land Zoning Map - Sheet LZN_005

Zone

- B1 Neighbourhood Centre
- B2 Local Centre
- B3 Commercial Core
- B4 Mixed Use
- B5 Business Development
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- IN1 General Industrial
- IN2 Light Industrial
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R4 High Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- SP1 Special Activities
- SP2 Infrastructure
- W1 Natural Waterways
- DM Deferred Matter

Cadastre

Cadastre 29/08/18 © Spatial Services



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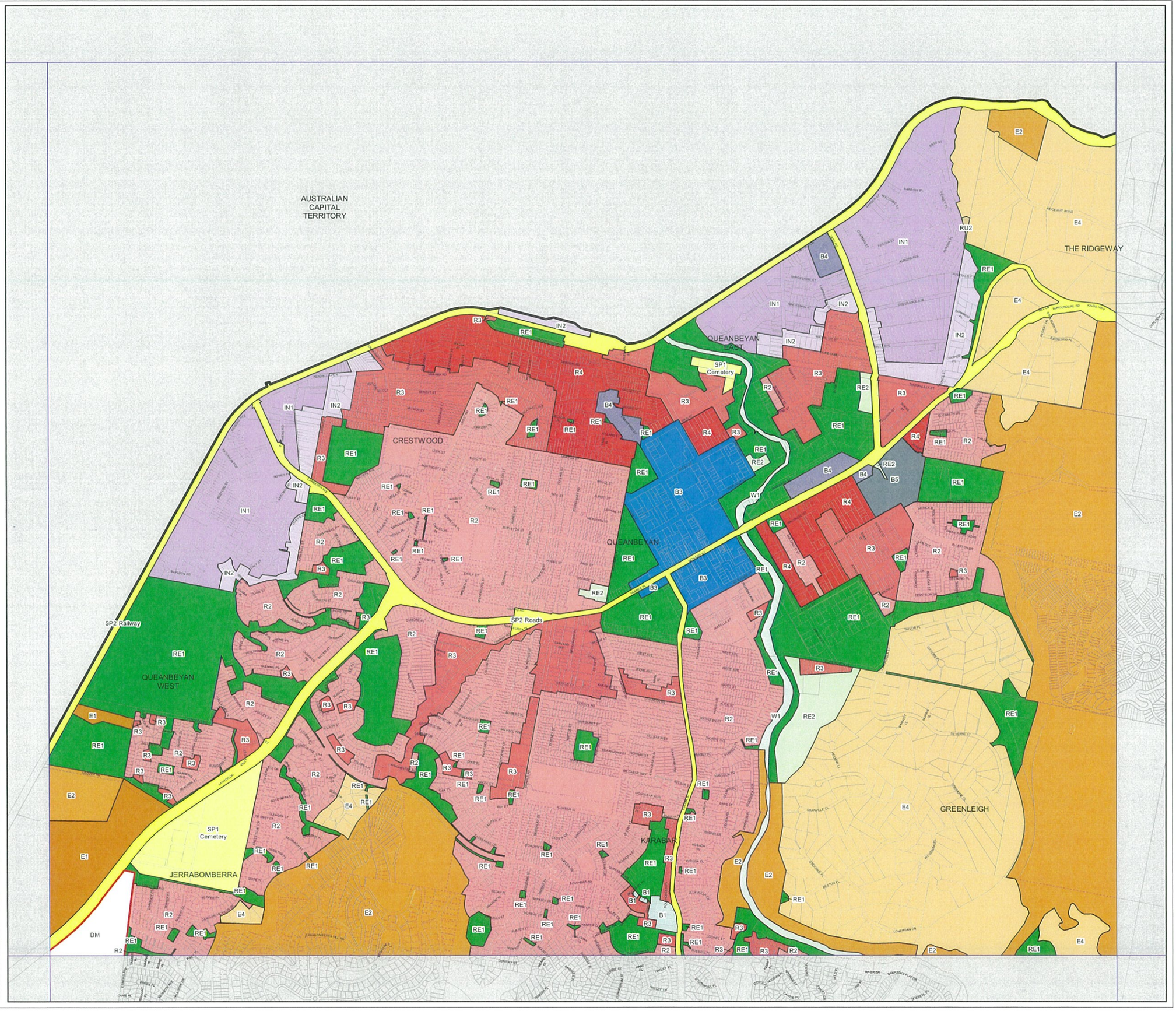


Queanbeyan City Council

Queanbeyan Local Environmental Plan 2012

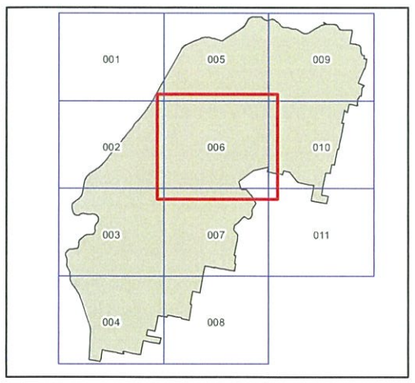
Land Zoning Map - Sheet LZN_006

Zone

B1	Neighbourhood Centre
B2	Local Centre
B3	Commercial Core
B4	Mixed Use
B5	Business Development
E1	National Parks and Nature Reserves
E2	Environmental Conservation
E3	Environmental Management
E4	Environmental Living
IN1	General Industrial
IN2	Light Industrial
R1	General Residential
R2	Low Density Residential
R3	Medium Density Residential
R4	High Density Residential
R5	Large Lot Residential
RE1	Public Recreation
RE2	Private Recreation
RU2	Rural Landscape
SP1	Special Activities
SP2	Infrastructure
W1	Natural Waterways
DM	Deferred Matter

Cadastre

Cadastre 29/08/18 © Spatial Services



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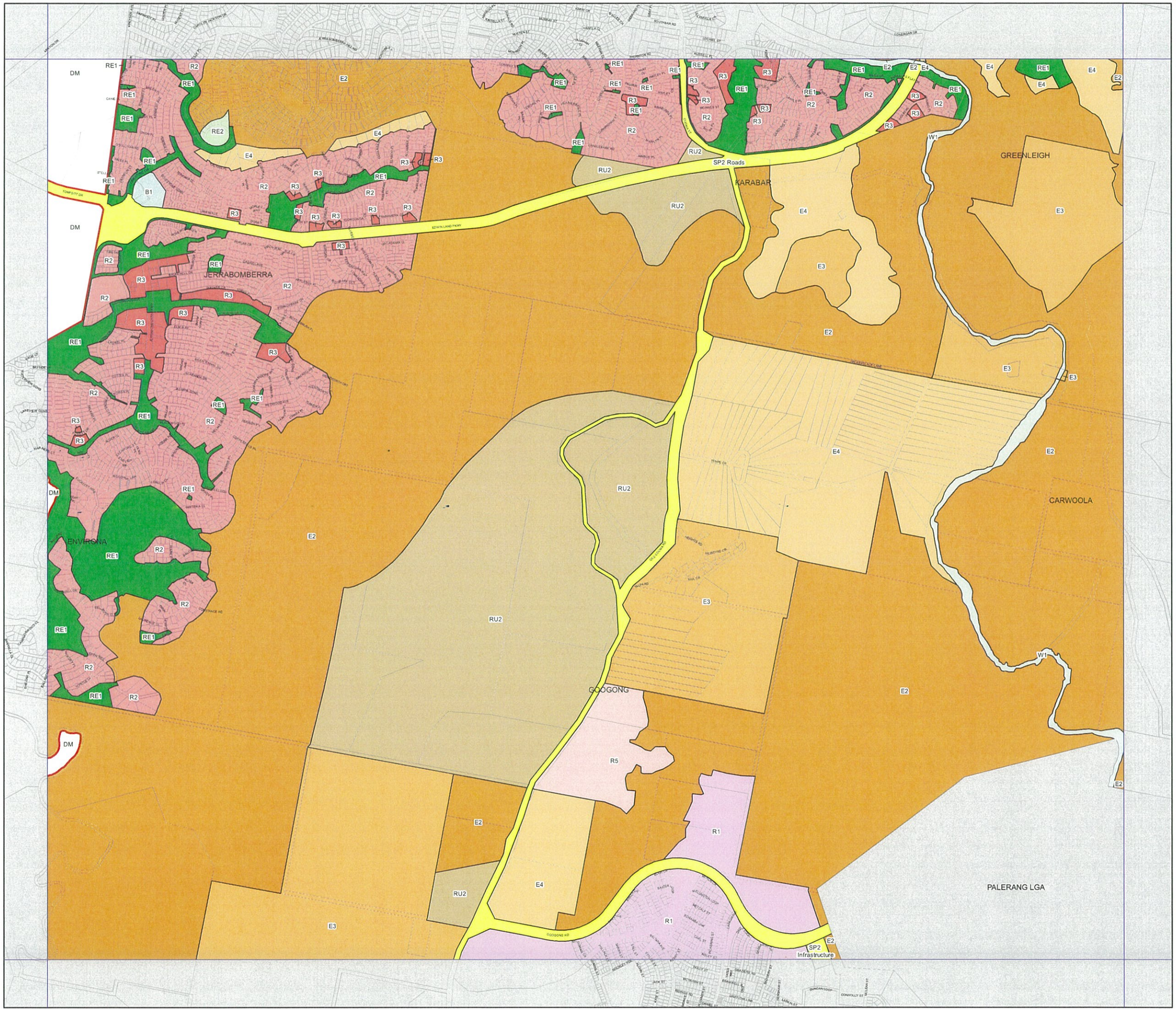


Queanbeyan City Council

Queanbeyan Local Environmental Plan 2012

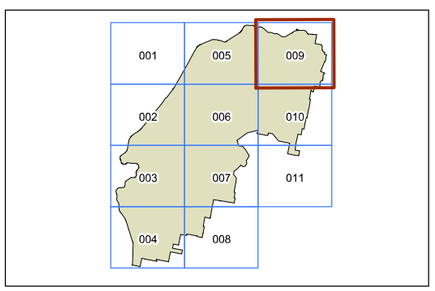
Land Zoning Map - Sheet LZN_009

Zone

- B1 Neighbourhood Centre
- B2 Local Centre
- B3 Commercial Core
- B4 Mixed Use
- B5 Business Development
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- IN1 General Industrial
- IN2 Light Industrial
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R4 High Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- SP1 Special Activities
- SP2 Infrastructure
- W1 Natural Waterways
- DM Deferred Matter

Cadastre

Cadastre 01/08/2015 © Land and Property Information (LPI)



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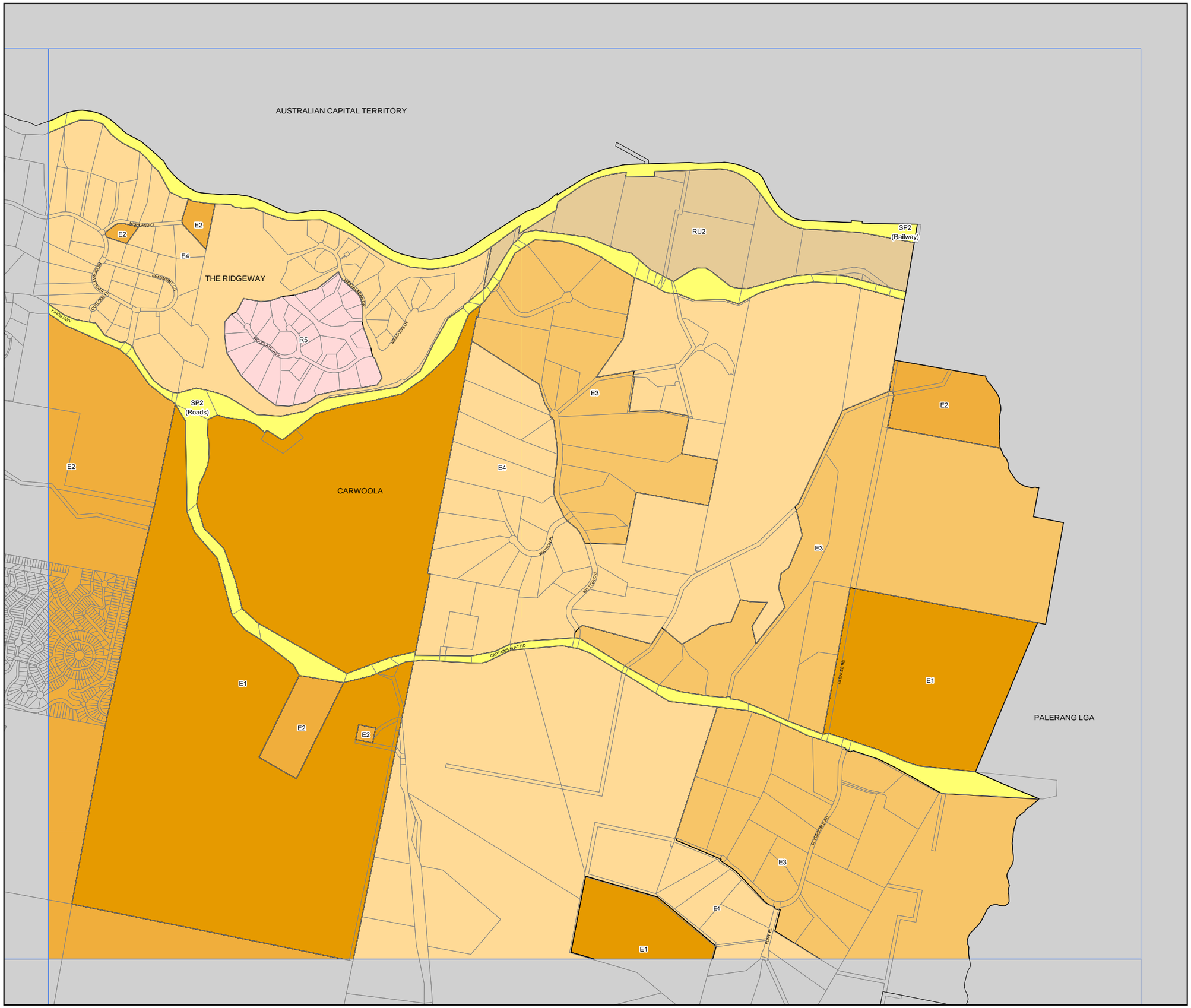


Queanbeyan City Council

Queanbeyan Local Environmental Plan 2012

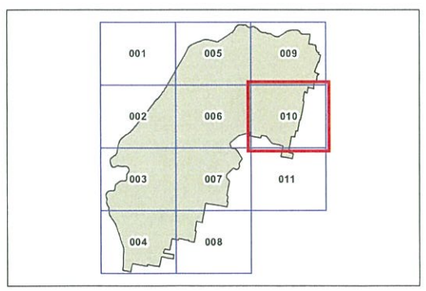
Land Zoning Map - Sheet LZN_010

Zone

- B1 Neighbourhood Centre
- B2 Local Centre
- B3 Commercial Core
- B4 Mixed Use
- B5 Business Development
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- IN1 General Industrial
- IN2 Light Industrial
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R4 High Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- SP1 Special Activities
- SP2 Infrastructure
- W1 Natural Waterways
- DM Deferred Matter

Cadastre

Cadastre 06/06/2012 © Land and Property Information (LPI)



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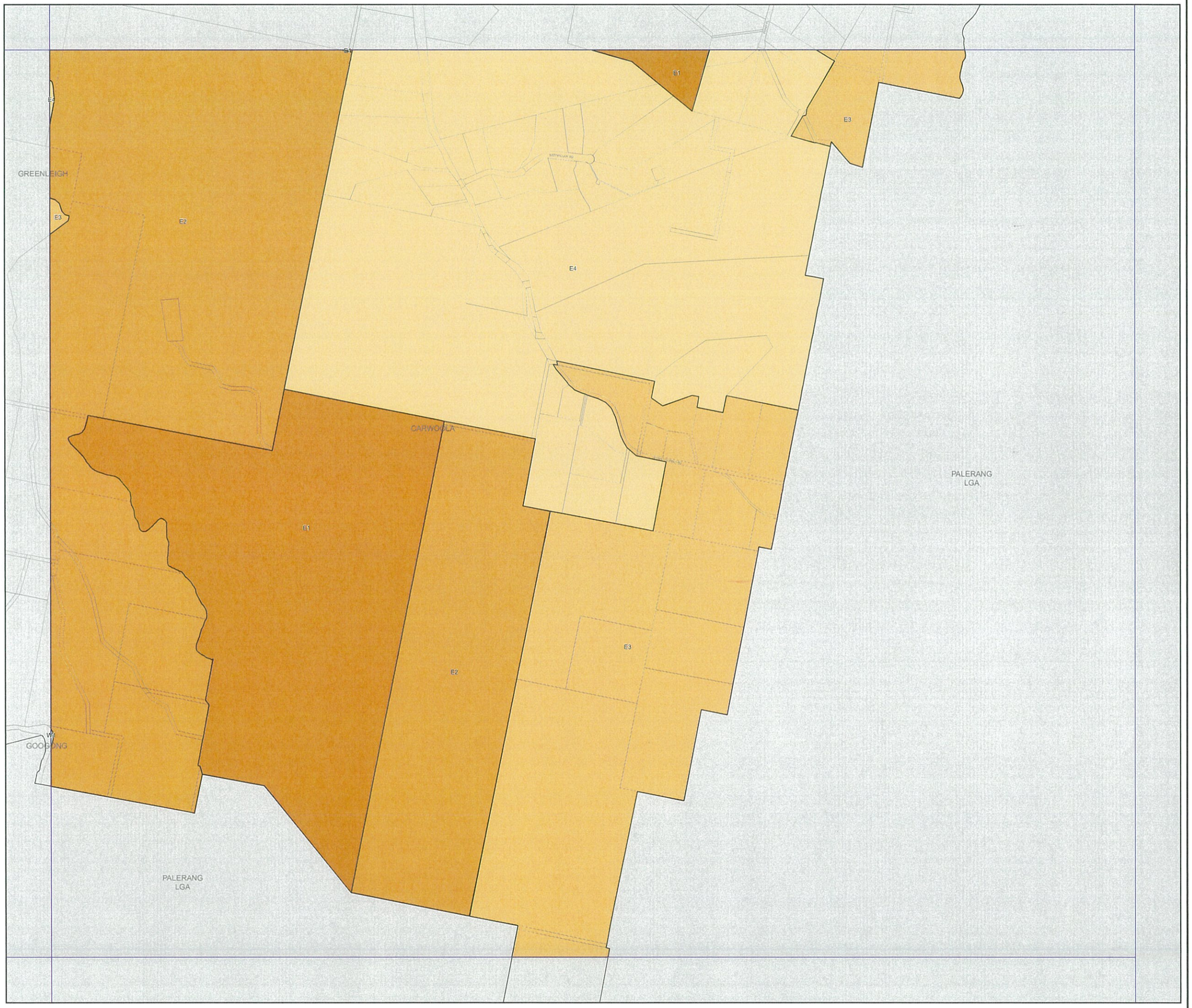

List of NSW Contaminated Sites Notified to EPA as of 2 August 2018

Background

A strategy to systematically assess, prioritise and respond to notifications under Section 60 of the *Contaminated Land Management Act 1997* (CLM Act) has been developed by the EPA. This strategy acknowledges the EPA's obligations to make information available to the public under *Government Information (Public Access) Act 2009*.

When a site is notified to the EPA, it may be accompanied by detailed site reports where the owner has been proactive in addressing the contamination and its source. However, often there is minimal information on the nature or extent of the contamination.

For some notifications, the information indicates the contamination is securely immobilised within the site, such as under a building or carpark, and is not currently causing any offsite consequences to the community or environment. Such sites would still need to be cleaned up, but this could be done in conjunction with any subsequent building or redevelopment of the land. These sites may not require intervention under the CLM Act, but could be dealt with through the planning and development consent process.

Where indications are that the nominated site is causing actual harm to the environment or an unacceptable offsite impact (i.e. it is a "significantly contaminated site"), the EPA would apply the regulatory provisions of the CLM Act to have the responsible polluter and/or landowner investigate and remediate the site.

As such, the sites notified to the EPA and presented in the following table are at various stages of the assessment and/or remediation process. Understanding the nature of the underlying contamination, its implications and implementing a remediation program where required, can take a considerable period of time. The tables provide an indication, in relation to each nominated site, as to the management status of that particular site. Further detailed information may be available from the EPA or the responsible landowner.

The following questions and answers may assist those interested in this issue:

Frequently asked questions

What is the difference between the "List of NSW Contaminated Sites Notified to the EPA" and the "Contaminated Land: Record of Notices"?

A site will be on the Contaminated Land: Record of Notices only if the EPA has issued a regulatory notice in relation to the site under the *Contaminated Land Management Act 1997*.

The sites appearing on this "List of NSW contaminated sites notified to the EPA" indicate that the notifiers consider that the sites are contaminated and warrant reporting to the EPA. However, the contamination may or may not be significant enough to warrant regulation by the EPA. The EPA needs to review and, if necessary, obtain more information before it can make a determination as to whether the site warrants regulation.

Why my site appears on the list?

Your site appears on the list because of one or more of the following reasons:

- The site owner and/or the person partly or fully responsible for causing the contamination notified to the EPA about the contamination under Section 60 of the *Contaminated Land Management Act 1997*. In other words, the site owner or the "polluter" believes the site is contaminated.
- The EPA has been notified via other means and is satisfied that the site is or was contaminated.

Does the list contain all contaminated sites in NSW?

No. The list only contains contaminated sites that the EPA is aware of, with regard to its regulatory role under the CLM Act. An absence of a site from the list does not necessarily imply the site is not contaminated.

The EPA relies upon responsible parties to notify contaminated sites.

How are these notified contaminated sites managed by the EPA?

There are different ways that the EPA manages these notified contaminated sites. First, an initial assessment is carried out by the EPA. At the completion of the initial assessment, the EPA may take one or more than one of the following management approaches:

- The contamination warrants the EPA's direct regulatory intervention either under the *Contaminated Land Management Act 1997* or the *Protection of the Environment Operations Act 1997* (POEO Act), or both. Information about current or past regulatory action on this site can be found on EPA website.
- The contamination with respect to the current use or approved use of the site, as defined under the *Contaminated Land Management Act 1997,* is not significant enough that it warrants EPA regulation.
- The contamination does not require EPA regulation and can be managed by a planning approval process.
- The contamination is related to an operational Underground Petroleum Storage System, such as a service station or fuel depot. The contamination may be managed under the POEO Act and the Protection of the Environment Operation (Underground Petroleum Storage Systems) Regulation 2014.
- The contamination is being managed under a specifically tailored program operated by another agency (for example t
- he Department of Industry and Investment's *Derelict Mines Program*).

I am the owner of a site that appears on the list. What should I do?

First of all, you should ensure the current use of the site is compatible with the site contamination. Secondly, if the site is the subject of EPA regulation, make sure you comply with the regulatory requirements, and you have considered your obligations to notify other parties who may be affected.

If you have any concerns, contact us and we may be able to offer you general advice, or direct you to accredited professionals who can assist with specific issues.

I am a prospective buyer of a site that appears on the list. What should I do?

You should seek advice from the vendor to put the contamination issue into perspective. You may need to seek independent expert advice.

The information provided in the list is meant to be indicative only, and a starting point for your own assessment. Site contamination as a legacy of past site uses is not uncommon,

particularly in an urbanised environment. If the contamination on a site is properly remediated or managed, it may not materially impact upon the intended future use of the site. However, each site needs to be considered in context.

List of NSW Contaminated Sites Notified to the EPA

Disclaimer

The EPA has taken all reasonable care to ensure that the information in the list of contaminated sites notified to the EPA (the list) is complete and correct. The EPA does not, however, warrant or represent that the list is free from errors or omissions or that it is exhaustive.

The EPA may, without notice, change any or all of the information in the list at any time.

You should obtain independent advice before you make any decision based on the information in the list.

The list is made available on the understanding that the EPA, its servants and agents, to the extent permitted by law, accept no responsibility for any damage, cost, loss or expense incurred by you as a result of:

1. any information in the list; or
2. any error, omission or misrepresentation in the list; or
3. any malfunction or failure to function of the list;
4. without limiting (2) or (3) above, any delay, failure or error in recording, displaying or updating information.

Site Status	Explanation
Under assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or *Protection of the Environment Operations Act 1997*. Alternatively, the EPA may require information via a notice issued under s77 of the *Contaminated Land Management Act 1997* or issue a Preliminary Investigation Order.
Regulation under CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the *Contaminated Land Management Act 1997* is not required.
Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the *Contaminated Land Management Act 1997*. A regulatory approach is being finalised.

Contamination currently regulated under CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the *Contaminated Land Management Act 1997* (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's Contaminated Land Public Record.
Contamination currently regulated under POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Management of the contamination is regulated under the *Protection of the Environment Operations Act 1997* (POEO Act). The EPA's regulatory actions under the POEO Act are available on the POEO public register.
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the *Environmental Planning and Assessment Act 1979* (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the *Contaminated Land Management Act 1997* (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed under the *Protection of the Environment Operations Act 1997* (POEO Act).
Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the *Environmental Planning and Assessment Act 1979* (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the *Contaminated Land Management Act 1997* (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's Contaminated Land Public Record.

Suburb	Site Name	Site Address	Contamination Activity Type	EPA ManagementcClass	Latitude	Longitude
COOTAMUNDRA	Former BP Depot	1-5 Murray STREET	Other Petroleum	Regulation under CLM Act not required	-34.62915841	148.0306962
COOTAMUNDRA	Caltex Service Station	26-34 Hovell STREET	Service Station	Regulation under CLM Act not required	-34.63624703	148.0347479
COOTAMUNDRA	Former Caltex Depot	219 Sutton STREET	Other Petroleum	Regulation under CLM Act not required	-34.65126548	148.0145283
COOTAMUNDRA	Former Ampol Service Station	72 Parker STREET	Service Station	Regulation under CLM Act not required	-34.63471008	148.0296112
COOTAMUNDRA	Former Ampol Cootamundra Rail Siding	Back Brawlin	Other Petroleum	Under assessment	-34.65326425	148.0143068
CORAMBA	Martin Street	End of Martin Street and adjacent car park OTHER	Service Station	Ongoing maintenance required to manage residual contamination	-30.22125208	153.0156997
COROWA	Corowa Shire Council Works Depot	24 Poseidon ROAD	Other Petroleum	Regulation under CLM Act not required	-35.98807923	146.3652266
COROWA	Former Ampol Corowa	10 Bow STREET	Service Station	Regulation under CLM Act not required	-35.99364786	146.3901259
COROWA	Cignall Corowa	280 Hume STREET	Service Station	Under assessment	-36.00996015	146.3760437
CORRIMAL	7-Eleven Corrimal	138-146 Princes HIGHWAY	Service Station	Regulation under CLM Act not required	-34.36986923	150.8978271
CORRIMAL	Woolworths Petrol - Corrimal	275-277 Princes HIGHWAY	Service Station	Under assessment	-34.37527426	150.8962637
COWRA	Former Gasworks	30 Brougham STREET	Gasworks	Contamination currently regulated under CLM Act	-33.8389659	148.6963482
COWRA	Shell Depot	34 Brougham STREET	Other Petroleum	Contamination formerly regulated under the CLM Act	-33.83932421	148.6976295
COWRA	Landmark Fertiliser Storage Facility	Corner Young Road & Waratah STREET	Chemical Industry	Regulation under CLM Act not required	-33.84321832	148.6722578
COWRA	Lowes Petroleum (former BP Cowra Depot)	12 Campbell STREET	Other Petroleum	Regulation under CLM Act not required	-33.83803706	148.6977873
CRANGAN BAY	Big T Road House.	555 and 565 Pacific HIGHWAY	Service Station	Contamination currently regulated under CLM Act	-33.17326538	151.6083864
CREMORNE	Shell Coles Express Service Station	225 Military ROAD	Service Station	Regulation under CLM Act not required	-33.83063306	151.226223
CRESTWOOD	Former Caltex Depot Queanbeyan	36 Kendall (Cnr Stephens Rd) AVENUE	Other Petroleum	Regulation under CLM Act not required	-35.34615546	149.207807
CRESTWOOD	Former BP Queanbeyan	64 Uriarra ROAD	Service Station	Regulation under CLM Act not required	-35.34646177	149.2246263
CROA	Breen Holdings	Bate Bay ROAD	Other Industry	Regulation under CLM Act not required	-34.03861737	151.1614114
CROWS NEST	Caltex Service Station	111-121 Falcon STREET	Service Station	Regulation under CLM Act not required	-33.82868236	151.2060317
CROYDON	Caltex Service Station	404-410 Liverpool ROAD	Service Station	Regulation under CLM Act not required	-33.88853994	151.115879
CROYDON	BP Ashfield	582-586 Parramatta ROAD	Service Station	Under assessment	-33.87399409	151.1267296
CROYDON PARK	Mobil Service Station	334 Georges River ROAD	Service Station	Regulation under CLM Act not required	-33.89771626	151.0999194

Suburb	Site Name	Site Address	Contamination Activity Type	EPA ManagementcClass	Latitude	Longitude
PYMBLE	Shell Coles Express Service Station	21 Ryde ROAD	Service Station	Regulation under CLM Act not required	-33.75198512	151.1438115
PYMBLE	Pymble West Dry Cleaners	6 Philip MALL	Other Industry	Under assessment	-33.76109009	151.1284329
PYRMONT	Former Council Works Depot (Fig and Wattle Depot)	14-26 Wattle STREET	Other Industry	Under assessment	-33.8752655	151.1942645
QUAKERS HILL	7-Eleven (former Mobil) Service Station	83 Lalor ROAD	Service Station	Regulation under CLM Act not required	-33.72759077	150.8966764
QUAKERS HILL	BP Branded Parkway (Former Caltex) Service Station Quakers Hill	450 Quakers Hill PARKWAY	Service Station	Regulation under CLM Act not required	-33.72998613	150.9023617
QUEANBEYAN	Former Mobil Service Station	153 Uriarra ROAD	Service Station	Regulation under CLM Act not required	-35.34425514	149.2148687
QUEANBEYAN	Bill Lilley Automotive	169 Crawford STREET	Service Station	Regulation under CLM Act not required	-35.35138121	149.232486
QUEANBEYAN	Woolworths Queanbeyan Service Station	196 Crawford (Cnr Morisset St) STREET	Service Station	Regulation under CLM Act not required	-35.35163055	149.2335759
QUEANBEYAN	Caltex Queanbeyan Service Station	88 Macquoid (also known as Bungendore Rd) STREET	Service Station	Regulation under CLM Act not required	-35.34930535	149.2438607
QUEANBEYAN	Former Mobil Emoleum Depot	109-111 High STREET	Other Petroleum	Regulation under CLM Act not required	-35.3396115	149.237556
QUEANBEYAN	Former Caltex Depot	20-30 Railway STREET	Other Petroleum	Regulation under CLM Act not required	-35.34523	149.22333
QUEANBEYAN EAST	BP-Branded Service Station Queanbeyan	50 Yass ROAD	Service Station	Regulation under CLM Act not required	-35.34126641	149.2445103
QUEANBEYAN WEST	Caltex Service Station	Lanyon Dr Cnr Mccrae St (1 Suraci Place) STREET	Service Station	Regulation under CLM Act not required	-35.36372923	149.2067531
QUIRINDI	Former Mobil Depot Quirindi	4-6 Cross STREET	Other Petroleum	Regulation under CLM Act not required	-31.49903355	150.681972
QUIRINDI	Caltex Service Station, Quirindi	199-201 George STREET	Service Station	Regulation under CLM Act not required	-31.50654793	150.6803589
QUIRINDI	Tamarang Servicentre Quirindi	113-117 Station STREET	Service Station	Under assessment	-31.50179204	150.6814611
RAMSGATE	Shell Coles Express Service Station	Grand Parade cnr Ramsgate ROAD	Service Station	Regulation under CLM Act not required	-33.98537988	151.1471234
RANDWICK	7-Eleven Service Station	126-130 Barker STREET		Contamination currently regulated under CLM Act	-33.92096152	151.2355927
RANDWICK	Service Station	33-37 Carrington Road cnr Albion STREET	Service Station	Contamination currently regulated under CLM Act	-33.90655015	151.2525065
RANDWICK	Service Station, Randwick	33-37 Carrington ROAD	Service Station	Contamination currently regulated under CLM Act	-33.90655015	151.2525065
RANDWICK	Caltex Service Station	2 Alison ROAD	Service Station	Regulation under CLM Act not required	-33.9065752	151.2320697
RANDWICK	Metro Petroleum	345 Avoca STREET	Service Station	Regulation under CLM Act not required	-33.92544832	151.2396799
RAVENSWORTH	Ravensworth Operations Narama Mine	Lemington ROAD	Other Industry	Regulation under CLM Act not required	-32.47115903	151.0359579
RAVENSWORTH	Cumnock Colliery	Pikes Gully ROAD	Other Industry	Regulation under CLM Act not required	-32.40218281	150.9960082

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State Overview
State Overview

Rivers and Streams
favourites · search · download sites · find a site
Real Time Data - Rivers And Streams

Daily River Reports
Daily River Reports

Dams
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Real Time Data - Major Dams

Groundwater (Telemetered data)
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Real Time Data - Bores

All Groundwater Site details
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All Groundwater Map
North Coast Region
Hunter Region
Greater Sydney Region
South Coast Region
Northwest Region
Central West Region
Southwest Region
Upper Murray River Basin
Murray River Basin
Murrumbidgee River Basin
Lake George Basin
Benanee River Basin
Far West Region
Great Artesian Basin
Coal Basins

Meteorology
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Real Time Data - Weather Stations

Hunter Integrated Telemetry System
Hunter Integrated Telemetry System

bandwidth high low

glossary and metadata

contact WaterNSW

Murrumbidgee River Basin

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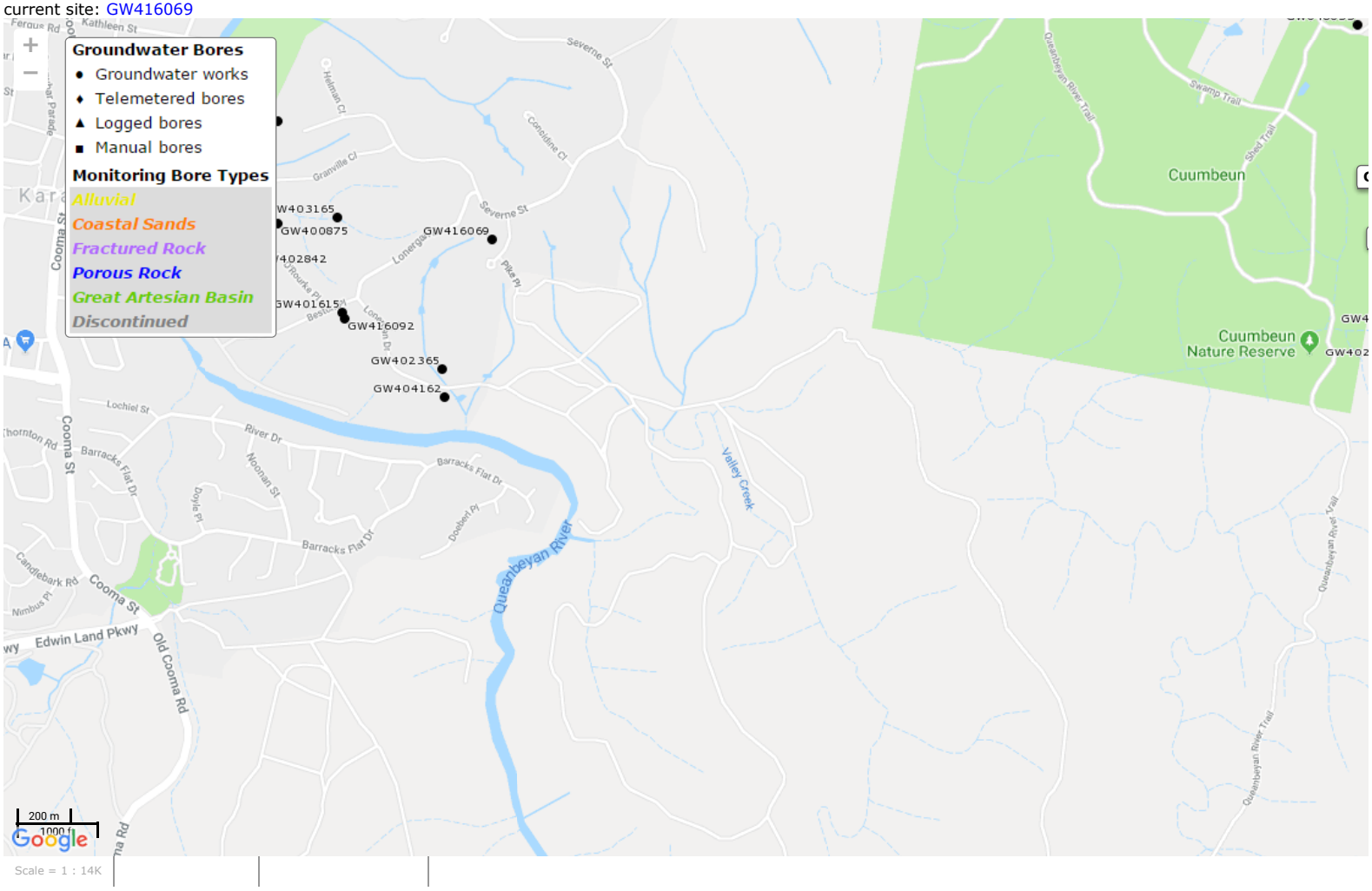
All data times are Eastern Standard Time

Map

current site: GW416069



NSW Office of Water
Work Summary

GW400875

Licence: 40BL186654 **Licence Status:** CONVERTED

Authorised Purpose(s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status:
Construct.Method:
Owner Type:

Commenced Date:
Completion Date: 30/07/1997
Final Depth: 36.60 m
Drilled Depth: 36.60 m

Contractor Name: Bungendore Water Bores
Driller:
Assistant Driller:

Property: N/A
GWMA: -
GW Zone: -
Standing Water Level: 16.000
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	MURRA	MURRA.042	LT 155 DP 713859
Licensed:	MURRAY	QUEANBEYAN	Whole Lot 155//713859

Region: 40 - Murrumbidgee
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6083900.0
Easting: 703588.0
Latitude: 35°22'02.9"S
Longitude: 149°14'27.4"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	36.60	200			Unknown
1	1	Casing	Pvc Class 9	0.00	36.60	150			

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
24.39	25.91	1.52	Unknown	16.00		0.25			
32.01	33.53	1.52	Unknown	16.00		1.01	33.53		

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Fill loose shale	Fill	
1.00	9.00	8.00	Decomposed yellow shale	Invalid Code	

9.00	21.00	12.00	Soft fractured shale	Invalid Code	
21.00	36.00	15.00	Black shale	Invalid Code	

Remarks

***** End of GW400875 *****

NSW Office of Water
Work Summary

GW401615

Licence: 40BL188080 **Licence Status:** CONVERTED

Authorised Purpose(s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status:
Construct.Method: Rotary Air
Owner Type:

Commenced Date:
Completion Date: 06/12/2000
Final Depth: 73.00 m
Drilled Depth: 73.00 m

Contractor Name: J & L Drilling Pty Ltd
Driller: Leon Thomas Sharp
Assistant Driller:

Property: LOT 139 8 BESTON PLACE GREENLEIGH ESTATE QUEANBEYAN 2620
Standing Water Level: 41.000
GWMA: -
GW Zone: -
Salinity:
Yield: 0.200

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	MURRA	MURRA.042	LOT139 DP713859
Licensed:	MURRAY	QUEANBEYAN	Whole Lot 139//713859

Region: 40 - Murrumbidgee
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6083609.0
Easting: 703788.0
Latitude: 35°22'12.2"S
Longitude: 149°14'35.5"E

GS Map: -
MGA Zone: 0
Coordinate Source: Map Interpretation

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	73.00	203			Rotary Air
1	1	Casing	Pvc Class 9	-1.00	73.00	139	125		Glued
1	1	Opening	Slots - Vertical	55.00	61.00	139		1	PVC Class 9, SL: 200.0mm, A: 3.00mm
1	1	Opening	Slots - Vertical	67.00	73.00	139		1	PVC Class 9, SL: 200.0mm, A: 3.00mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
55.00	55.20	0.20	Unknown	41.00			56.00	02:00:00	
68.00	68.50	0.50	Unknown			0.20	71.00	02:00:00	

Geologists Log
Drillers Log

From	To	Thickness	Drillers Description	Geological Material	Comments

(m)	(m)	(m)			
0.00	13.00	13.00	SHALE, YELLOW	Shale	
13.00	73.00	60.00	SHALE, GREY	Shale	

Remarks

***** End of GW401615 *****

NSW Office of Water
Work Summary

GW402365

Licence: 40BL189463
Licence Status: CONVERTED

Authorised Purpose(s): DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status:
Construct.Method: Rotary - Percussion (Down Hole Hammer)
Owner Type:

Commenced Date:
Completion Date: 21/05/2003
Final Depth: 79.00 m
Drilled Depth: 79.00 m

Contractor Name: Central West Water Drillers
Driller: Michael Patrick O'neill
Assistant Driller:

Property: N/A 22 LONERGAN DRIVE QUEANBEYAN 2620
GWMA: -
GW Zone: -
Standing Water Level: 18.000
Salinity:
Yield: 2.750

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	MURRA	MURRA.042	LT127 DP709217
Licensed:	MURRAY	QUEANBEYAN	Whole Lot 127//709217

Region: 40 - Murrumbidgee
River Basin: - Unknown
Area/District:
CMA Map: 8727-3N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: (Unknown)
Northing: 6083419.0
Easting: 704101.0
Latitude: 35°22'18.1"S
Longitude: 149°14'48.1"E

GS Map: -
MGA Zone: 0
Coordinate Source: Map Interpretation

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	79.00	175			Rotary - Percussion (Down Hole Hammer)
1	1	Casing	Pvc Class 9	-0.30	79.00	139	125		Driven into Hole, Riveted
1	1	Opening	Slots - Vertical	30.00	42.00	139		1	Casing - Hand Sawn Slot, PVC Class 9, SL: 200.0mm, A: 2.00mm
1	1	Opening	Slots - Vertical	54.00	72.00	139		1	Casing - Hand Sawn Slot, PVC Class 9, SL: 200.0mm, A: 2.00mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
34.00	35.00	1.00	Unknown	18.00		0.25			
55.00	56.00	1.00	Unknown	18.00		0.50			
66.00	70.00	4.00	Unknown	18.00		2.00			

Geologists Log

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	6.00	6.00	Shale, yellow	Shale	
6.00	20.00	14.00	Shale, grey	Shale	
20.00	44.00	24.00	Shale, black	Shale	
44.00	60.00	16.00	Shale, green	Shale	
60.00	79.00	19.00	Shale, black	Shale	

Remarks

21/05/2003: Form A Remarks:
Sump installed from 70 metres to 79 metres.

***** End of GW402365 *****

NSW Office of Water
Work Summary

GW402771

Licence: 40BL189608
Licence Status: CONVERTED
Authorised Purpose(s): DOMESTIC
Intended Purpose(s):

Work Type: Bore
Work Status:
Construct.Method:
Owner Type:

Commenced Date:
Completion Date: 03/10/2003
Final Depth: 66.00 m
Drilled Depth: 66.00 m

Contractor Name: Bungendore Water Bores
Driller: Daniel Robert Hill
Assistant Driller:

Property: N/A 9 O ROURKE PLACE QUEANBEYAN 2620
Standing Water Level: 22.000
GWMA: -
Salinity:
GW Zone: -
Yield: 1.063

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	MURRA	MURRA.42	LT153 DP713859
Licensed:	MURRAY	QUEANBEYAN	Whole Lot 153//713859

Region: 40 - Murrumbidgee
CMA Map: 8727-3N
River Basin: - Unknown
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: (Unknown)
Northing: 6083848.0
Easting: 703503.0
Latitude: 35°22'04.6"S
Longitude: 149°14'24.0"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unidentified Location

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	66.00	200			Rotary - Air/Foam
1		Annulus	Waterworn/Rounded	0.00	66.00				Q:1.500m3
1	1	Casing	Pvc Class 9	0.00	66.00	160	152		Glued
1	1	Opening	Slots	30.00	66.00	160		1	Slotted In Hole, , SL: 150.0mm, A: 2.00mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
22.00	22.00	0.00	Unknown	22.00					
45.00	48.00	3.00	Unknown	22.00					
58.00	60.00	2.00	Unknown	22.00					

Geologists Log

Drillers Log

From	To	Thickness	Drillers Description	Geological Material	Comments

(m)	(m)	(m)			
0.00	0.30	0.30	soil	Soil	
0.30	15.00	14.70	Shale, soft weathered	Shale	
15.00	66.00	51.00	Shale, blacky grey	Shale	

Remarks

12/11/2009: Nat Carling, Updated coordinates (as existing were entered as a negative value, which is invalid), based in the centre of the authorised land.

***** End of GW402771 *****

NSW Office of Water
Work Summary

GW402778

Licence: 40BL189490
Licence Status: CONVERTED

Authorised Purpose(s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status:
Construct.Method: Rotary - Air/Foam
Owner Type:

Commenced Date:
Completion Date: 02/10/2003
Final Depth: 36.00 m
Drilled Depth: 36.00 m

Contractor Name: Bungendore Water Bores
Driller: Daniel Robert Hill
Assistant Driller:

Property: N/A 11 O ROURKE PLACE QUEANBEYAN 2620
GWMA: -
GW Zone: -
Standing Water Level: 19.000
Salinity:
Yield: 3.375

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	MURRA	MURRA.42	LT154 DP713859
Licensed:	MURRAY	QUEANBEYAN	Whole Lot 154//713859

Region: 40 - Murrumbidgee
River Basin: - Unknown
Area/District:
CMA Map: 8727-3N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: (Unknown)
Northing: 6083900.0
Easting: 703497.0
Latitude: 35°22'02.9"S
Longitude: 149°14'23.8"E

GS Map: -
MGA Zone: 0
Coordinate Source: GPS - Global Positioning System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	36.00	200			Rotary - Air/Foam
1		Annulus	Waterworn/Rounded	0.00	36.00				Graded, Q:1.200m3
1	1	Casing	Pvc Class 9	-0.50	36.00	160	152		Seated on Bottom, Driven into Hole, Screwed and Glued
1	1	Opening	Slots - Vertical	23.00	36.00	160		1	Casing - Hand Sawn Slot, PVC Class 9, SL: 150.0mm, A: 2.00mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
23.00	24.00	1.00	Unknown	19.00		0.13			
26.00	28.00	2.00	Unknown	19.00		2.00			
32.00	34.00	2.00	Unknown	19.00		1.25		01:00:00	

Geologists Log

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.30	0.30	SOIL	Soil	
0.30	16.00	15.70	SHALE, SOFT WEATHERED	Shale	
16.00	36.00	20.00	SHALE, HARD GREY	Shale	

Remarks

***** End of GW402778 *****

NSW Office of Water
Work Summary

GW402842

Licence: 40BL189772
Licence Status: CONVERTED

Authorised Purpose(s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status:
Construct.Method: Rotary - Air/Foam
Owner Type:

Commenced Date:
Completion Date: 30/11/2004
Final Depth: 60.00 m
Drilled Depth: 60.00 m

Contractor Name: Bungendore Water Bores
Driller: Daniel Robert Hill
Assistant Driller:

Property: N A 7 O' ROURKE PL QUEANBEYAN 2620
GWMA: -
GW Zone: -
Standing Water Level: 24.000
Salinity:
Yield: 2.250

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	MURRA	MURRA.42	
Licensed:	MURRAY	QUEANBEYAN	Whole Lot 152//713859

Region: 40 - Murrumbidgee
River Basin: - Unknown
Area/District:
CMA Map: 8727-3N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: (Unknown)
Northing: 6083811.0
Easting: 703514.0
Latitude: 35°22'05.8"S
Longitude: 149°14'24.5"E

GS Map: -
MGA Zone: 0
Coordinate Source: GPS - Global Positioning System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	60.00	200			Rotary - Air/Foam
1		Annulus	Waterworn/Rounded	0.00	60.00				Graded, Q:1.500m3
1	1	Casing	Pvc Class 9	-0.50	60.00	160	152		Screwed and Glued
1	1	Opening	Slots - Vertical	30.00	60.00	160		1	Casing - Hand Sawn Slot, PVC Class 9, SL: 120.0mm, A: 2.00mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
36.00	38.00	2.00	Unknown	24.00		1.00			
53.00	55.00	2.00	Unknown	24.00		1.25		01:00:00	

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	SHALE, SURFACE ROCKS	Shale	
1.00	6.00	5.00	SHALE, SOFT BROWN	Shale	
6.00	17.00	11.00	SHALE, LIGHT BROWN	Shale	
17.00	60.00	43.00	SHALES, BLUE/BLACK DACITE	Shale	

Remarks

***** End of GW402842 *****

NSW Office of Water
Work Summary

GW403165

Licence: 40BL190601
Licence Status: CONVERTED

Authorised Purpose(s): DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status:
Construct.Method:
Owner Type:

Commenced Date:
Completion Date: 13/07/2005
Final Depth: 78.00 m
Drilled Depth: 78.00 m

Contractor Name:
Driller: Michael Patrick O'neill
Assistant Driller:

Property: N/A 6 GRANVILLE CLOSE QUEANBEYAN 2620
GWMA: -
GW Zone: -
Standing Water Level: 29.000
Salinity:
Yield: 3.250

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	MURRA	MURRA.42	LT109 DP705742
Licensed:	MURRAY	QUEANBEYAN	Whole Lot 109//705742

Region: 40 - Murrumbidgee
River Basin: - Unknown
Area/District:
CMA Map: 8727-3N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: (Unknown)
Northing: 6083916.0
Easting: 703778.0
Latitude: 35°22'02.2"S
Longitude: 149°14'34.9"E

GS Map: -
MGA Zone: 0
Coordinate Source: Map Interpretation

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	78.00	200			Rotary - Percussion (Down Hole Hammer)
1	1	Casing	Pvc Class 9	10.30	72.00	140	128		Glued
1	1	Opening	Slots - Vertical	66.00	74.00	140		1	PVC Class 9, SL: 200.0mm, A: 2.00mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Clay, red	Clay	
1.00	7.00	6.00	Clay, yellow	Clay	
7.00	20.00	13.00	Shale, yellow	Shale	

20.00	78.00	58.00	Shale, black	Shale	

Remarks

***** End of GW403165 *****

NSW Office of Water
Work Summary

GW404162

Licence: 40BL189243
Licence Status: CONVERTED

Authorised Purpose(s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Air
Owner Type: Private

Commenced Date:
Completion Date: 23/05/2005
Final Depth: 100.00 m
Drilled Depth: 100.00 m

Contractor Name: Central West Water Drillers
Driller: Michael Patrick O'neill
Assistant Driller:

Property: N/A 35 LONERGAN DRIVE QUEANBEYAN 2620
GWMA:
GW Zone:
Standing Water Level: 22.000
Salinity: Good
Yield: 4.500

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	MURRA	MURRA.42	130//709217
Licensed:			

Region: 40 - Murrumbidgee
River Basin: 410 - MURRUMBIDGEE RIVER
Area/District:
CMA Map: 8727-3N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6083333.0
Easting: 704109.0
Latitude: 35°22'20.9"S
Longitude: 149°14'48.5"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	100.00	125			Rotary Air
1	1	Casing	Pvc Class 9	-0.30	90.00	125			Seated on Bottom,
1	1	Opening	Slots	90.00	100.00	125		1	PVC Class 9, Inline Glued

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
96.00	97.00	1.00	Unknown	22.00		4.50			

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	7.00	7.00	SHALE - YELLOW	Shale	

7.00	18.00	11.00	SHALE - GREY	Shale	
18.00	90.00	72.00	SHALE - RED/GREY	Shale	
90.00	100.00	10.00	LIMESTONE	Limestone	

Remarks

23/05/2005: Form A Remarks:
ENTERED BY PATRICIA EWERS ON 5TH FEBRUARY 2008. FORM AG - VERY FEW DETAILS PROVIDED.

INFORMATION NOT PROVIDED ON FORM:

NO INFORMATION ON SALINITY
NO INFORMATION ON PUMPING TESTS ON BORE COMPLETION
NO DETAILS ON CASING ATTACHMENT METHOD
NO DETAILS ON SLOT OPENING TYPE, ATTACHMENT METHOD AND APERTURE SIZE
NO DETAILS ON GRAVEL PACK
NO DETAILS ON BORE DEVELOPMENT
NO INFORMATION ON WHO CHOSE BORE LOCATION

***** End of GW404162 *****

NSW Office of Water
Work Summary

GW416069

Licence: 40BL190091
Licence Status: CONVERTED

Authorised Purpose(s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method:
Owner Type: Private

Commenced Date:
Completion Date: 19/07/2004
Final Depth: 113.00 m
Drilled Depth: 113.00 m

Contractor Name: Central West Water Drillers
Driller:
Assistant Driller:

Property: N/A 4 WOODMAN PLACE QUEANBEYAN 2620
GWMA:
GW Zone:
Standing Water Level: 74.000
Salinity: Good
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	MURRA	MURRA.42	162//733091
Licensed:			

Region: 40 - Murrumbidgee
River Basin: 410 - MURRUMBIDGEE RIVER
Area/District:
CMA Map: 8727-3N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6083831.0
Easting: 704272.0
Latitude: 35°22'04.6"S
Longitude: 149°14'54.5"E

GS Map: -
MGA Zone: 0
Coordinate Source: GPS - Global Positioning System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	113.00	125			Unknown
1	1	Casing	Pvc Class 9	0.00	113.00	125			
1	1	Opening	Slots	72.00	78.00	125		1	PVC Class 9
1	1	Opening	Slots	96.00	107.00	125		1	PVC Class 9

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
72.00	78.00	6.00	Unknown						
96.00	107.00	11.00	Unknown						

Geologists Log
Drillers Log

From	To	Thickness	Drillers Description	Geological Material	Comments

(m)	(m)	(m)			

Remarks

19/07/2004: Form A Remarks:
Helen Lester: Coordinates are taken from charted licence location.
Bore/Excavation Form.
No other details were provided.

***** End of GW416069 *****

NSW Office of Water
Work Summary

GW416092

Licence: 40WA411028
Licence Status: CURRENT

Authorised Purpose(s): DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method:
Owner Type: Private

Commenced Date:
Completion Date: 31/10/2007
Final Depth: 102.00 m
Drilled Depth:

Contractor Name: Central West Water Drillers
Driller: Michael Patrick O'neill
Assistant Driller:

Property: N/A 4 BESTON PLACE QUEANBEYAN 2620
GWMA:
GW Zone:
Standing Water Level: 32.000
Salinity:
Yield: 0.630

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	MURRA	MURRA.42	137//713859
Licensed:			

Region: 40 - Murrumbidgee
River Basin: 410 - MURRUMBIDGEE RIVER
Area/District:
CMA Map: 8727-3N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6083590.0
Easting: 703793.0
Latitude: 35°22'12.8"S
Longitude: 149°14'35.8"E

GS Map: -
MGA Zone: 0
Coordinate Source: GPS - Global Positioning System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	102.00	0			(Unknown)
1	1	Casing	Pvc Class 9	-1.00	102.00	132			
1	1	Opening	Screen	72.00	78.00			1	PVC Class 9
1	1	Opening	Screen	90.00	96.00			1	PVC Class 9

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

31/10/2007: Form A Remarks:
Helen Lester: Coordinates are taken from charted licence location.
Bore/Excavation Form
No other details were provided.

***** End of GW416092 *****

NSW Office of Water
Work Summary

GW416490

Licence: 40BL189614 **Licence Status:** CONVERTED

Authorised Purpose(s): DOMESTIC
Intended Purpose(s): DOMESTIC, IRRIGATION

Work Type: Bore
Work Status: Supply Obtained
Construct.Method:
Owner Type: Private

Commenced Date:
Completion Date: 04/01/2012
Final Depth: 66.00 m
Drilled Depth:

Contractor Name:
Driller: Unkown Unknown
Assistant Driller:

Property: N/A 5 O ROURKE PLACE QUEANBEYAN 2620
GWMA:
GW Zone:
Standing Water Level:
Salinity:
Yield: 1.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	MURRA	MURRA.42	151//713859
Licensed:			

Region: 40 - Murrumbidgee
River Basin: 410 - MURRUMBIDGEE RIVER
Area/District:
CMA Map: 8727-3N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6083708.0
Easting: 703496.0
Latitude: 35°22'09.2"S
Longitude: 149°14'23.9"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	66.00	150			Unknown

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

04/01/2012: Form A Remarks:

Helen Lester: Coordinates are taken from charted licence location.
Form AG
Completion Date entered as per signage of form.
PVC casing 150mm
No other details were provided.

***** End of GW416490 *****

Appendix D

Historical Aerial Photographs

Douglas Partners
Geotechnics | Environment | Groundwater

Aerial Photograph 1961
Updated Contamination Assessment
Lot 5, DP 1199045, Greenleigh, NSW

21.03.2019

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Douglas Partners Geotechnics / Environment / Groundwater		**Aerial Photograph 1973**	22 .03
		Updated Contamination Assessment	2
	21.03.2019	**Lot 5, DP 1199045, Greenleigh, NSW**	1

Douglas Partners Geotechnics / Environment / Groundwater			Aerial Photograph 1978 Updated Contamination Assessment Lot 5, DP 1199045, Greenleigh, NSW	N	22 .03
					3
		21.03.2019			1

Douglas Partners
Geotechnics | Environment | Groundwater

Date: 21.03.2019

Aerial Photograph 1984

Updated Contamination Assessment

Lot 5, DP 1199045, Greenleigh, NSW

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Douglas Partners
Geotechnics | Environment | Groundwater

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□□□□□ **Aerial Photograph 1987**
Updated Contamination Assessment
Lot 5, DP 1199045, Greenleigh, NSW

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Douglas Partners
Geotechnics | Environment | Groundwater

	Aerial Photograph 1995		22 .03
	Updated Contamination Assessment		
21.03.2019	Lot 5, DP 1199045, Greenleigh, NSW		1

Douglas Partners
Geotechnics / Environment / Groundwater

Date: 21.03.2019	**Aerial Photograph 1998** **Updated Contamination Assessment** **Lot 5, DP 1199045, Greenleigh, NSW**	22 .03 1

Douglas Partners
Geotechnics / Environment / Groundwater

Aerial Photograph 2004
Updated Contamination Assessment
Lot 5, DP 1199045, Greenleigh, NSW

21.03.2019

22□03

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Douglas Partners
Geotechnics | Environment | Groundwater

d d		Aerial Photograph 2018	N	22 .03
rr		Updated Contamination Assessment		9
	21.03.2019	Lot 5, DP 1199045, Greenleigh, NSW		1

Appendix E

Site Photographs

Photo 1: View of the site from the east looking north-west over northern part of development

Photo 2: View of the site from Mine Site 4 looking towards the North

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	1
	Creek, Lot 5 DP 1199045, NSW	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 3: View of the site from the west looking north-east over northern part ofdevelopment

Photo 4: View of the site from the east looking south over eastern part of development

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	2
	Creek, Lot 5 DP 1199045, NSW	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 5: View of the sheep dip area looking north

Photo 6: View of sheep dip area, showing waste material, looking south

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	3
	Creek, Lot 5 DP 1199045, NSW	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 7: View of shaft at Mine site 1, looking to the south

Photo 8: View of shaft and stockpiled spoil at Mine Site 1, looking west

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	4
	Creek, Lot 5 DP 1199045, NSW	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 9: View of typical waste material encountered during inspection

Photo 10: View of limestone quarry in the south-east of the site, looking south

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	5
	Creek, Lot 5 DP 1199045, NSW	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 11: View of the site to the north-west, from the limestone quarry

Photo 12: View of stockpiled spoil to the north-west of the limestone quarry

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	6
	Creek, Lot 5 DP 1199045, NSW	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 13: View of the kiln area looking to the north-east

Photo 14: View of Mine Site 4 looking to the north, open pits in the foreground

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	7
	Creek, Lot 5 DP 1199045, NSW	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 15: View of Mine Site 4, open trench excavation

Photo 16: View of Mine Site 4, stockpiled spoil

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	8
	Creek, Lot 5 DP 1199045, NSW	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 17: View of Mine Site 4, stockpiled spoil

Photo 18: View of Mine Site 4, stockpiled spoil

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	9
	Creek, Lot 5 DP 1199045, NSW	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 19: View of Mine Site 4, open trench excavation, above adit entrance

Photo 20: View of Mine Site 4 , adit entrance, looking to the west

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	10
	Creek, Lot 5 DP 1199045, NSW	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 21: View of Mine Site 4, open cut excavation area

Photo 22: View of Mineral Processing area, scattered building rubble

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	11
	Lot 5 DP 1199045, Greenleigh	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 23: View of Mineral Processing area, scattered building rubble

Photo 24: View of Mineral Processing area, example of concrete troughs

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	12
	Lot 5 DP 1199045, Greenleigh	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 25: View of Mineral Processing area, remnant buildings

Photo 26: View of Mine Site 3 open shaft, looking to the south

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	13
	Lot 5 DP 1199045, Greenleigh	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 27: View of Mine Site 3, open shaft, looking to the north-west

Photo 28: View of additional mine shaft in north-west of the site, within north-west of the developmen

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	14
	Lot 5 DP 1199045, Greenleigh	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 29: View of additional mine shaft in north-west of the site, within north-west of the developmen

t Photo 30: View of quarry area to south-east of additional mine shaft

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	15
	Lot 5 DP 1199045, Greenleigh	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

t **Photo 31: View of quarry area to south-east of additional mine shaft**

Photo 32: View of the site from north-west looking to the east over development area

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	16
	Lot 5 DP 1199045, Greenleigh	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 33: View of Valley Creek bed

Photo 34: View of Valley Creek bed

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	17
	Lot 5 DP 1199045, Greenleigh	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18

Photo 35: View of example car bodies scattered across the site

Photo 36: View of small stockpile in east of the site containing asbestos material

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88224.03
	Jumping Creek Estate	Plate	18
	Lot 5 DP 1199045, Greenleigh	REV:	A
	Client: Spacelab Studio Pty Ltd	DATE:	29-Aug-18