Larry Cook Consulting Pty Ltd

PHASE I ENVIRONMENTAL SITE ASSESSMENT WITH TARGETED SOIL SAMPLING AND TESTING

Lots 19, 20, 21, 23, 24, 25, 30, 31, 32, 33, 37, 50, 53, 64, 65, 68, 80, 81, 82, 85, 86, 87, 89, 91, 108 & 145 in DP755221
Lots 22, 23, 32, 73, 75 & 76 in DP755253
Lot A in DP365595, Lots 1 & 3 in DP617088
Lot 881 in DP563889, Lot 1 in DP1222754
Lot 7 in DP1230083, Lot 245 in DP45517
Lot 7012 in DP1059767, Lot 7029 in DP93603
Lot 7035 in DP 1051932, Lot 7036 in DP1059768
Lot 7303 in DP1154929, Lot C in DP382358
Lot 2 in DP1139252, Lot 882 in DP563889
Pt Lot 102 in DP1139060, Lot 7039 in DP1059766
Lot 7303 in DP1161109

Cooks Road Glenworth Valley
NSW 2250

PREPARED FOR: **GLENWORTH VALLEY OUTDOOR ADVENTURES**

PROJECT NUMBER: **21097**

DATE: **12TH OCTOBER 2021**

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1 x PDF	21097-B Phase I Environmental Site Assessment – Various Lots Cooks Road Glenworth Valley	Version 3	12th Oct 2021	Glenworth Valley Glenworth Valley Outdoor Adventures	LLC

EXECUTIVE SUMMARY

Larry Cook Consulting Pty Ltd recently carried out Phase I environmental site assessments on 49 contiguous and isolated parcels of land scattered over the Mangrove Mountain plateau near Calga and adjacent deeply incised Glenworth Valley, the majority of which are located in the valley system. The site investigations assessed the potential for contamination in soil on Lots 19, 20, 21, 23, 24, 25, 30, 31, 32, 33, 37, 50, 53, 64, 65, 68, 80, 81, 82, 85, 86, 87, 89, 91, 108 & 145 in DP755221, Lots 22, 23, 32, 73, 75 & 76 in DP755253, Lot A in DP365595, Lots 1 & 3 in DP617088, Lot 881 in DP563889, Lot 1 in DP1222754, Lot 7 in DP1230083, Lot 245 in DP45517, Lot 7012 in DP1059767, Lot 7029 in DP93603, Lot 7035 in DP 1051932, Lot 7036 in DP1059768, Lot 7303 in DP1154929, Lot C in DP382358, Lot 2 in DP1139252, Lot 882 in DP563889, Pt Lot 102 in DP1139060, Lot 7039 in DP1059766 and Lot 7303 in DP1161109.

The subject land parcel comprises 49 lots ranging in size from 0.1 to 267.5 hectares. The total area contend with the land parcel is 1173.6 Ha.

The investigations and assessments were triggered by Glenworth Valley Outdoor Adventures who proposes to add a number of permitted uses (APUs) to the existing town planning controls that apply to the Site.

Two previous Phase I environmental site investigations by environmental consultancies in 2013 and 2014 were undertaken on one or more of these parcels of land. Given the age of the assessments, the NSW EPA advised the regulatory consent authority Central Coast Council that they should seek a contemporary assessment prepared by a suitably qualified contaminated land consultant.

This Phase I environmental site assessment summarises the findings of detailed site inspections, review of available historical records and information including historical aerial photos and land title records, and results of other relevant investigations. A targeted soil sampling program was carried out in one parcel of land (Lot A in DP365595) which was designed to supplement the site history data and provide an assessment of any potential contamination in targeted areas of environmental concern.

The 49 subject parcels of land are scattered over the Mangrove Mountain plateau near Calga and deeply incised Glenworth Valley, the majority of which are located in the valley system. Some of the lots are contiguous and some isolated in space.

In summary, based on a review of historical and recent aerial photographs and title records, the use of the land parcels has been mostly for farming and pastoral activities and partly for residential and horse agistment. In the past 50 years the Glenworth Valley Company had been formed providing tourism, camping and other environmentally sustainable recreational activities. Prior to establishment of Glenworth Valley Company, the area was mostly vacant, and a small number of land parcels used for farming and horse agistment. Between about 1954 and 1980, the areas were mostly vacant parcels with some used for farming and residential use. From 1980 to present, the parcels remain mostly vacant with an increase in farming, tourism accommodation, recreational activities, horse agistment and residential use.

In regard to the ownership history of Lot A in DP365595, the records reveal that the property was an operational citrus orchard since at least the 1950s. At the height of the operations a substantial part of the property was used for the orchard. Use of the property continued as a commercial orchard until the early 1990s when the importation of oranges impacted on the viability of orchards in the district. Use of the property as a commercial orchard ceased in the mid-1990s, and the majority of trees were gradually removed. Low-intensity cattle grazing has been undertaken to date.

A general inspection of the majority of the land parcels that are undeveloped and detailed investigations of those lands that are developed were carried out on 20th August 2021. The objectives were:

- Document land use and record details of any developments.
- Collect strategically located soil samples near potentially contaminated areas.

In this regard, strategic soil sampling was carried out in two locations in Lot A DP365595 where potential contamination could occur.

This environmental assessment concludes that 38 of the 49 parcels of land are vacant and undeveloped and 11 of the 49 land parcels have been used or are being used for a variety of purposes such as farming, horse agistment, residential and in more recent years tourism, camping, recreation and staging special events. The results of the site inspections, aerial photographs and other records reviewed indicate a low risk of potential contamination for the proposed rezoning of land. It is assessed that the risk of site contamination in these 11 land parcels is low and unlikely to be significantly contaminated and assessed suitable or could be made suitable for the uses proposed in the rezoning proposal.

The environmental assessment carried out in Lot A in DP365595 concludes that the orchard activities operational up till the mid-1990s have largely been replaced by cattle grazing. It is apparent that no fertilisers or insect treatment have been used for at least 30 years. The present and past use of the land for low-intensity cattle grazing does not incorporate any cattle drenching and is unlikely to have caused any significant contamination on the land. However, although there are no longer any fuel storage tanks in Lot A, drum-diesel fuel and drum-oil storage is still kept on the property but isolated in one of the machinery sheds. This storage may give result in very localised contamination in the immediate vicinity of the storage areas. It is noted that the volumes of products are very low and the various farm components are kept in clean condition.

The results of targeted soil testing in identified Areas of Environmental Concern (AEC) in Lot A revealed the following:

- pH values were slightly to moderately acidic (5.6 – 6.0)
- EC values were low indicating low salinity (66 - 64 µS/cm)
- Total Recoverable Hydrocarbons (TRH) were all recorded less than the Practical Quantification Limit (PQL);
- BTEX were all recorded less than the PQL;
- Organophosphorus Pesticides (OPP) were all recorded less than the PQL;
- Organochlorine pesticides (OCP) were all recorded less than the PQL; and
- Trace to low concentrations of some heavy metals were recorded above the PQL.

In summary, the laboratory report from the AEC targeted soil investigation shows that concentrations of tested analytes were all below the adopted Soil Investigation Level guidelines.

Given the length of time since the orchard was operational (30 years) and the nature of the farming products used (chicken manure and enclosed insect baits) it is concluded that it is unlikely there is any significant residual contamination. This environmental assessment concludes that Lot A DP 365595 was unlikely to be contaminated and was assessed suitable or could be made suitable for the uses proposed in the rezoning proposal.

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1.0 INTRODUCTION

Larry Cook Consulting (LCC) was commissioned by *Glenworth Valley Outdoor Adventures* (the owner) in July 2021 to carry out environmental site investigations on the potential for contamination in soil in 49 parcels of land; Lots 19, 20, 21, 23, 24, 25, 30, 31, 32, 33, 37, 50, 53, 64, 65, 68, 80, 81, 82, 85, 86, 87, 89, 91, 108 & 145 in DP755221, Lots 22, 23, 32, 73, 75 & 76 in DP755253, Lot A in DP365595, Lots 1 & 3 in DP617088, Lot 881 in DP563889, Lot 1 in DP1222754, Lot 7 in DP1230083, Lot 245 in DP45517, Lot 7012 in DP1059767, Lot 7029 in DP93603, Lot 7035 in DP 1051932, Lot 7036 in DP1059768, Lot 7303 in DP1154929, Lot C in DP382358, Lot 2 in DP1139252, Lot 882 in DP563889, Pt Lot 102 in DP1139060, Lot 7039 in DP1059766 and Lot 7303 in DP1161109. The distribution and locations of the 49 subject lots are shown in a *Six Maps* cadastral plan in **Figure 1** and outlined in a satellite image in **Figure 2**, as supplied by Central Coast Council (Council).

The subject land parcel comprises 49 lots ranging in size from 0.1 to 267.5 hectares. The total area contend with the land parcel is 1173.6 Ha.

The investigations and assessments were triggered by Glenworth Valley Outdoor Adventures who proposes to add a number of permitted uses (APUs) to the existing town planning controls that apply to the Site.

Previous environmental site investigations were undertaken on one or more of these parcels of land by other environmental consultancies in 2013 and 2014. Given the age of the assessments, the NSW EPA advised the local regulatory authority Central Coast Council (Council) that they should *seek a contemporary assessment prepared by a suitably qualified contaminated land consultant.*

The address of the parcels of land are herein collectively identified as Cooks Road Glenworth Valley.

Following discussions with *Glenworth Valley Outdoor Adventures* (the owner) and nearby community over several months, anecdotal knowledge of the history of the Site, review of historical aerial photos and land title records and directives from Central Coast Council a targeted environmental investigation was undertaken. A targeted soil sampling program supplements the site history data and provides an assessment of ground conditions and any potential contamination.

This report summarises the findings of site inspections, review of available historical records and information including historical aerial photos, land title records and results of targeted soil sampling, and results of other relevant investigations.

1.1 BACKGROUND

A review of Council's zoning plans identifies a large part of the subject land parcels to be partly 'E2' Environmental Conservation and partly 'RU2' Rural Landscape. The current zoning is shown in **Figure 3**.

The subject land parcels are owned by The Glenworth Valley Pastoral Company Pty Ltd, NSW Department of Trade and Industry (Crown Lands) and the Darkinjung Local Aboriginal Land Council (DLALC).

The categories of the land holdings are delineated in **Figure 4**. Glenworth Valley Outdoor Adventures proposes to add a number of permitted uses (APUs) to the existing town planning controls that apply to the Site including additional permitted uses in respect to nature based recreational activities, environmentally sustainable tourist accommodation and extensive agricultural uses.

The subject site comprises approximately 1070.2 Ha of land zoned E2 Environmental Conservation and 103.4 Ha of land zoned RU2 Rural Landscape under Gosford Local Environmental Plan 2014 (draft Central Coast Environmental Management Plan).

Lot A DP 365595, the subject of targeted soil sampling and testing is zoned RU2 Rural Landscape under Gosford Local Environmental Plan 2014 (draft Central Coast Environmental Management Plan).

1.2 OBJECTIVES

This assessment aims to identify the potential for on-site soil contamination with respect to previous, current or proposed land use. The objectives of this Targeted Environmental Investigation (TEI) were to:

- Document the available Site history;
- Identify potential on and off-site sources of contamination (past and present);
- Identify potential contamination types;
- Document the Site condition;
- Provide a preliminary assessment of potential Site contamination; and
- Assess the need for further investigations, if any.

1.3 SCOPE OF WORK

The scope of work for the Targeted Environmental Investigation included the review, assessment and reporting of the following data;

- Review of information held on the properties;
- Review of publicly available data (including historic aerial photographs, geological plans, topographical maps and other resource maps as available);
- Review of information held by State Government Departments (EPA);
- Review of relevant information held by Central Coast Council;
- Review of literature sources describing environmental issues (Type of facility e.g., hardware shop) at sites in NSW;
- On-site inspection (walk-over) of the many parcels of land and surrounding areas;
- Visual assessment of any potential hazardous materials;
- A photographic record of present site conditions;
- Review of locally available information on the site sources from the local Council and residents (if available);
- Discussion with relevant parties (if available) and local EPA/Council officials (if available);

- Selected (targeted) soil sampling, laboratory analysis and assessment against relevant guidelines; and
- Data assessment and reporting.

2.0 SITE DESCRIPTIONS

2.1 LOCATIONS

The 49 subject parcels of land are scattered over the Mangrove Mountain plateau near Calga and deeply incised Glenworth Valley, the majority of which are located in the valley system. Some of the lots are contiguous and some isolated in space.

The parcels of land are located in the Parish of Popran, County of Northumberland and in the Central Coast local government area (LGA). The distribution and locations of the 49 subject lots are shown in a *Six Maps* cadastral plan in **Figure 1**. Aerial photos of each lot are provided in **Appendix A**.

The key features required to identify the Site are summarised in **Table 1**.

Table 1
Site Identification

Lot	Deposited Plan	Address
19	755221	69 Cooks Road Glenworth Valley
20		69 Cooks Road Glenworth Valley
21		69 Cooks Road Glenworth Valley
23		69 Cooks Road Glenworth Valley
24		69 Cooks Road Glenworth Valley
25		69 Cooks Road Glenworth Valley
30		69 Cooks Road Glenworth Valley
31		69 Cooks Road Glenworth Valley
32		69 Cooks Road Glenworth Valley
33		69 Cooks Road Glenworth Valley
37		69 Cooks Road Glenworth Valley
50		69 Cooks Road Glenworth Valley
53		69 Cooks Road Glenworth Valley
64		69 Cooks Road Glenworth Valley
65		69 Cooks Road Glenworth Valley
68		69 Cooks Road Glenworth Valley
81		69 Cooks Road Glenworth Valley
82		69 Cooks Road Glenworth Valley

85		69 Cooks Road Glenworth Valley
86		69 Cooks Road Glenworth Valley
87		69 Cooks Road Glenworth Valley
89		69 Cooks Road Glenworth Valley
91		69 Cooks Road Glenworth Valley
108		69 Cooks Road Glenworth Valley 45 Cooks Road Calga
145		69 Cooks Road Glenworth Valley 45 Cooks Road Calga
22	755253	69 Cooks Road Glenworth Valley
23		69 Cooks Road Glenworth Valley
32		69 Cooks Road Glenworth Valley
73		69 Cooks Road Glenworth Valley
75		69 Cooks Road Glenworth Valley
76		69 Cooks Road Glenworth Valley
1	617088	69 Cooks Road Glenworth Valley
3		69 Cooks Road Glenworth Valley
881	563889	69 Cooks Road Glenworth Valley
1	1222754	69 Cooks Road Glenworth Valley
7	1230083	Morgans Road Wendoree Park
245	48817	69 Cooks Road Glenworth Valley
7012	1059767	69 Cooks Road Glenworth Valley
7029	93603	Glenworth Valley
7035	1051932	Popran Road Glenworth Valley
7036	1059768	Glenworth Valley
7303	1154929	Glenworth Valley
A	365595	69 Cooks Road Glenworth Valley
C	382358	69 Cooks Road Glenworth Valley
2	1139242	69 Cooks Road Glenworth Valley
882	563889	69 Cooks Road Glenworth Valley
Pt 102	1139060	69 Cooks Road Glenworth Valley
7039	1059766	69 Cooks Road Glenworth Valley
7303	1161109	Peats Ridge Road Calga

2.2 ACCESS

Vehicle access to Cooks Road properties and Glenworth Valley is via Cooks Road which takes off Peats Ridge Road at Calga.

2.3 SURROUNDING LAND USES

The 49 parcels of land are essentially surrounded by rural land.

2.4 TOPOGRAPHY AND DRAINAGE

Most of the land parcels are hosted within deeply incised Glenworth Valley comprising undulating hills associated with the Hawkesbury River Valley system, in particular the Popran Creek system including its floodplain which are flanked to the west, north and east by rolling, moderately steep hills.

A small number of properties including Lot A in DP365595 and lots 145 and 108 in DP 755221 are located atop the Mangrove Mountain plateau located immediately west of the Hunter Range which constitutes a watershed in this district. In particular, these three parcels of land are located in the headwaters of the Cabbage Tree Creek system which flows south-southwest to Popran Creek.

The elevations of the 49 land parcels vary greatly with elevations ranging from less than 10 m Australian Height Datum (AHD) in the Popran Creek floodplain to approximately 220 m AHD atop the plateau where Lot A, Lot 145 and the upper parts of Lot 108 are located.

2.5 SOIL LANDSCAPES

The reader is referred to the *Soil Landscapes of the Gosford-Lake Macquarie 1:100,000 Sheet* Report (Murphy, 1993). The land parcels are underlain by variably thick colluvial, and in parts alluvial soils derived from the weathering of the underlying Triassic age sedimentary rocks.

The soils beneath the elevated land parcels on the plateau (Lot A, Lot 145 and the upper parts of Lot 108) belong to the Sydney Town and Somersby soil landscapes developed atop undulating to rolling low hills and moderately inclined slopes and ridges on Hawkesbury Sandstone along the edge of the Somersby Plateau.

The colluvial, residual and alluvial soil profiles recorded in most of the parcels of land in the lower elevation areas within the Popran Creek Valley system are developed atop the Terrigal Formation and belong to the Watagan soil landscape.

2.6 GEOLOGY

The reader is referred to the published 1:250,000-scale Sydney Geology Map (NSW Department of Mines, 1966).

The parcels of land are located in the northern central part of the Sydney Basin where the upper part of the Triassic sedimentary sequence is exposed. The Local Government Area (LGA) is largely underlain by Triassic-age Hawkesbury Sandstone which consists of a thick sequence of interbedded massive and cross-bedded (sheeted) medium to coarse grained quartz sandstone with occasional interbeds and lenses of shale. Interbeds of very fine to medium-grained sandstone also occur in some units. The sandstone unit has a recorded maximum thickness of approximately 130 m beneath the Site. Excellent large-scale vertical exposures can be observed in the numerous road cuttings on the nearby Sydney to Newcastle M1 Motorway.

Regional geological mapping by state government geologists revealed that the Hawkesbury Sandstone generally dips to the south-southwest towards the central part of the Sydney Basin at approximately 1.0^{o} to 1.5^{o}.

The sandstone in the Calga area is variably deeply weathered and generally covered with a sandy colluvial soil varying between 0.2 and 3.0 metres depth. Site investigations reveal the existence of flat-lying sandstone shelves forming tiered (step down) topography on the adjoining lots to the south and south-east.

The Hawkesbury Sandstone is underlain by Triassic-age Terrigal Formation, which belongs to the Narrabeen Group and consists of interbedded, flat-lying, lithic to quartz-lithic sandstone, siltstone, and minor claystone and conglomerate.

2.7 HYDROGEOLOGY

Water-bearing zones (aquifers) are commonly developed within the Hawkesbury Sandstone in the Mangrove Mountain area at different elevations down to its base, which is the contact with the underlying and older Narrabeen Group sediments. The vast majority of registered bores in the Mangrove Mountain area extract water from aquifers hosted by the Hawkesbury Sandstone. The aquifers are known throughout the sandstone sequence but are more productive in the upper third and lower third (Lee J. and Cook L., 2005). The central part of the Hawkesbury Sandstone is relatively 'silty' with poor prospects of useable groundwater supplies.

The average bore yield on Mangrove Mountain is 0.4 L/s. Groundwater is typically acidic and soft with low salinity. However, the sandstone-hosted aquifers in some, but not all, areas are known to contain dissolved iron which, when oxygenated during bore pumping (drawdown) and/or exposure to the atmosphere can cause staining problems. Manganese is also elevated in some aquifers.

Published and unpublished results of groundwater studies and investigations in the Hawkesbury Sandstone in the Mangrove Mountain area and in the wider Sydney Basin indicate that aquifers hosted by the Hawkesbury Sandstone on Mangrove Mountain and in the area centred on the Project Site are found in:

- Sub-horizontal relatively porous and stacked layers (beds) of sheeted sandstone with increased primary permeability (in contrast to less permeable interbedded massive 'tight' sandstone units, and shale). These primary aquifers provide the main aquifer storage and are characterised by relatively low yields, in the order of 0.4 L/s.
- Pervasive sub-vertical, semi-continuous to continuous, rock defects such as fractures and joints with secondary 'enhanced' permeabilities. These aquifers constitute a major component of the aquifer's transmissivity but only a minor component of the aquifer's storage. Fracture controlled sandstone aquifers provide relatively moderate to occasionally high yields which, in some areas, can be up to between 5 and 10 times the district average of 0.4 L/s.

3.0 SITE HISTORY

3.1 SOURCES OF INFORMATION

The sources of information that were available for the historical Site assessment are listed below:

- Central Coast Council – Section 149
- Former Gosford City Council – Planning Certificate

- NSW Department of Lands Spatial Information eXchange (SIX Maps);
- WaterNSW Groundwater Bore Records Search;
- NSW OEH register of EPA Licences;
- NSW OEH list of registered Remediation or Investigation site Orders;
- Safe Work NSW - Search for on-site Licences to keep dangerous goods;
- Spatial Services NSW - Historical Aerial Photographs;
- Multiple site visits conducted between mid-2000s and 2021; and
- Interviews and discussions with local residents where possible.

3.2 EPA RECORDS

A search of the NSW EPA register of Environmental Protection Notices under sections 58 and 60 of the Contaminated Land Management Act 1997 (CLM Act) was conducted in July 2021 to assess the potential for contaminated land in the area.

In summary;

- The search did NOT identify any records of notices in the 49 parcels of land.
- The 49 land parcels are NOT declared to be in ‘investigation’ or ‘remediation’ areas, nor are they subject to an ‘investigation’ or ‘remediation’ order under the Contaminated Land Management Act, 1997.

3.3 PUBLIC REGISTER OF POEO LICENSES

A search of the public register of licenses issued under the Protection of the Environment Operations Act 1997 (POEO) did NOT identify any licenses or prosecutions regarding the 49 parcels of lands.

3.4 SAFEWORK NSW

Site inspections did NOT identify any evidence of potential dangerous goods stores, hence no search of the SafeWork NSW records for licences to keep dangerous goods was deemed necessary.

3.5 LOCAL CONSENT AUTHORITY

Central Coast Council is the local consent authority. A review of the Section 149(2) and (5) Planning Certificates was undertaken for 11 of the land holdings that had identified infrastructure. The review did not reveal any impediments relating to contaminated lands.

3.6 ANECDOTAL EVIDENCE AND RESIDENT INTERVIEWS

Informal interviews with the owner of the land parcels and local residents in the area over several years provided further anecdotal evidence to support description of the site history.

In summary, anecdotal evidence indicates that the large majority of the land parcels (38) are undeveloped. Eleven of the land parcels are partly developed and are described in **Table 2**.

Table 2: Description of Developed Lots

Lot	DP	Development
37	455221	Dwelling
89	455221	Function centre, administration, horse yards, maintenance/machinery sheds, managers dwelling, camping grounds, cottage - Glenworth Valley Outdoor Adventures
108	455221	Cabins - Glenworth Valley Outdoor Adventures
145	455221	Dwelling, horse adjustment and stables, horse riding, horse arena - Glenworth Valley Outdoor Adventures
22	755253	Camping areas, amenities, maintenance depot, water storage tank, sand/gravel/rock supply - Glenworth Valley Outdoor Adventures
A	365595	Orchard and farm, machinery shed, storage shed, dwelling, cottage, car port, cattle yards
C	382358	Cottage
2	1139242	Cottage
881	563889	Dwellings and secondary buildings
882	563889	Dwelling and sheds
7012	1059767	Access road into Glenworth Valley & sand/rock stockpile

3.7 HISTORICAL AERIAL PHOTOGRAPHS

A review of current and historical aerial photographs was conducted to assess the timeline and nature of any development or land use in Glenworth Valley, mainly Lot 89 in DP755221 and Lot A in DP365595. It is noted that the majority of the lots in Glenworth Valley are either undeveloped or have little to minimal historical development. Aerial photographs were reviewed for the years 1954, 1961, 1976, 1991, 1994 and 2006. It is noted that the 1961 coverage is the earliest aerial photographic coverage now available from *Spatial Services NSW*.

Representative images for each of these years are presented in **Appendix B**. The key observations made from aerial reconnaissance are summarised in **Table 3**.

Table 3: Review of Aerial Photographs

Date & Details	Observations
Gosford 1954	Lot 89 in DP755221 The area is mostly covered with dense bushland. Sinuous south flowing Popran Creek meanders along the river flats within the incised valley flanks. Access to this area is via a bridge from western corner of Popran Creek. On the north-eastern corner of the valley flats, a residence and associated sheds are visible. There appears to be small structures (buildings/sheds) present in some parts, but the resolution of the black & white aerial photography is poor. The access road is a sinuous gravel road which runs down the hill slope to the valley flats from Cooks Road. Northern and southern corners of Cooks Road were used for farming purposes with associated dams.
Gosford 1961	Lot 89 in DP755221 The part of Glenworth Valley now developed as a function centre, horse riding establishment, administration and adventure park was, in 1961 a modest development comprising what appears to be a small cottage and several scattered small sheds located on a cleared parcel of fenced land. Lot A in DP365595 The property is largely developed as a citrus orchard with distinct rows of trees. The exception is the north-eastern third which remains covered with natural bushland, some of which appears to be tall open eucalypt forest. Infrastructure including what appears to be a house is located in the north-western corner near Cooks Road
Gosford 1976	Lot 89 in DP755221 A new house with an adjoining building and shed are newly constructed buildings clustered within a rectangular fenced area, the same site as in 1961. The surrounding area is grassed but undeveloped. Lot A in DP365595 The property remains largely developed as a citrus orchard with distinct rows of trees. The exception is the north-eastern third which remains covered with natural bushland, apart from a small square cultivated block in the northern central part which may have young citrus growing. Infrastructure appears to have been expanded with new additional structures in the north-western corner. The cluster of buildings appears to be the same as the present day. A rural dam has been constructed in the southern part of the property on the southern boundary.

Date & Details	Observations
Gosford 1991	Lot 89 in DP755221 The house and adjoining building and shed are still present with the addition of a new shed north-west of the building cluster. A horse arena has been constructed immediately east of the buildings and a dam west of the infrastructure. It appears that a large elongate area on the rived flat (floodplain) has been ploughed. Lot A in DP365595 The property remains largely developed as a citrus orchard with distinct rows of trees as in the earlier aerial coverage. north-eastern third has been largely cleared but with no orchard development. Infrastructure appears to have been expanded with a new relatively large machinery shed east of the building cluster and smaller shed between the buildings. Lot 881 in DP563889 The property (vacant and tree covered in the 1976 aerial photos) has been partly developed as a rural entity with defined paddocks for horses/cattle and two adjacent buildings (dwelling and machinery shed) constructed in the central western part in the 1980s.
Gosford 1994	Lot 89 in DP755221 The infrastructure including the house, adjoining building, sheds and horse arena remains unchanged since 1991. Lot A in DP365595 The image is poor, but it appears that the orchard and infrastructure has remained unchanged since the 1991 aerial coverage. Lot 881 in DP563889 The property largely unchanged as a rural entity since 1991.

Date & Details	Observations
Gosford 2006	Lot 89 in DP755221 The land use has apparently changed. Although the configuration of the buildings remains the same, the horse arena has been changed to a car park and the dam filled in. The area immediately north of the buildings is now a horse mounting area. Lot A in DP365595 Although the orchard is operational, the area covered by citrus has been reduced to the western half of the Site. The remaining eastern part if the property is grass covered and possibly used for grazing. The infrastructure remains the same as the 1994 aerial coverage. Lot 881 in DP563889 An additional cluster of a second dwelling and machinery shed in the central eastern part, northeast of the original buildings.
Current	Lot 89 in DP755221 The configuration of the buildings in the north-western corner remains the same with a car park immediately east of the buildings and a newly constructed function centre south of the building cluster. The roadways have been upgraded and surrounding area grassed. The maintenance area has also been upgraded. Lot A in DP365595 The orchard has been reduced to just several rows in the central eastern part of the property. The remaining areas are largely planted with fodder for grazing. The infrastructure remains the same as earlier aerial coverage. Lot 881 in DP563889 The property largely unchanged as a rural entity since 2006.

3.8 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

Two Phase I Environmental Site Assessment have been undertaken over one or more of the land parcels. The details are:

Network Geotechnics. 2013. Proposed Re-Zoning of Land – Preliminary Contamination Assessment

Reference*:*

Network Geotechnics. 2013. Proposed Re-Zoning of Land – Preliminary Contamination Assessment, Lots 19, 20, 21, 23, 24, 25, 30, 37, 64, 65, 68, 80, 81, 82, 85, 86, 87, 89, 91, 108, 145 in D.P.755221, Lot 1 in D.P.121001 and

Lots 22, 23, 32, 73, 75, 76 in D.P.755253, Cooks Road, Calga. Ref. G09/1442-A dated 28th August 2013.

A review of Council zoning plans identified the subject land zoning to be partly 'E2' Environmental Conservation and partly 'RU2' Rural Landscape. It is understood that the owner proposed to rezone the part of the land which is zoned as E2 to RU2 and include additional permitted uses in respect to nature based recreational activities, environmentally sustainable tourist accommodation and extensive agricultural uses. The then current land use is mainly for tourism accommodation with recreational activities and horse agistment. Part of the site is used for residential purposes. It is understood that the owner had applied to the relevant authorities to re-zone the land from E2 to RU2.

The report presented a study of historical aerial photographs and collation of land title records, results of a field walkover assessment, a description of surface conditions and an assessment of the suitability of the site for proposed re-zoning of land in regard to contamination issues.

The Stage 1 Contamination Assessment for the site was based on a walk over inspection, historical title search and review of historical aerial photographs. Based on the site history, historical aerial photographs and walkover inspection the following comments were made:

- The land parcels have been used for a variety of purposes such as farming, horse agistment, residential and in more recent years tourism and camping areas.
- A review of historical and then current aerial photographs and other records reviewed indicated a low risk of potential contamination for the proposed rezoning of land. It was assessed that the risk of site contamination was low and that a Stage 2 detailed contamination assessment would not be required.

Michael Leavey Consulting. 2014. Preliminary Site Contamination Report. Lot A DP355595 45 Cooks Road Calga. September 2014

Reference*:*

Michael Leavey Consulting. 2014. Preliminary Site Contamination Report. Lot A DP355595 45 Cooks Road Calga. September 2014.

The Preliminary Site Contamination Investigation Report was prepared on behalf of the then owners in support of including Lot A DP 365595 in Planning Proposal PP_2014_GOSFO_006_00. The Planning Proposal related to certain land at Glenworth Valley and Calga and sought to allow a range of nature-based recreational activities and environmentally sustainable tourist accommodation as additional permitted uses under Gosford Local Environmental Plan 2014 (draft Central Coast Environmental Management Plan).

The purpose of the report was to provide a preliminary site investigation to assess any potential contamination on Lot A, and to assess whether the land was suitable or could be made suitable for the proposed rezoned uses having regard to any contamination.

The property was purchased in 1967 as an operational citrus orchard with the majority of the land used for growing lemons and oranges. Use of the property continued as a commercial orchard until the early 1990s when the principal use was changed to cattle grazing.

The previous use of the land as a commercial orchard involved the use of fertiliser (chicken manure) and insect treatment but ceased in the mid-1990s upon the cessation of commercial citrus growing operations. The previous use did involve the storage of diesel fuel and oil for tractors and machinery on the farm, as was, and still is common on many rural properties in the district. This fuel storage was ongoing and was assessed in the report.

At the time of its preparation, the report noted that the then current use of the land was for cattle grazing, and residential use of the dwelling. A small number of orange trees remained; however, these were not considered at that time to be in good health and were, according to the consultant likely to be removed.

The report noted that there have never been any cattle dip facilities on the property, and all cattle were wormed orally and treated for disease by injection rather than by any chemical applications.

The orange trees on the property were not at that time treated with fertiliser or with any insect treatment, and this practice ceased approximately 30 years ago.

Diesel fuel storage for tractors and machinery was still present on the property in a covered, raised tank. There was oil storage recorded in the machinery shed used for servicing tractors and farm machinery. Oil storage was in single drums only, and oil was applied directly from the drum.

The report concluded that there had been no fertiliser or insect treatment used on the land for approximately 20 years and given this length of time and the nature of the products used (chicken manure and enclosed insect baits) it was considered unlikely there was any contamination on the site from the previous use as an orchard.

The consultant concluded that the then current use of the land for cattle grazing was unlikely to have caused any contamination on the land, and there has never been a cattle dip on the property.

There is diesel fuel and oil storage on the property, which was considered common to many rural properties and would be in common with other properties included in the Planning Proposal. This storage may give rise to some very localised contamination in the immediate vicinity of the storage areas.

The report concluded that Lot A DP 365595 was unlikely to be contaminated and was assessed suitable, or could be made suitable, for the uses proposed in the then Planning Proposal.

3.9 SITE HISTORY SUMMARY

A review of NSW state government title records was undertaken by Network Geotechnics in 2013 for the parcels of land with the exception of Lot A in DP365595.

In summary, based on a review of historical and recent aerial photographs and title records, the use of the land parcels has been mostly for farming and pastoral activities and partly for residential and horse agistment. In the past 50 years the Glenworth Valley Company had been formed providing tourism, camping and other

environmentally sustainable recreational activities. Prior to establishment of Glenworth Valley Company, the area was mostly vacant, and a small number of land parcels used for farming and horse agistment. Between about 1954 and 1980, the areas were mostly vacant parcels with some used for farming and residential use. From 1980 to present, the parcels remain mostly vacant with an increase in farming, tourism accommodation, recreational activities, horse agistment and residential use.

Available historical ownership and leasing details are transcribed in **Table 4**.

Table 4: Land Title Records

Date	Title Lot/DP	Volume/ Folio	Notes
13 Dec, 2011	Lots 19,80,89,91,22,32,76 in DP755253	-	The Glenworth Valley Pastoral Company Pty Ltd described as the first schedule.
18 July, 1898	Lots 19,80,89,91,22,32,76 in DP755253	-	Augustine James Kelly (farmer) as the proprietor of the estates
13 Dec, 1955	Lots 19,80,89,91,22,32,76 in DP755253	-	Calga Pastoral Company is listed as the first schedule.
6 Jan, 1947	-	5966/5&6	Public Trustee transfers to Arthur Munro Blakeley (farmer) ½ share with Kevin Thomas Byrne (farmer).
19 May, 1949	-	5966/5&6	Arthur Munro Blakeley (farmer) ½ share with Kevin Thomas Byrne (farmer).
7 June, 1950	22/755253	6252/703	Arthur Munro Blakeley (farmer) ½ share with Kevin Thomas Byrne (farmer) transfer to Calga
28 July, 1959	22/755253	6252/703	Calga Pastoral Company transfer to Henry George Freriecks.
28 Aug, 2007	Lots 20,21,23,24,25,30,37 in DP755221	-	The Glenworth Valley Pastoral Company Pty Ltd described as first schedule.
3 Nov, 1944	Lot 22, Portions 20,21,23,24,25,30 & 37 in DP755221	58/1953	Public Trustee transfer to Joseph Eisman (dry cleaner)
5 April, 1950	Lots 23,21,38,22,44,56 & Portions 23,24,25,30 & 37	593/2116	Joseph Eisman transfers to Calga Pastoral Company Pty Ltd.
28 August, 2007	Lots 64,65 & 68 in DP755221	-	The Glenworth Valley Pastoral Company Pty Ltd is described as the proprietor of the estate.
15 April, 1908	Lots 64,65 & 68 in DP755221	1937/96 & 1823/93	Stephen Michael Kelly is described as the proprietor of Popran, Lower Mangrove
9 Nov, 1944	Lots 64,65 & 68 in DP755221	1937/96 & 1823/93	Public Trustee transfers to Calga Pastoral Company Pty Ltd.
19 April, 1950	Lots 64,65 & 68 in DP755221	1937/96 & 1823/93	Joseph Eisman transfers to Calga Pastoral Company Pty Ltd.

5 Jan, 1973	-	11994/193&194	W.H. Thornley Estates Pty Ltd transfers to Glenworth Valley Pastoral company Pty Ltd.
5 Jan, 1973	81/755221, PT81/755221	9859/139	W.H. Thornley transfer to Glenworth Valley Pastoral Company Pty Ltd.
27 Nov, 1964	81/755221, PT81/755221	9859/139	Calga Pastoral Company Pty Ltd to W.H. Thornley Estates Pty Ltd.
13 April, 1950	85/755221	1823/94	Joseph Eisman transfer to Calga Pastoral Company
9 Nov, 1944	85/755221	1823/94	Public Trustee transfer to Joseph Eisman.
1 Oct, 1907	85/755221	1823/94	Stephen Michael Kelly described as the first schedule
28 Aug, 2007	86 & 87/755221	-	The Glenworth Valley Pastoral Company Pty Ltd (owner)
20 July, 1909	86 & 87/755221	1988/35	The Bank of NSW described as the first schedule.
3 April, 1914	86 & 87/755221	11994/196 & 197	The Bank of NSW transfer to Stephen Michael Kelly (Orchardist & farmer)
3 Nov, 1944	86 & 87/755221	11994/196 & 197	Public Trustee transfer to Joseph Eisman.
13 April, 1950	86 & 87/755221	11994/196 & 197	Joseph Eisman transfer to Calga Pastoral Company
28 Aug, 2007	108/755221	-	The Glenworth Valley Pastoral Company Pty Ltd described as the first schedule.
28 Nov, 1918	-	7256/136	Horace Flint Hayman is now the proprietor of the estate
16 Sept, 1964	-	7256/136	William Trevor Thornley is now the proprietor of the estate
29 Sept, 1972	-	7256/136	William Trevor Thornley transfer to Thomas McIntosh & Susan McIntosh as joint tenants
29 Jan, 1975	-	7256/136	Thomas McIntosh transfer to Glenworth Valley Pastoral Company
14 Dec, 2009	145/755221	-	The Glenworth Valley Pastoral Company Pty Ltd described as the first schedule.
14 Nov, 1941	-	6949/3	Harry Cooke is described as the first schedule.
21 Dec, 1964	-	6949/3	William Trevor Thornley (Milk Vendor) is now the proprietor of the estate.
29 Sept, 1972	-	6949/3	William Trevor Thornley transfer to Barry Wilfred Lawler and Barbara Anne Lawler as joint tenants
28 Aug, 2007	23/755253	-	The Glenworth Valley Pastoral Company Pty Ltd described as the first schedule.
5 March, 1950	Lot 173	255/2123	Kelvin Thomas Byrne & Arthur Munro Blakeley transfer to

			Calga Pastoral Company
28 Aug, 2007	73 & 75/755253	-	The Glenworth Valley Pastoral Company Pty Ltd described as the first schedule.
21 May, 1906	73 & 75/755253	6286/36	Kelvin Thomas Byrne & Arthur M. Blakeley (owners)
13 April, 1951	73 & 75/755253	6286/36	Kelvin Thomas Byrne & Arthur M. Blakeley transfer to Calga Pastoral Company.
16 Sept, 1964	73 & 75/755253	6286/36	Calga Pastoral Company transfer to W.H. Thornley Estates Pty Ltd
29 Sept, 1972	73 & 75/755253	6286/36	W.H. Thornley Estates Pty Ltd transfer to Glenworth Valley Pastoral Company.
7 July, 2009	102/113906	-	First Schedule: Barton Lawler (196/755253) and The Glenworth Valley of the part (1/121001).

In regard to the ownership history of Lot A in DP365595, the records reveal that Mr & Mrs Marler purchased the property in 1967 as an ongoing citrus orchard, growing oranges and lemons. At the height of the operations a substantial part of the property was used for the orchard. Use of the property continued as a commercial orchard until the early 1990s when the importing of oranges impacted on the viability of orchards in the district and led to the closure of packing houses in Gosford. Use of the property as a commercial orchard ceased in the mid-1990s, and the majority of trees were gradually removed.

4.0 UNDERGROUND STORAGE TANKS

This current assessment did not reveal the presence of any underground storage tanks.

5.0 ABOVE GROUND STORAGE TANKS

The contamination site assessment carried out by Michael Leavey Consulting in 2014 in Lot A DP 365595 recorded the presence of an above ground diesel storage facility for tractors and machinery in a covered, raised tank, located at the eastern side of the storage shed close to the dwelling

However, the recent site inspection revealed that this storage had been removed and the site cleared.

Small volume above-ground fuel storage tanks are located in Lot 89 DP755221, the land parcel hosting the main Glenworth Valley Outdoor Adventures precinct.

6.0 SITE INVESTIGATIONS

6.1 INTRODUCTION

Larry Cook (Environmental Consultant) conducted several site inspections in 2021 to complete a site inspection of the various accessible parcels of land and record land use and any potential sites of contamination.

6.2 RECORD OF FIELD AND OFFICE-BASED INVESTIGATIONS

A review of each parcel of land is provided in this section including an aerial photo of each lot and notes regarding the setting, landform, any infrastructure, and potential sources of contamination.

Lot 19 in DP755221

- No infrastructure
- River flat, flank of valley with tall open eucalypt forest in the central north and south-east parts of the lot
- Access track through axis of river flat
- No significant contamination observed
- No potential sources of contamination observed

Lot 20 in DP755221

- No infrastructure
- River flat, mangroves and flank of valley with tall open eucalypt forest
- No significant contamination observed
- No potential sources of contamination observed

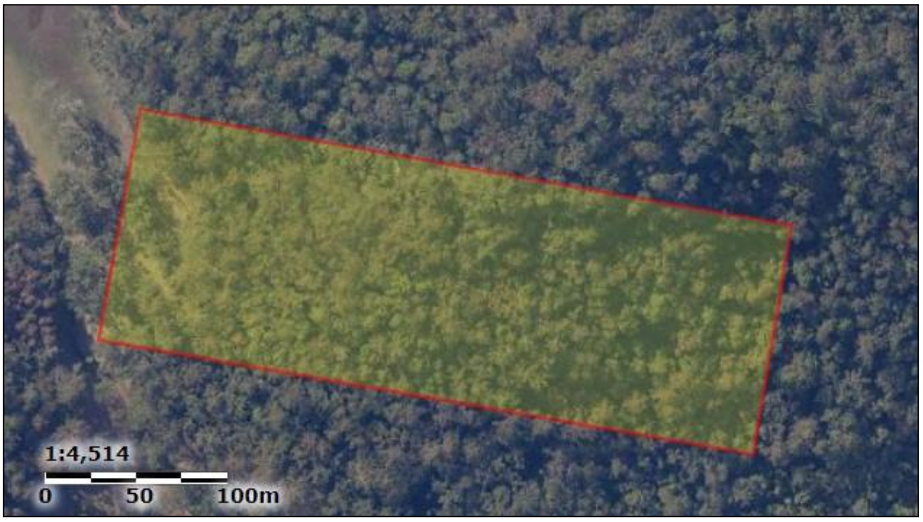
Lot 21 in DP755221

- No infrastructure
- River flat, mangroves and flank of valley with tall open eucalypt forest
- Access track on river flat in south-eastern part
- No significant contamination observed
- No potential sources of contamination observed

Lot 23 in DP755221

- No infrastructure
- Mainly flank of valley with tall open eucalypt forest with minor river flat
- No significant contamination observed
- No potential sources of contamination observed

Lot 24 in DP755221



- No infrastructure
- Minor river flat in west and flank of valley with tall open eucalypt forest
- No significant contamination observed
- No potential sources of contamination observed

Lot 25 in DP755221

- No infrastructure
- Mainly river flat and flanks of valley with tall open eucalypt forest
- Access track across river flat in north-western part
- No significant contamination observed
- No potential sources of contamination observed

Lot 30 in DP755221

- No infrastructure
- Mainly river flat and flank of valley with tall open eucalypt forest to east
- Access track along forest edge in eastern part
- No significant contamination observed
- No potential sources of contamination observed

Lot 31 in DP755221

- No infrastructure
- Mainly river flat and flanks of valley with tall open eucalypt forest
- No significant contamination observed
- No potential sources of contamination observed

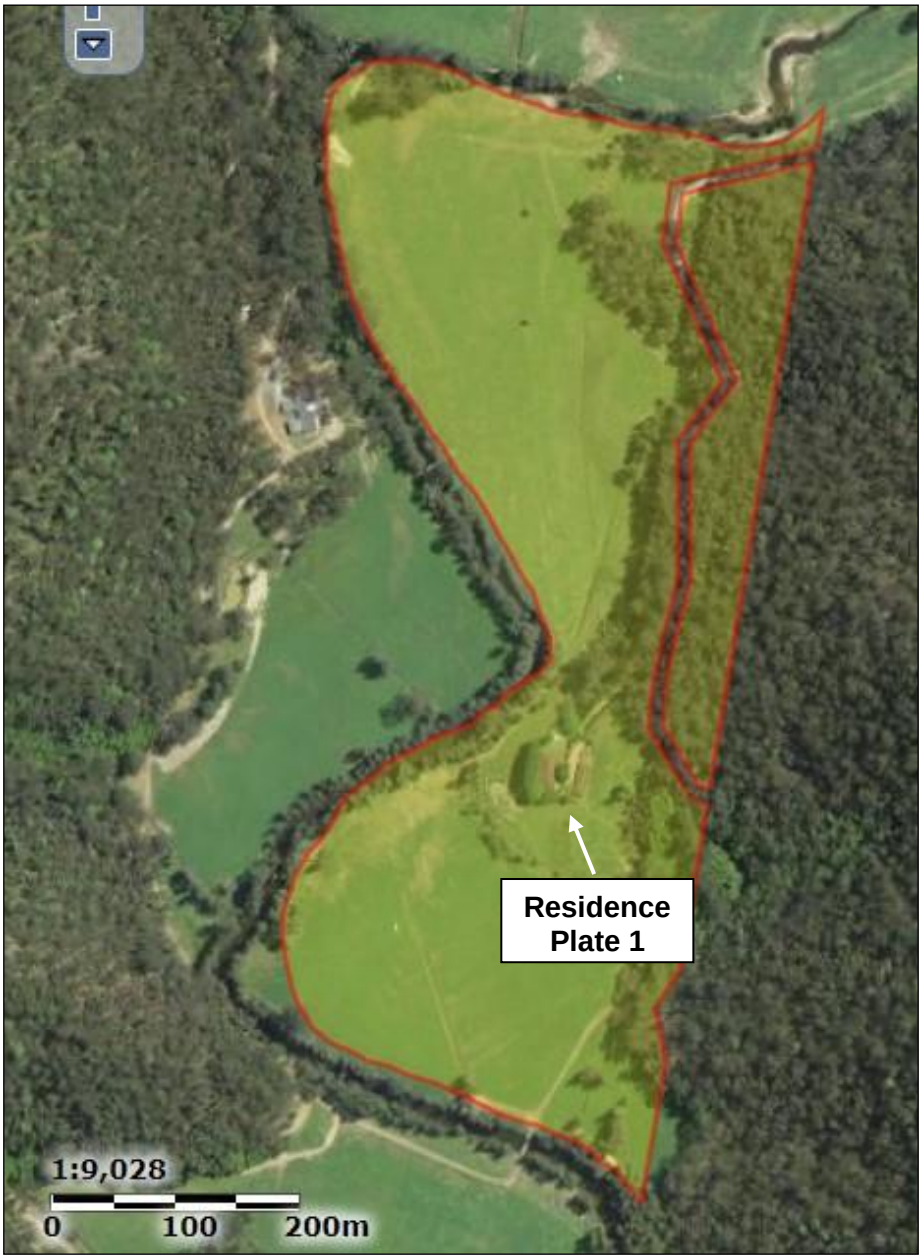
Lot 32 in DP755221

- No infrastructure
- Mainly river flat and mangroves?
- No significant contamination observed
- No potential sources of contamination observed

Lot 33 in DP755221

- No infrastructure
- Mainly river flat
- No significant contamination observed
- No potential sources of contamination observed

Lot 37 in DP755221

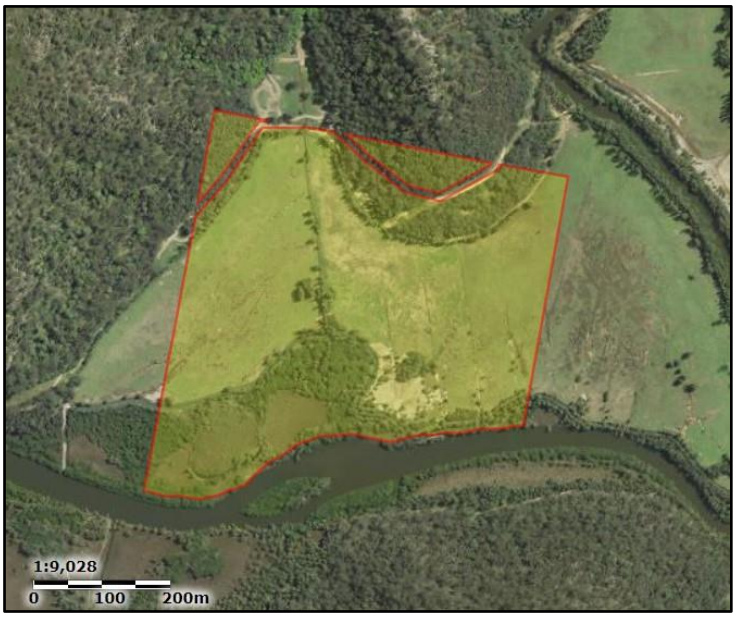


- Dwelling and pool (**Plate 1**)

Plate 1 Residence

- Mainly river flat and flank of valley with tall open eucalypt forest to east
- Access track to dwelling and in southern part
- No significant contamination observed
- Potential source of contamination associated with an On-Site Sewage Treatment system (OSSM) that treats all wastewater generated from the dwelling. The OSSM is Council approved with a current permit to operate. There are no signs of imminent or present failure of the OSSM.

Lot 50 in DP755221



- No infrastructure
- Mainly river flat and mangroves in the southern part
- Access track in central northern part and in north-east
- No significant contamination observed
- No potential sources of contamination observed

Lot 53 in DP755221

- No infrastructure
- Mainly flank of valley with tall open eucalypt forest and minor river flat in the eastern part
- Access track dissects eastern part at base of valley flank
- No significant contamination observed
- No potential sources of contamination observe

Lot 64 in DP755221

- No infrastructure
- Mainly flank of valley with tall open eucalypt forest and minor river flat
- Access track in northernmost part
- No significant contamination observed
- No potential sources of contamination observed

Lot 65 in DP755221

- No infrastructure
- Tall open eucalypt forest
- Access track to south-east of site
- No significant contamination observed
- No potential sources of contamination observed

Lot 68 in DP755221

- No infrastructure
- River flat in western part and flank of valley with tall open eucalypt forest in eastern part
- Access track in north-western part
- No significant contamination observed
- No potential sources of contamination observed

Lot 81 in DP755221

- No infrastructure
- Mangroves and flank of valley with tall open eucalypt forest to the south
- No significant contamination observed
- No potential sources of contamination observed

Lot 82 in DP755221

- No infrastructure
- Dominantly flank of valley with tall open eucalypt forest to the south with mangroves in northernmost part
- No significant contamination observed
- No potential sources of contamination observed

Lot 85 in DP755221

- No infrastructure
- Dominantly flanks of valley with tall open eucalypt forest to the north-west and eastern parts with mangroves in south-western part and river flat in the central southern part
- Access track in central southern part
- No significant contamination observed
- No potential sources of contamination observed

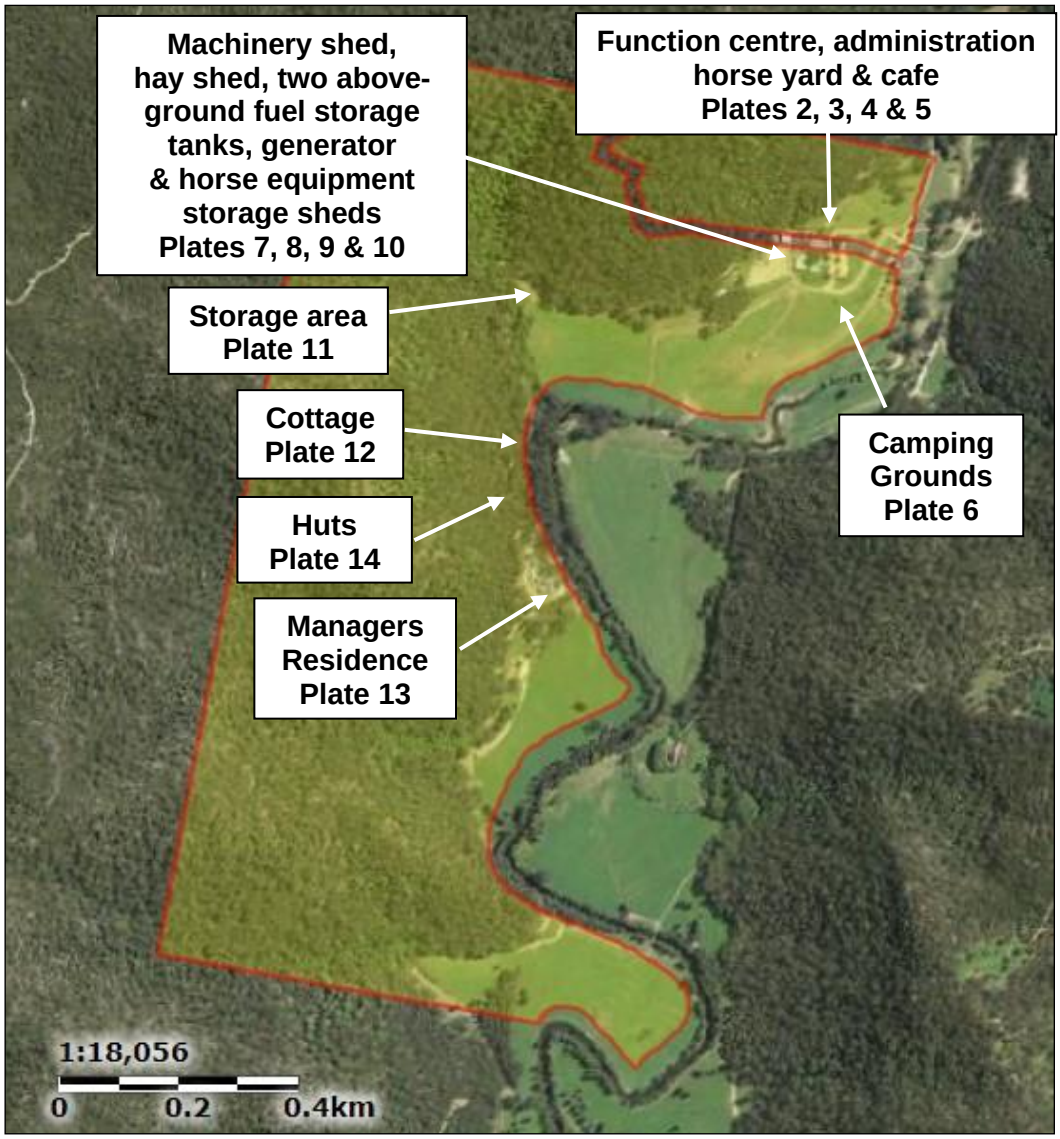
Lot 86 in DP755221

- No infrastructure
- Dominantly flank of valley with tall open eucalypt forest to the east and river flat in the westernmost part
- No significant contamination observed
- No potential sources of contamination observed

Lot 87 in DP755221

- No infrastructure
- Dominantly flank of valley with tall open eucalypt forest to the east and north-west and river flat in the south-western part
- No significant contamination observed
- No potential sources of contamination observed

Lot 89 in DP755221



- Glenworth Valley Outdoor Adventures Precinct
- Flank of valley with tall open eucalypt forest to west and river flat in north-eastern an, central western and south-eastern parts of lot
- Access tracks along river flats
- Infrastructure is associated with Glenworth Valley Adventures and ancillary structures

Function centre	Plate 2
Administration	Plate 3
Horse mounting yard	Plate 4
Cafe	Plate 5
River flats with occasional camping, recreation activities and events	Plate 6
Hay shed	Plate 7
Machinery/maintenance sheds	Plate 8
Back-up generator	Plate 9
Horse equipment and storage	Plate 10
Storage areas	Plate 11
Cottage	Plate 12
Managers dwelling	Plate 13
Huts	Plate 14

Plate 2 Function Centre

Plate 3 Administration

Plate 4 Horse Mounting Yard

Plate 5 Cafe

Plate 6 Horse Activities and Camping Areas

Plate 7 Hay Shed and Above Ground Fuel Storage

Plate 8 Machinery/Maintenance Shed

Plate 9 Shed and Back-Up Generator

Plate 10 Horse Equipment and Storage

Plate 11 Storage Area

Plate 12 Cottage

Plate 13 Managers Residence

Plate 14 Huts

- Access tracks peripheral to, and across river flats
- No significant contamination observed
- A potential source of contamination is associated with an On-Site Sewage Treatment system (OSSM) connected to the function centre, administration/office, cottage and dwelling and two 1,500 L above ground storage tanks located adjacent to the hay shed.

The OSSMs treat all wastewater generated from the various infrastructure. The OSSMs are Council approved with current permits to operate. There are no signs of imminent or present failure of the OSSM. Details of the OSSMs are as follows:

1. Primary treatment at office/administration in a dual poly tank treatment system with disposal via absorption trench (**Plate 15**)

Plate 15 Wastewater Treatment Tank - Administration

2. Secondary treatment of all wastewaters generated from the function centre in a recently installed commercial five-tank aerated wastewater treatment system (**Plate 16**). Treated wastewater is discharged via sub-surface drip irrigation north of the facilities.

Plate 16 Wastewater Treatment Tanks – Function Centre

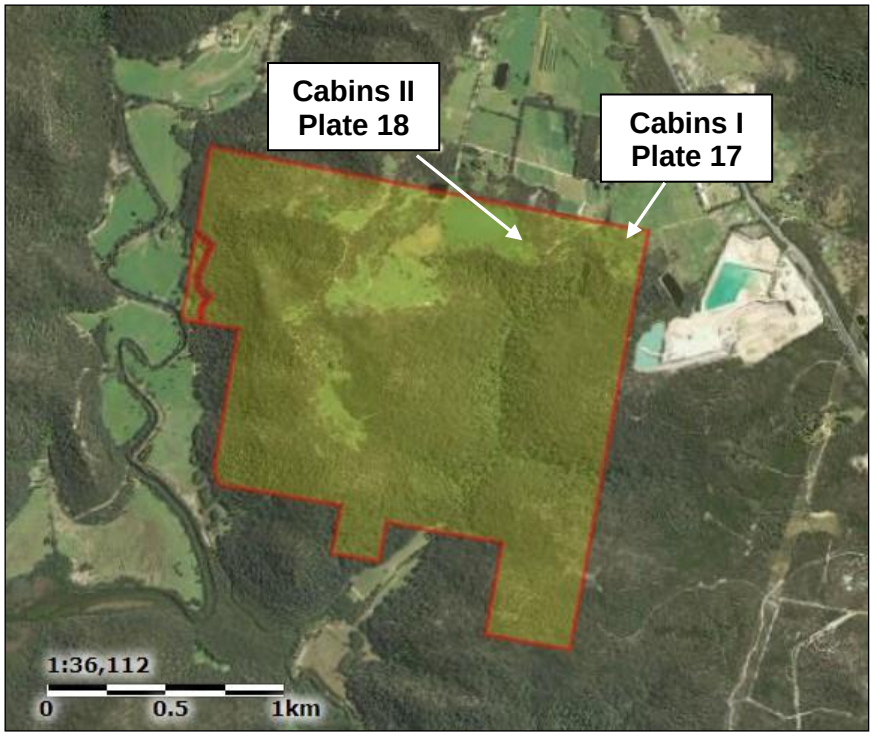
3. Secondary treatment of all wastewater generated from the dwelling and cottage south-west of the function centre. Recently installed domestic 10-person aerated wastewater treatment systems. Treated wastewater is discharged via sub-surface drip irrigation close to the buildings

- Glenworth Valley Outdoors host camping, music festivals and other major public events from time to time (so far prior to the Covid-19 pandemic). Wastewater from campers is managed by the on-site facilities. Wastewater generated from the occasional large event attendances are managed by portable toilet contractors subject to Council approval.
- A potential local source of contamination is the above-ground fuel storage located in the maintenance and equipment storage precinct. The tank is suitably bunded and Council approved.

Lot 91 in DP755221

- No infrastructure
- Access track in easternmost part of lot proximal to flank of valley with tall open eucalypt forest to the west
- No significant contamination observed
- No potential sources of contamination observed

Lot 108 in DP755221



- Two sets of recently constructed *Farm Stay* accommodation located in the north-eastern part of lot (**Plates 17 and 18**)

Plate 17 Cabins I

Plate 18 Cabins II

- Access tracks in north-eastern part and central northern historically cleared areas
- Dominantly tall open eucalypt forest with historically cleared rural/grazing land in the central northern part
- A potential source of contamination is associated with the On-Site Sewage Treatment systems (OSSMs) connected to the Farm Stay accommodation with consists of two sets of two cabins

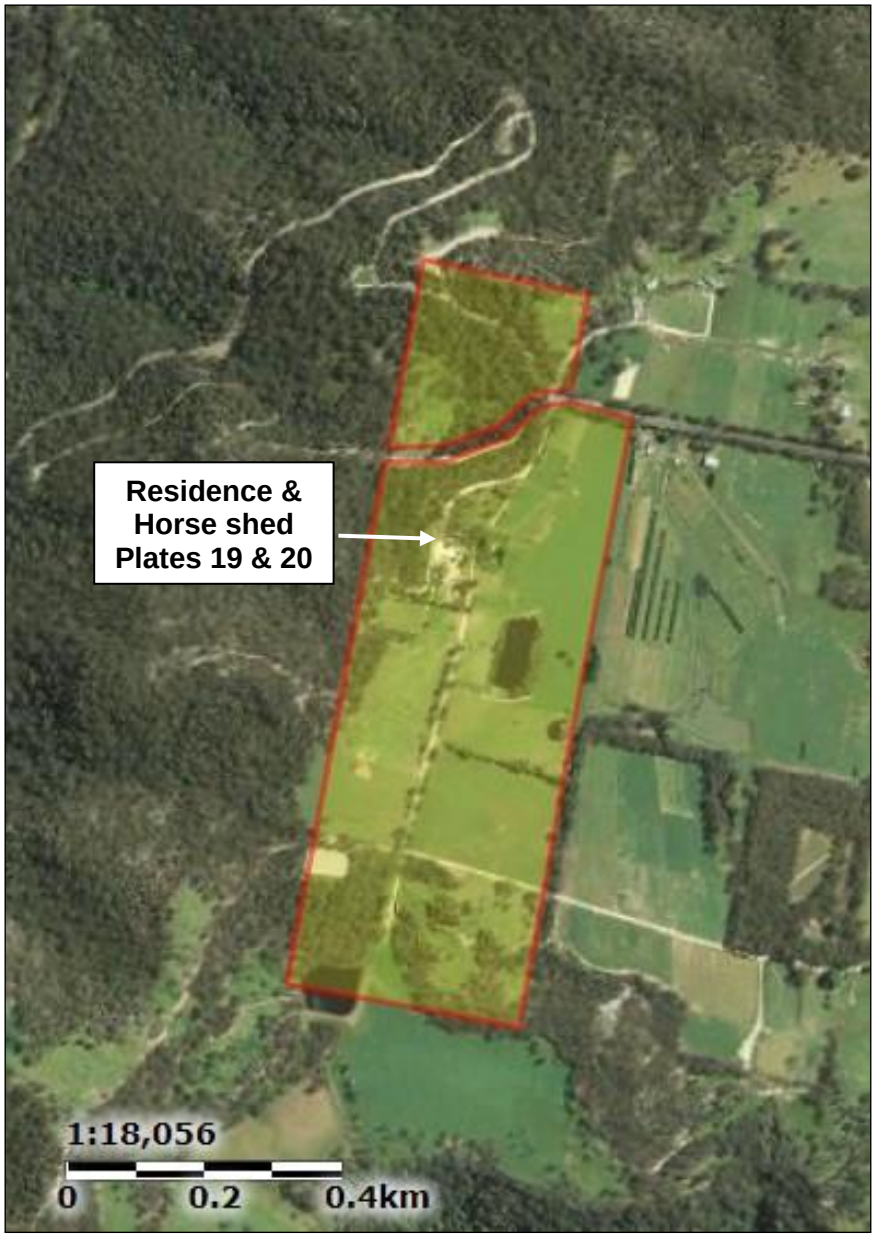
The OSSMs treat all wastewater generated from the cabins. The OSSMs are Council approved with current permits to operate.

Secondary treatment of all wastewater generated from the cabins. A NSW Health and Council approved 10-person Aerated Wastewater Treatment system (AWTS) is attached to each cluster of two cabins. Treated wastewater is discharged via sub-surface drip irrigation close to the sets of cabins

It is understood that cattle grazing is a permitted use of the land in the cleared central northern part

- No significant contamination observed
- No potential sources of contamination observed

Lot 145 in DP755221



- Active horse adjustment, horse arena, stables and yards located in the northern to central part of lot (**Plates 19 and 20**). Open to signed-up customers and clientele

Plate 19 Horse Shed

- A three-bedroom dwelling is located in the central northern part (**Plate 20**).

Plate 20 Residence

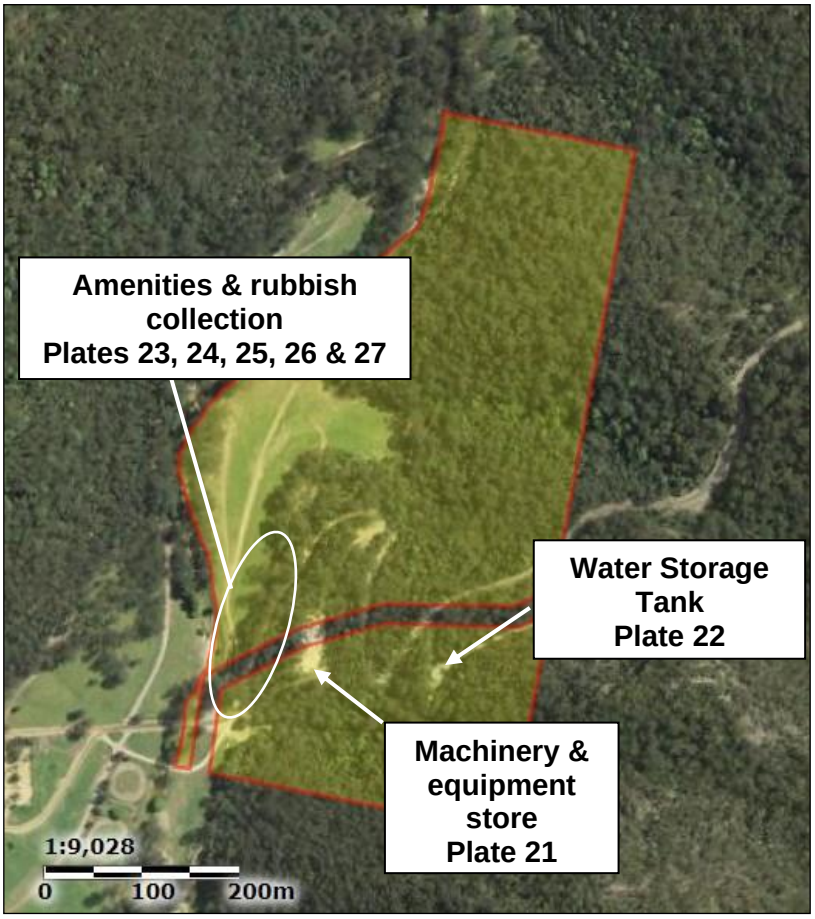
- A network of access tracks across the lot
- A farm dam is located in the central eastern part
- Tall open eucalypt forest in the northern part with historically cleared rural/grazing land in the central and southern part
- A potential source of contamination is associated with the On-Site Sewage Treatment systems (OSSMs) connected to the dwelling

The OSSM treats all wastewater generated from the dwelling. The OSSM is Council approved with a current permit to operate.

It is understood that equine activities are a permitted use of the land in the cleared central and southern parts

- No above ground fuel storage
- No significant contamination observed
- No potential sources of contamination observed

Lot 22 in DP755253



- Flank of valley with tall open eucalypt forest in the eastern and central parts and river flat in western part of lot
- A sinuous access road winds down from the east into Glenworth Valley. A network of access tracks crosses the river flats in the western part
- An equipment and machinery depot with several storage sheds and shipping containers (**Plate 21**). No fuel storage visible

Plate 21 Equipment and Machinery Depot

- A large volume water storage tank is located on the eastern side of the Glenworth Valley access road (**Plate 22**)

Plate 22 Water Storage Tank

- Glenworth Valley Outdoors host camping, music festivals and other major public events from time to time (so far prior to the Covid-19 pandemic). Wastewater from campers is managed by the on-site facilities. Wastewater generated from the occasional large event attendances are managed by portable toilet contractors subject to Council approval.

A potential source of contamination is associated with two composting toilet systems and a 'pump out' system installed as amenities for campers (**Plates 23, 24 and 25**). The amenities are Council approved with current permits to operate. There are no signs of imminent or present failure of the amenities.)

Plate 23 Toilet Amenities

Plate 24 Toilet Amenities

Plate 25 Toilet Amenities

Temporary waste storage centres located in dedicated accessible locations are shown in **Plates 26 and 27**.

Plate 26 Waste Storage Centre

Plate 27 Waste Storage Centre

- Glenworth Valley Outdoors host camping, music festivals and other major public events from time to time (so far prior to the Covid-19 pandemic). Wastewater from campers is managed by the on-site facilities. Wastewater generated from the occasional large event attendances are managed by portable toilet contractors subject to Council approval.
- No significant contamination observed

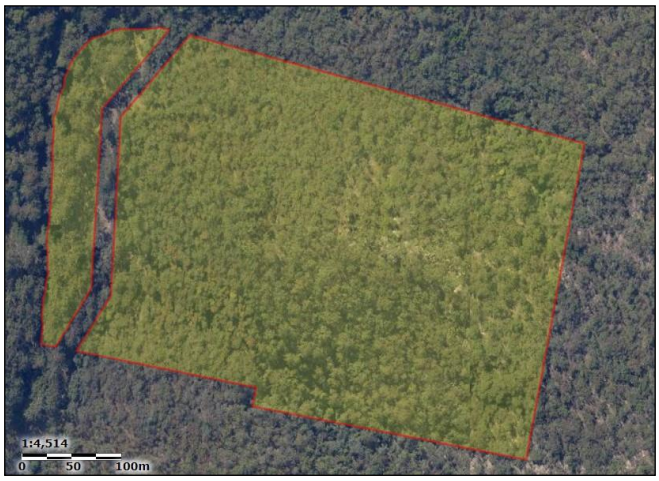
Lot 23 in DP755253

- No infrastructure
- Majority of tall open eucalypt forest with narrow river flat
- No significant contamination observed
- No potential sources of contamination observed

Lot 32 in DP755253

- No infrastructure
- Access track dissects the lot on edge of river flat
- Flank of valley with tall open eucalypt forest to the west and river flat in the eastern part
- River flat used for campers
- No significant contamination observed
- No potential sources of contamination observed

Lot 73 in DP755253



- No infrastructure
- Tall open eucalypt forest
- No significant contamination observed
- No potential sources of contamination observed

Lot 75 in DP755253

- No infrastructure
- Tall open eucalypt forest
- No significant contamination observed
- No potential sources of contamination observed

Lot 76 in DP755253

- No infrastructure
- Tall open eucalypt forest
- No significant contamination observed
- No potential sources of contamination observed

Lot A in DP365595

Lot A (the site) slopes to the south from the northern Cooks Road boundary, with a gentle north-south amphitheatre-like profile, down towards a relatively large rural dam located in the central part close to the southern boundary. The highest elevation of the land is the north-east corner on the Cooks Road boundary.

The site is currently mainly used for cattle grazing. A small number of citrus trees (oranges) remain on the property; however, these are not in commercial production.

Built improvements on the property include a dwelling house, garage/ storage area, a storage shed, machinery/hay shed and a small set of cattle yards on Cooks Road adjacent to the entry to the Site. Other improvements include fencing and an irrigation system fed from the on-site dam. The location of built improvements is shown on the enclosed aerial photo acquired by satellite in August 2021.

Land surrounding the Site is rural in nature and utilised for horticulture and grazing. Areas of native vegetation remain. To the west of the Site is the Glenworth Valley recreational/ tourist facility, which is accessed by Cooks Road. An aircraft navigation station operated by the Civil Aviation Authority is located to the north-east. The Calga Sand Quarry is located approximately 1 km to the south-east.

- Plateau area underlain by sandy loam soil developed atop strongly weathered Hawkesbury Sandstone.
- Historically cleared for grazing and agriculture. Remnant vegetation in the north-east
- Access tracks throughout farm
- Brick dwelling and adjacent weatherboard cottage, and car port
- Operational citrus orchard
- Evidence of cropping and cattle grazing
- Farm dam in the southern central part of the lot
- Infrastructure and ancillary structures

Plate 28 Residence and Cottage

Plate 29 Hay Shed

Plate 30 Storage Shed

Plate 31 Cattle Yards

Plate 32 Orchard

Lot 1 in DP617088

- No infrastructure
- Tall open eucalypt forest
- No significant contamination observed
- No potential sources of contamination observed

Lot 3 in DP617088

- No infrastructure
- Dominantly river flat with mangroves in southern part and tall open eucalypt forest long western boundary
- No significant contamination observed
- No potential sources of contamination observed

Lot 881 in DP563889

Lot 881 is located immediately north of Cooks Road boundary and north of Lot A.

The site is partly cleared and currently used for horse/cattle grazing.

Built improvements on the property include two dwelling houses in the central western and central eastern parts with adjoining machinery sheds and defined managed paddocks.

Land surrounding the Site is rural in nature and utilised largely for grazing. Areas of native vegetation remain to the west, Glenworth Valley.

- No significant contamination observed
- Potential very local sources of contamination possibly associated with the machinery sheds and rural use of the land.

Lot 1 in DP1222754

- No infrastructure
- Tall open eucalypt forest
- No significant contamination observed
- No potential sources of contamination observed

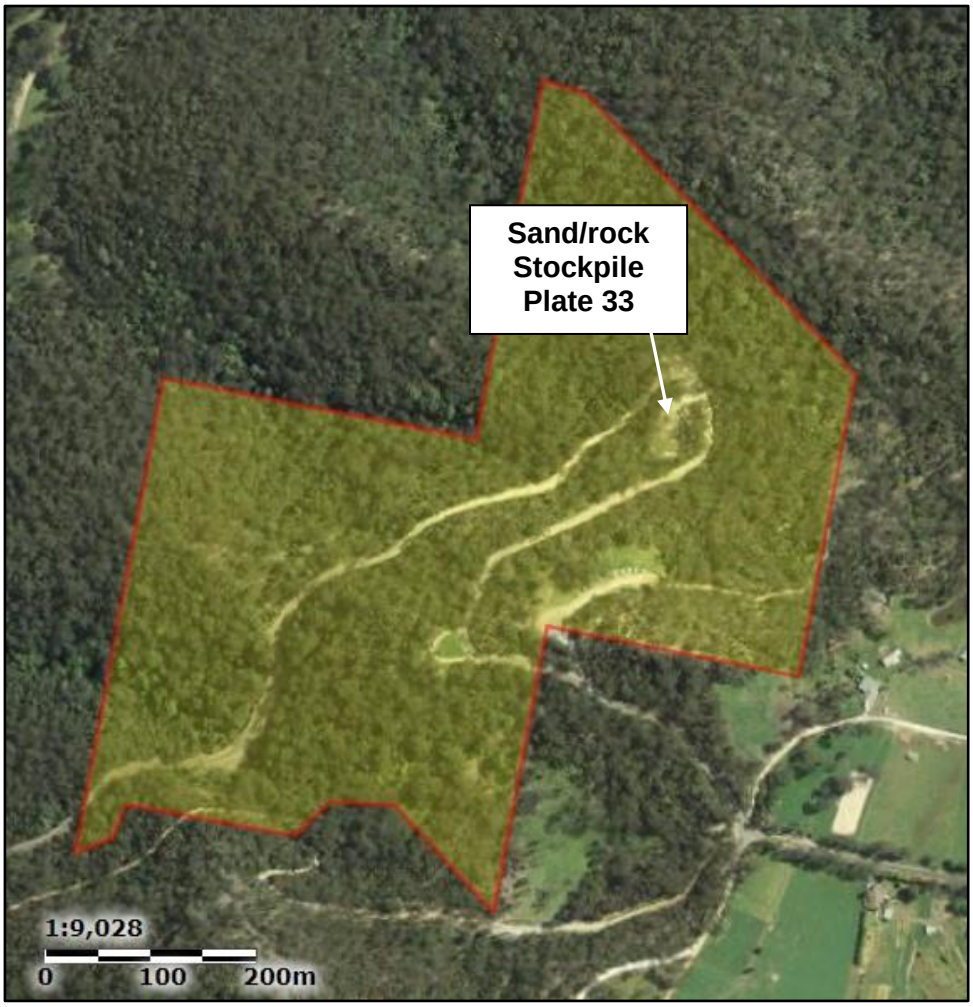
Lot 7 in DP1230083

- No infrastructure
- Dominantly tall open eucalypt forest with possible minor development of mangrove in the northern part adjacent to the waterway.
- No significant contamination observed
- No potential sources of contamination observed

Lot 245 in DP48817

- No significant infrastructure. Small portable amenities in the north-western part
- Dominantly tall open eucalypt forest with minor river flat on the western end.
- Network access tracks in the westernmost part.
- No significant contamination observed
- No potential sources of contamination observe

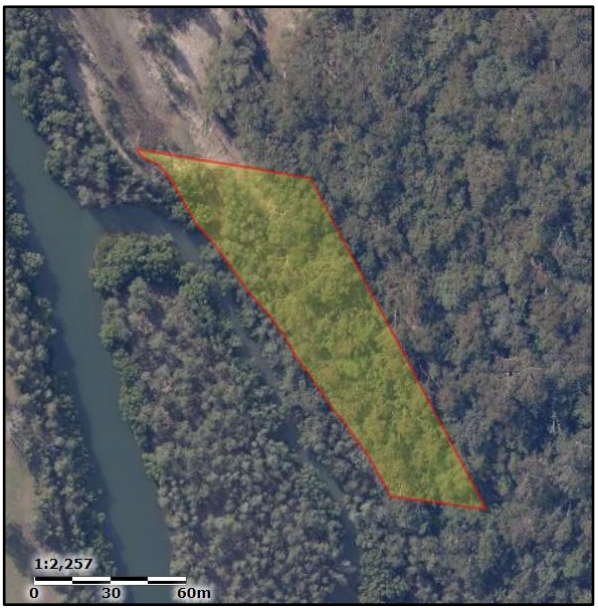
Lot 7012 in DP1059767



- Dominantly tall open eucalypt forest with relative steep slopes.
- Main sinuous access road into Glenworth Valley.
- No significant contamination observed
- No potential sources of contamination observed
- Sand/rock stockpile (**Plate 34**)

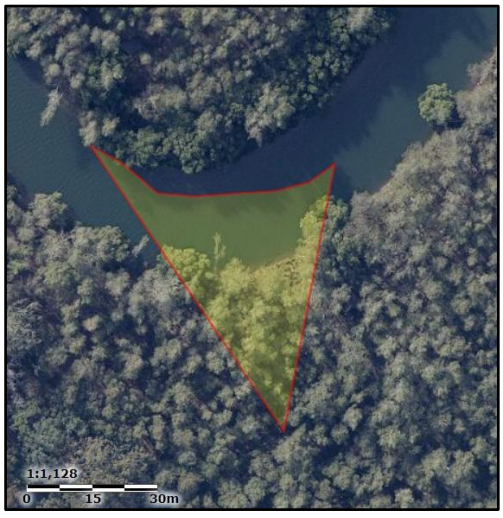
Plate 33 Sand Stockpile

Lot 7029 in DP93603



- No infrastructure
- Dominantly tall open eucalypt forest with possible minor development of mangrove along western and northern parts adjacent to the waterway.
- No significant contamination observed
- No potential sources of contamination observed

Lot 7035 in DP1051932



- No infrastructure
- Dominantly tall open eucalypt forest with possible development of mangrove in northern part adjacent to the waterway.
- No significant contamination observed
- No potential sources of contamination observed

Lot 7036 in DP1059768

- Tall open eucalypt forest and river flat.
- Network access tracks in the westernmost part.
- No significant contamination observed
- No potential sources of contamination observed

Lot 7303 in DP1154929

- Sinuous tree-lined Popran Creek.
- No significant contamination observed
- No potential sources of contamination observed

Lot C in DP382358

- Dominantly tall open eucalypt forest with cleared central area.
- Access track in south-eastern corner and cottage (constructed in 1980s)
- No significant contamination observed
- Council-approved On-Site Sewage Management system (OSSM) treats all wastewater from eh cottage with disposal via absorption trench
- No potential sources of contamination observed

Lot 2 in DP1139242

- Dominantly cleared land with tall open eucalypt forest in south-western part.
- Access tracks dissect the land.
- Cottage in north-eastern corner (constructed in 1950s and observed in 1961 aerial coverage)
- No significant contamination observed
- Council-approved On-Site Sewage Management system (OSSM) treats all wastewater from eh cottage with disposal via absorption trench
- No potential sources of contamination observed

Lot 882 in DP563889

Lot 882 is located immediately north of the Cooks Road - Peats Ridge Road intersection.

The site is mostly cleared and currently used for horse/cattle grazing.

Built improvements on the property include a rural/machinery shed in the central part (1970s) and a dwelling in the south-eastern part that is observed in the 1991 aerial photography (built in 1980s).

Land surrounding the Site is rural in nature and utilised largely for grazing.

- No significant contamination observed
- Potential for very local sources of contamination possibly associated with the machinery shed and rural use of the land.

Pt Lot 102 in DP1139060

- No infrastructure
- Tall open eucalypt forest with clearing in north-eastern part
- No significant contamination observed
- Potential source of localised contamination associated with a temporary cluster of poly water tanks and machinery and metal framework deposited in the cleared area in the north-eastern part close to Peats Ridge Road.

Lot 7039 in DP1059766

- No infrastructure
- Dominantly tall open eucalypt forest with small clearings in central eastern and south-eastern parts
- Access tracks observed in the south-eastern corner, central eastern part, and the main access road down into Glenworth Valley
- No significant contamination observed
- No potential sources of contamination observed

Lot 7303 in DP1161109

- No infrastructure
- Dominantly tall open eucalypt forest
- Access track observed along the eastern Peats Ridge Road boundary
- No significant contamination observed
- No potential sources of contamination observed

6.3 DETAILED SITE INVESTIGATIONS – 20TH AUGUST 2021

A general inspection of the majority of the land parcels that are undeveloped and detailed investigations of those lands that are developed was carried out on 20th August 2021. The objectives were:

- Document land use and record details of any developments.
- Collect strategically located soil samples near potentially contaminated areas.

In this regard, strategic soil sampling was carried out in two locations in Lot A DP365595 where potential contamination could occur. Descriptions of the soil sampling program, methodology and results of field and laboratory testing are documented in Sections 7.4 and 7.5.

6.4 POTENTIALLY CONTAMINATED SOIL

The previous historic use of the land in Lot A DP 365595 as a commercial orchard involved the use of fertiliser (chicken manure) and insect treatment but ceased in the mid-1990s once the orchard ceased commercial operations. The previous use did involve the storage of diesel fuel and oil for tractors and machinery, as is common on many rural properties in the area.

However, the current use of the land is largely for cattle grazing, and residential use of the dwelling, cottage and car port in the north-western corner. A small number of orange trees remain in two moderately long and two relatively small rows.

As documented earlier in this report, there has never been any cattle dip facilities on the property, and all cattle are wormed orally and treated for disease by injection rather than by any chemical applications.

Anecdotal evidence indicates that the orange trees on the property were not at that time treated with fertiliser or with any insect treatment, and this practice ceased approximately 30 years ago.

Diesel fuel storage for tractors and machinery was still present on the property in a raised tank in 2014 however, this storage has been removed. There is oil storage recorded in the machinery shed used for servicing tractors and farm machinery. Oil storage is still in single drums only, and oil is apparently applied directly from the drum.

Based on the site history documented in this investigation and assessment, the site inspections and information provided by the local residents, the following areas of potential environmental concern are listed below in **Table 5**.

Table 5: Potential Contaminants of Concern

Potential Contaminants	Historical Activities	Dispersion Mechanism & Areas of Environmental Concern (AEC)
Petroleum Hydrocarbons Total Recoverable hydrocarbons (TRH) Benzene Toluene Ethylbenzene, Xylenes (BTEX)	Storage of petroleum products on the Site over at least 60 years in the storage sheds in Lot A, in particular the larger shed now used for hay storage.	Potential residual hydrocarbons associated with the petroleum product store on the Site and any localised on-site spillage associated with these activities.
Heavy Metals	Storage of petroleum products on the Site over at least 60 years in the storage sheds in Lot A, in particular the larger shed now used for hay storage.	Potential residual hydrocarbons associated with the petroleum product store on the Site and any localised on-site spillage associated with these activities.
Pesticides and insecticides. Organophosphorus pesticides Organochlorine pesticides	Potential use in orchard management operations, in particular the management of pests and insects	Unlikely but potential residual accumulation of organophosphorus and organochlorine chemicals in soils surrounding and downslope of the citrus rows.

6.5 SOIL SAMPLING AND TESTING

The scope of this investigation included a contingency for targeted (strategic) soil sampling to assess the type, degree and extent of any contamination over parts of Lot A DP365595 where farming activities were noted, in particular storage of petroleum products including petrol, diesel, oils and grease and possible use of insecticides and pesticides in the management of the citrus orchard.

7.0 SOIL ASSESSMENT CRITERIA

In evaluating potentially contaminated sites, a series of soil acceptance criteria should be adopted to assess the on-site contaminant concentrations of various environmental media.

7.1 NATIONAL ENVIRONMENT PROTECTION MEASURE

The National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM 1999) is made under the national Environment Protection Council Act 1994. The NEPM 1999 was amended in 2103 (16th May 2013).

The NSW EPA has endorsed the National Environment Protection (Assessment of Site Contamination) Amendment Measure (2013) 'Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater'. The NEPM provides a framework for the use of investigation and screening levels for soil, soil gas and groundwater. The framework is predicted on a matrix of human health, ecological and groundwater investigation and screening levels in conjunction with guidance for specific Contaminants of Concern (COC). The investigation levels and screening levels in the NEPM are the concentrations of a COC above which further appropriate investigation and evaluation would be required.

The guidelines are described as follows:

Health Investigation Levels (HILs)

Levels listed for a range of metal and organic substances applicable to assessing human health risk via all relevant pathways of exposure.

Health Screening Levels (HSLs).

For BTEX, TRH and naphthalene compounds applicable to assessing human health risk via the inhalation and direct contact pathways.

Ecological Investigation Levels (EILs)

Levels for selected metal and organic substances applicable for assessing risk to terrestrial ecosystems.

Ecological Screening levels (ESLs)

Levels for BTEX, Total Petroleum Hydrocarbons (TPH) and benzo(a)pyrene compounds applicable for assessing the risk to terrestrial systems.

Petroleum Hydrocarbon Management Limits (Management Limits)

Applicable to TRH compounds only. The NEPM states that these Management Limits are applicable as screening levels following an evaluation of human and ecological risks and risks to groundwater resources. The Management Limits are relevant for operating sites where significant sub-surface leakage of Total Petroleum Hydrocarbons (TPH) compounds has occurred and when decommissioning industrial and commercial sites.

Levels are provided for soil and groundwater in the NEPM for four (4) types of land uses:

A Residential A with garden/accessible soil also includes children's day care centres, preschools and primary schools.

B Residential B with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.

C Recreational C includes public open space such as parks, playgrounds, playing fields (e.g., ovals), secondary schools and unpaved footpaths.

D Commercial/industrial D includes premises such as shops, offices, factories and industrial sites.

Given the subject sites are predominantly open spaces the most appropriate soil assessment criterion for this investigation is **Recreational C**. In general, the NEPM recommend site conditions be compared against the guidelines in a staged manner, firstly to assess for exceedances of the HSL's and the need for a Health Risk

Assessment prior to assessment against the ESL's and consideration of potential migration or exposure pathways, followed by an assessment of the physical and aesthetic suitability of the medium.

7.2 AESTHETIC CRITERIA

The NEPM (2013) *Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater* advises that there are no specific numeric aesthetic guidelines, however site assessment requires balanced consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity.

General assessment considerations include:

- that chemically discoloured soils or large quantities of various types of inert refuse, particularly if unsightly, may cause ongoing concern to site users;
- the depth of the materials, including chemical residues, in relation to the final surface of the site;
- the need for, and practicality of, any long-term management of foreign material.

7.3 WASTE CLASSIFICATION CRITERIA

Liquid and non-liquid waste designated for disposal shall be assessed in accordance with the NSW EPA Waste Classification Guidelines (DECCW; 2009). Guidelines are defined for the specific contaminant concentration (SCC) and the toxicity characteristics leaching procedure (TCLP). To establish waste classification using both SCC and TCLP, the test values for each chemical contaminant must be compared with the threshold values set in Table 2 of the guidelines.

Classification	SCC value	TCLP value
General solid waste	≤ SCC1	≤ TCLP1
Restricted solid waste	≤ SCC2	≤ TCLP2
Hazardous waste	> SCC2	> TCLP2

7.4 SOIL SAMPLING

7.4.1 OBJECTIVES

A site-specific sampling program was developed for parts of Lot A in DP365595 with the objective of assessing potential soil contamination at the Areas of Environmental Concern (AEC) identified during the site history review and site investigation in August 2021, namely the small remaining citrus rows in the 'old' orchard and immediately downslope of the machinery shed that has drum-stored petroleum fuels and oils. Soil samples were selected to assess soil conditions at the AEC targets on the Site.

Soil samples were selected for analysis based on the stratigraphic conditions, land use and as to provide an understanding of potential contamination vertically and laterally.

7.4.2 SAMPLING PROCEDURE

Sample locations were excavated manually using a hand-operated auger, spot excavations or trenching. Soil descriptions and site coordinates were recorded in the field. Soil logging procedures followed a systematic and standardised format providing a classification of the soil group based on particle size and structure. Field tests and observations were conducted to distinguish between soil composition, condition, and structure.

All soil samples were collected in accordance with industry standard QA/QC procedures. A minimum 1 kg sample was collected at designated sample locations and depths with disposable sterile nitrile gloves and placed directly into sterile glass containers and bags (for asbestos identification). Sample containers were individually labelled with identification numbers, dates, and location clearly marked on the container. Samples were submitted to the project laboratory accompanied by Chain of Custody (COC) documentation.

Sample equipment was washed down and decontaminated between sample sites to prevent potential cross contamination.

7.4.3 SOIL SAMPLING

Larry Cook Consulting (Senior Environmental Consultant Larry Cook) conducted a program of soil sampling on 20th August 2021.

Hand dug excavations were located downslope of the large machinery shed and within rows of citrus in the remnant orchard. The locations of the soil sampling sites are shown in **Figure 5**. The soil investigations revealed moderately thick colluvial soils with poorly developed skeletal profiles between approximately 0.30 and 0.60 m thickness.

The soils were classified according to the textural classification in AS/NZS 1547:2012. A summary soil classification for the soils encountered in the soil investigations is presented in **Table 6**.

Table 6
Summary Soil Profile

TOPSOIL/ COLLUVIAL	0.00 - 0.20 m Sandy Loam. Yellow-brown to grey-brown topsoil/colluvium. Common amounts of organic material. Dry and loose. Average thickness: 0.20 m Average interval: 0.00 - 0.20 m
COLLUVIAL	0.20 - 0.60 m Sandy Loam. Yellow-brown to pale yellow. Quartz dominant and medium to coarse grained. Common strongly weathered sandstone fragments to 20 mm below about 0.40 m depth. Dry and semi dense. Average thickness: >0.40 m Average interval: 0.20 - >0.60 m

A total of two soil samples were collected from excavations at strategically located sites considered to be potentially contaminated. Soil samples were collected between approximately 0.20 and 0.40 m depth. A primary soil sample was collected from each excavation.

A summary of soil sample locations and soil descriptions is provided in **Table 7**. In summary, the soil profile is interpreted to be dominantly in-situ natural material associated with the weathering of the underlying sedimentary rock (Hawkesbury Sandstone).

Table 7 Summary Details - Soil Samples

Sample ID	Location	Coordinates		Description
		E	N	
S1	SE corner of Site close to boundary	0333333	6302536	Yellow-brown to grey-brown topsoil/colluvium. Common amounts of organic material. Dry and loose. .
S2	Eastern part of Site on central part of eastern boundary	0333399	6202705	Yellow-brown to pale yellow. Quartz dominant and medium to coarse grained. Common strongly weathered sandstone fragments to 20 mm below about 0.40 m depth. Dry and semi dense.

7.5 SOIL TESTING

A total of two primary soil samples (S1 and S2) were submitted to *Envirolab Services* (ELS) Chatswood, a NATA accredited testing laboratory and tested/analysed for:

- pH
- Electrical Conductivity (EC)
- Total Petroleum Hydrocarbons C6-C40 (TRH);
- Benzene, Toluene, Ethylbenzene, Xylene, (BTEX);
- Organophosphorus Pesticides (OPP);
- Organochlorine pesticides (OCP); and
- 8 Heavy Metals (Mercury, Cadmium, Lead, Arsenic, Total Chromium, Copper, Nickel and Zinc);

8.0 QUALITY ASSURANCE & QUALITY CONTROL

8.1 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQO) are required to define the quality and quantity of data needed to support management decisions. The process for establishing DQO's is documented by Australian Standard: AS 4482.1-2005 and referenced by the National Environment Protection (Assessment of the Site Contamination) Measure (NEPC 2013) and the Guidelines for the NSW Site Auditor Scheme, 2nd ed (NSW DEC, 2006). The DQO's for the investigation were to obtain sufficient representative data to allow a high-quality environmental assessment of:

1. The location, nature, and degree of soil and groundwater contamination at selected sampling locations (if any);
2. The risks posed to human health and the environment, including potential future users of the site;
3. The requirements for any further investigative works; and

4. To a standard consistent with generally accepted and current professional consulting practice for such an investigation.

The assessment was conducted to a standard consistent with generally accepted and current professional consulting practice for such an investigation. The evaluation criteria (Decision Rules) adopted for the investigation are summarised in **Table 8**.

Table 8: Data Quality Objectives

DQO	Evaluation Criteria
Documentation completeness	Completion of field records, chain of custody documentation, laboratory test certificates from NATA-accredited laboratories.
Data comparability	Use of appropriate techniques for the sampling, storage and transportation of samples. Use of NATA accredited laboratory using NEPM procedures
Data representativeness	Adequate sampling coverage of all areas of environmental concern at the site, and selection of representative samples
Precision and accuracy for sampling and analysis	Use properly trained and qualified field personnel and Achieve laboratory QC criteria.

8.2 FIELD QUALITY ASSURANCE & QUALITY CONTROL

The Quality Assurance and Quality Control (QA/QC) protocols used during the field investigations are documented in **Table 9**.

Table 9: Field QA/QC

Protocol	Description
Sampling Team	Site personnel comprised only professionally qualified environmental scientists and occupational hygienists trained in conducting asbestos surveys and site contamination investigations.
Sample Equipment	All sample equipment decontaminated between sample sites. Disposable equipment including gloves changed between each sample.
Field Screening	Visual and manual inspection of sample materials for potential contamination
Chain of Custody Forms	All samples were logged and transferred under appropriately completed Chain of Custody Forms.

8.3 LABORATORY QUALITY ASSURANCE & QUALITY CONTROL

Analysis and testing of soil samples was conducted by Envirolab, West Chatswood. Envirolab is NATA approved for the selected analysis. Laboratory QA/QC results are detailed in the laboratory report contained in the appendices section of this report.

8.4 QUALITY ASSURANCE & QUALITY CONTROL DISCUSSION

A summary of the Data Quality performance is provided in **Table 10**.

Table 10: Data Quality Objectives and Criteria

DQO	Evaluation Criteria	Status
Documentation completeness	Completion of field records, chain of custody documentation, laboratory test certificates from NATA-registered laboratories.	✓
Data comparability	Use of appropriate techniques for the sampling, storage and transportation of samples. Use of NATA certified laboratory using NEPM procedures. Comparison with previous site information.	✓
Data representativeness	Good sampling coverage of all areas of environmental concern at the site, and selection of representative samples from each sampling location. Targeting Areas of Environmental Concern for contaminants of concern.	✓
Precision and accuracy for sampling and analysis	Use properly trained and qualified field personnel. Appropriate sampling and field techniques. Achieve laboratory QC criteria.	✓

The project laboratory is NATA accredited, and the Practical Quantitation Limits (PQL) were within the acceptable levels for the investigation criteria. The laboratory certificate of analysis provided in **Appendix C** indicate that for the samples collected during the scope of works, sampling techniques, transport procedures and laboratory analysis were satisfactory.

The QA/QC indicators either all complied with the required standards or showed variations that would have no significant effect on the quality of the data or the conclusions of this assessment. It is therefore concluded that, for the purposes of this study, the QA/QC results are valid, and the quality of the ***data is acceptable for use in this assessment***.

9.0 SOIL ANALYSIS RESULTS

Laboratory results are summarised in **Table 11**. A copy of the laboratory certificate and Chain of Custody (COC) documentation are provided in **Appendix C**. Laboratory QA/QC results are also detailed in the laboratory report in **Appendix C**.

The NSW EPA has endorsed the National Environment Protection (Assessment of Site Contamination) Amendment Measure (2013) 'Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater'. The guidelines provide Health Investigation Levels (HILs), Health Screening Levels (HSLs) and Ecological screening levels (ESLs). Levels are provided for soil and groundwater in the NEPM for four (4) types of land uses:

A Residential A with garden/accessible soil also includes children's day care centres, preschools and primary schools.

B Residential B with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.

C Recreational C includes public open space such as parks, playgrounds, playing fields (e.g., ovals), secondary schools and unpaved footpaths.

D Commercial/industrial D includes premises such as shops, offices, factories and industrial sites.

Given the subject sites are dominantly open spaces, the appropriate soil assessment criteria for this investigation are considered to be **NEPM C Recreational C includes public open space such as parks, playgrounds, playing fields, secondary schools and unpaved footpaths**.

In general, the NEPM recommend site conditions be compared against the guidelines in a staged manner, firstly to assess for exceedances of the HSL's and the need for a Health Risk Assessment prior to assessment against the ESL's and consideration of potential migration or exposure pathways, followed by an assessment of the physical and aesthetic suitability of the medium.

Analytical results were also assessed against the **Petroleum Hydrocarbon Management Limits (Management Limits)**

In summary:

- pH values were slightly to moderately acidic (5.6 – 6.0)
- EC values were low indicating low salinity (66 - 64 µS/cm)
- Total Recoverable Hydrocarbons (TRH) were all recorded less than the Practical Quantification Limit (PQL);
- BTEX were all recorded less than the PQL;
- Organophosphorus Pesticides (OPP) were all recorded less than the PQL;
- Organochlorine pesticides (OCP) were all recorded less than the PQL; and
- Trace to low concentrations of some heavy metals were recorded above the PQL.

Table 11: Total Concentration Results - SOIL
Site Location: Lot A in DP365595 Cook Road Glenworth Valley

Analyte																											
				Organochlorine Pesticides (OCP)					Organophosphate Pesticides (OPP)	BTEX					Total Recoverable Hydrocarbons						Metals/Metalloids							
				Aldrin	Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor		Benzene	Toluene	Ethyl benzene	m+p-Xylene	o-Xylene	TRH C6-C9	TRH C10-C36	F1 TRH C6-C10	F2 TRH C10-C16	F3 TRH C16-C34	F4 TRH C34-C40	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Assessment Criteria - NEPM (2013) Soil Investigation Levels (mg/Kg)																											
Landuse Soil Assessment NEPM A (Standard residential,Primary Schools & Accessible Soil)				6	6	50	240	6	-	-	-	-	-	-	-	-	-	-	-	-	100	20	100	6000	300	40	400	7400
Landuse Soil Assessment NEPM B (Residential minimal Access to Soils)				10	10	90	600	10	-	-	-	-	-	-	-	-	-	-	-	-	500	150	500	30000	1200	120	1200	60000
Landuse Soil Assessment NEPM C (Recreational Open Space, Secondary Schools)				10	10	70	400	10	-	-	-	-	-	-	-	-	-	-	-	-	300	90	300	17000	600	80	1200	30000
Landuse Soil Assessment NEPM D (Industrial and Commercial)				45	45	530	3600	50	-	-	-	-	-	-	-	-	-	-	-	-	3000	900	3600	240000	1500	730	6000	400000
Petroleum Hydrocarbon Management Limits (Management Limits) - NEPM D - Coarse Soil				-	-	-	-	-	-	-	-	-	-	-	65	1000	700	1000	3500	10000	-	-	-	-	-	-	-	-
Soil Vapour HSLs for Vapour Intrusion Sand - 0 to <1m										0.5	160	55	40	-	-	-	45	110	-	-	-	-	-	-	-	-	-	-
Total Concentrations (ppm) - PQL				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.5	1	2	1	25	125	25	50	100	100	4	0.4	1	1	1	0.1	1	1
Area	**ID**	**Depth**	**PID**	**Description**	**Date**																							
Site	**S 1**	0.2-0.4	-	soil	**26/8/21**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.5	<1	<2	<1	<25	<125	<25	<50	<100	<100	<4	<0.4	**23**	**2**	**4**	<0.1	<1	**9**
Site	**S 2**	0.2 - 0.4	-	soil	**26/8/21**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.5	<1	<2	<1	<25	<125	<25	<50	<100	<100	<4	<0.4	**38**	**79**	**6**	<0.1	**3**	**74**
95% Upper Confidence Limit Calculations																											
Number of samples				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Average				0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.25	0.5	1.0	0.5	12.5	62.5	12.5	25.0	50.0	50.0	2	0.20	31	41	5	0.05	2	42
Maximum				**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.1**	**0.25**	**0.5**	**1.0**	**0.5**	**12.5**	**63**	**12.5**	**25**	**50**	**50.0**	**2**	**0.20**	**38**	**79**	**6**	**0.05**	**3**	**74**
Minimum				0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.25	0.5	1.0	0.5	12.5	62.5	12.5	25.0	50.0	50.0	2	0.20	23	2	4	0.05	0	9
NSW EPA Waste Classification Criteria (DECCW 2009)																											
General Solid Waste (GSW)	**CT1 mg/Kg**			**-**	**-**	**-**	**-**	**-**	**-**	**10**	**288**	**600**	**1000**	**1000**	N/A	N/A	**-**	**-**	**-**	**-**	**100**	**20**	**100**	-	**100**	**4**	**40**	-
	TCLP1 mg/L			-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	5	1	5	-	5	-	-	-
	SCC1 mg/Kg			-	-	-	-	-		18	518	1080	1800	1800	**650**	**10000**	-	-	-	-	500	100	1900	-	1500	50	1050	-
Restricted Solid Waste (RSW)	CT2 mg/Kg			-	-	-	-	-	-	40	1152	2400	4000	4000	N/A	N/A	-	-	-	-	400	80	400	-	400	16	160	-
	TCLP2 mg/L			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	4	20	-	20	-	-	-
	SCC2 mg/Kg			-	-	-	-	-	-	72	2073	4320	7200	7200	2600	40000	-	-	-	-	2000	400	7600	-	6000	200	4200	-

In summary, the laboratory report from the AEC targeted soil investigation shows that concentrations of tested analytes were all below the adopted Soil Investigation Level guidelines for **NEPM C Recreational C includes public open space such as parks, playgrounds, playing fields, secondary schools and unpaved footpaths**.

Total Recoverable Hydrocarbons and BTEX

Laboratory analysis of the soil sample collected downslope of the machinery shed targeting AEC returned levels of BTEX all below the PQL and less than the Petroleum Hydrocarbon Management Limits (Management Limits) and relevant NEPM Health and Soil Investigation Level guidelines.

Laboratory analysis of the soil sample collected downslope of the machinery shed returned levels of TRH all below the PQL and less than the Petroleum Hydrocarbon Management Limits (Management Limits) and relevant NEPM Health and Soil Investigation Level guidelines.

Organophosphorus Pesticides (OPP)

Laboratory analysis of the soil sample collected within citrus rows in the 'old' orchard returned levels of OPP all below the PQL and less than the relevant NEPM Health and Soil Investigation Level guidelines.

Organochlorine pesticides (OCP)

Laboratory analysis of the soil sample collected within citrus rows in the 'old' orchard returned levels of OCP all below the PQL and less than the relevant NEPM Health and Soil Investigation Level guidelines.

Heavy Metals

Laboratory analysis of the two soil samples targeting AEC returned levels of arsenic, cadmium and mercury all below the PQL and relevant NEPM Health and Soil Investigation Level guidelines.

Levels of chromium, copper, lead, nickel and zinc were generally above the PQL but significantly less than the NEPM Health and Soil Investigation Level guidelines.

10.0 ENVIRONMENTAL MANAGEMENT

10.1 NATURE OF SOIL CONTAMINATION

Based on the results reviewed during this assessment, *Larry Cook Consulting* has identified potential contamination sites in Lot A associated with the soil material peripheral to the main storage shed and close to the citrus rows in the 'old' orchard. Field investigations comprising site investigations and manual excavation of soil did not identify any visible (stains/leachate) or olfactory signs of any significant soil contamination.

The aim of this targeted environmental investigation has been to focus on the potential for contamination on the Site associated with the AEC. The assessment did not reveal any significant contamination in soil.

BTEX and TRHs

The laboratory analysis of soil sample S1 targeting AEC associated with the machinery shed returned levels of BTEX below the PQL, less than the Management Limits and less than the relevant NEPM HSILs.

Organophosphorus Pesticides (OPP)

The laboratory analysis of soil sample S2 targeting AEC associated with the orchard returned levels of OPP below the PQL, less than the Management Limits and less than the relevant NEPM HSILs.

Organochlorine pesticides (OCP)

The laboratory analysis of soil sample S2 targeting AEC associated with the orchard returned levels of OCP below the PQL, less than the Management Limits and less than the relevant NEPM HSILs.

Heavy Metals

Laboratory analysis of the two soil samples targeting AEC returned trace levels of heavy metals for five of the eight metals. However, all analyses were less than the relevant NEPM Health and Soil Investigation Level guidelines.

Summary of Soil Investigation Results

The following points summarise the key findings from the soil investigation:

- Level of TRHs were less than the Management Limits.
- Concentrations of BTEX analysed were less than the Management Limits.
- Concentrations of Organophosphorus Pesticides (OPP) were less than the Health and Soil Investigation Level guidelines.
- Concentrations of Organochlorine pesticides (OCP) were less than the Health and Soil Investigation Level guidelines.
- Concentrations of the suite of eight (8) heavy metals analysed were less than the Health and Soil Investigation Level guidelines.

10.2 HUMAN HEALTH

The soil testing component of this investigation in Lot A has been limited to targeted point source samples from accessible surface and near-surface sites. Analytical results from soil testing on Lot A suggests that the risk of contamination is low.

10.3 SIGNIFICANT RISK OF HARM

A critical concept under the Contaminated Land Management Act 1997 (CLM Act) is whether contamination ‘presents a significant risk of harm to human health or some other aspect of the environment’. There are also obligations under *section s.60* of the CLM Act for landowners and persons whose activities have contaminated land and who become aware that land is contaminated ‘in such a way as to present a significant risk of harm’.

Based on the available data outlined in this report, the risk of any contamination is assessed as low. However, it is noted that the NSW EPA are the sole arbiters as to whether land represents a significant risk of harm, and their view may differ from that expressed herein.

10.4 SITE SUITABILITY

This targeted environmental investigation incorporated a title search, established current land use and site history review of the 49 land parcels including limited AEC targeted soil sampling on Lot A DP365595. The environmental investigation did not identify any sources of significant contamination. That is, no hydrocarbon, heavy metal or pesticide/insecticide contamination was recorded that exceeds the NEPM guidelines for any of the land use category D.

Groundwater was not encountered during the investigation; however, hydrogeological conditions may change in the future dependant on climatic factors.

Therefore, in their present conditions, the 49 land parcels are considered suitable for the proposed rezoning.

11.0 CONCLUSIONS AND RECOMMENDATIONS

The Stage 1 Environmental Site Assessment for 11 of the 49 land parcels was based on detailed field inspections, present land use, historical title search and review of historical aerial photographs. Based on the site history, aerial photographs and walkover inspections the following conclusions are made:

- The site has been used for a variety of purposes such as farming, horse agistment, residential and in more recent years tourism, camping, recreation and running special events.
- The results of the site inspections, aerial photographs and other records reviewed indicate a low risk of potential contamination for the proposed rezoning of land.
- It is assessed that the risk of site contamination to be low

This environmental assessment concludes that the 49 land parcels are unlikely to be significantly contaminated and assessed suitable or could be made suitable for the uses proposed in the rezoning proposal.

The Stage 1 Environmental Site Assessment carried out in Lot A in DP365595 concludes that the orchard activities operational up till the mid-1990s have largely been replaced by cattle grazing. It is clear that no fertiliser or insect treatment has been used for at least 30 years. The present and past use of the land for low-intensity cattle grazing does not incorporate any cattle drenching and is unlikely to have caused any significant contamination on the land. However, although there are no longer any fuel storage tanks in Lot A, drum-diesel fuel and drum-oil storage is still kept on the property but isolated in one of the machinery sheds. This storage may give result in very localised contamination in the immediate vicinity of the storage areas. It is noted that the volumes of products are very low and the various farm components are kept in clean condition.

The results of targeted soil testing in identified Areas of Environmental Concern (AEC) in Lot A revealed the following:

- pH values were slightly to moderately acidic (5.6 – 6.0)
- EC values were low indicating low salinity (66 - 64 µS/cm)
- Total Recoverable Hydrocarbons (TRH) were all recorded less than the Practical Quantification Limit (PQL);
- BTEX were all recorded less than the PQL;
- Organophosphorus Pesticides (OPP) were all recorded less than the PQL;
- Organochlorine pesticides (OCP) were all recorded less than the PQL; and
- Trace to low concentrations of some heavy metals were recorded above the PQL.

In summary, the laboratory report from the AEC targeted soil investigation shows that concentrations of tested analytes were all below the adopted Soil Investigation Level guidelines.

Given the length of time since the orchard was operational (30 years) and the nature of the farming products used (chicken manure and enclosed insect baits) it is concluded that it is unlikely there is any significant residual contamination. This environmental assessment concludes that Lot A DP 365595 was unlikely to be contaminated and was assessed suitable or could be made suitable for the uses proposed in the rezoning proposal.

12.0 LIMITATIONS

This report and the associated services performed by Larry Cook Consulting are in accordance with the scope of services set out in the agreement between Larry Cook Consulting and the owners. The scope of services was defined by the requests of the owners.

Larry Cook Consulting derived the data in this report primarily from visual inspections, examination of available records, interviews with individuals with information about the site, and limited sample collection and analysis made on the date/s indicated. In preparing this report, Larry Cook Consulting has relied upon, and presumed accurate, certain information provided by government authorities, the owners and others identified herein. The report has been prepared on the basis that while Larry Cook Consulting believes all the information in it is deemed reliable and accurate at the time of preparing the report, it does not warrant its accuracy or completeness and to the full extent allowed by law excludes liability in contract, tort or otherwise, for any loss or damage sustained by the owners arising from or in connection with the supply or use of the whole or any part of the information in the report through any cause whatsoever.

Limitations also apply to analytical methods used in the identification of substances (or parameters). These limitations may be due to non-homogenous material being sampled (i.e., the sample to be analysed may not be representative), low concentrations, the presence of ‘masking’ agents and the restrictions of the approved

analytical technique. As such, non-statistically significant sampling results can only be interpreted as 'indicative' and not used for quantitative assessments.

The data, findings, observations, conclusions and recommendations in the report are based solely upon the state of the site at the time of the investigation. The passage of time, manifestation of latent conditions or impacts of future events (e.g., changes in legislation, scientific knowledge, land uses, etc.) may render the report inaccurate. In those circumstances, Larry Cook Consulting shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of the report.

This report has been prepared on behalf of and for the exclusive use of the owners. Larry Cook Consulting accepts no liability or responsibility whatsoever and expressly disclaims any responsibility for or in respect of any use of or reliance upon this report by any third party or parties.

It is the responsibility of the owners to accept if they so choose any recommendations contained within and implement them in an appropriate, suitable and timely manner.

13.0 REFERENCES

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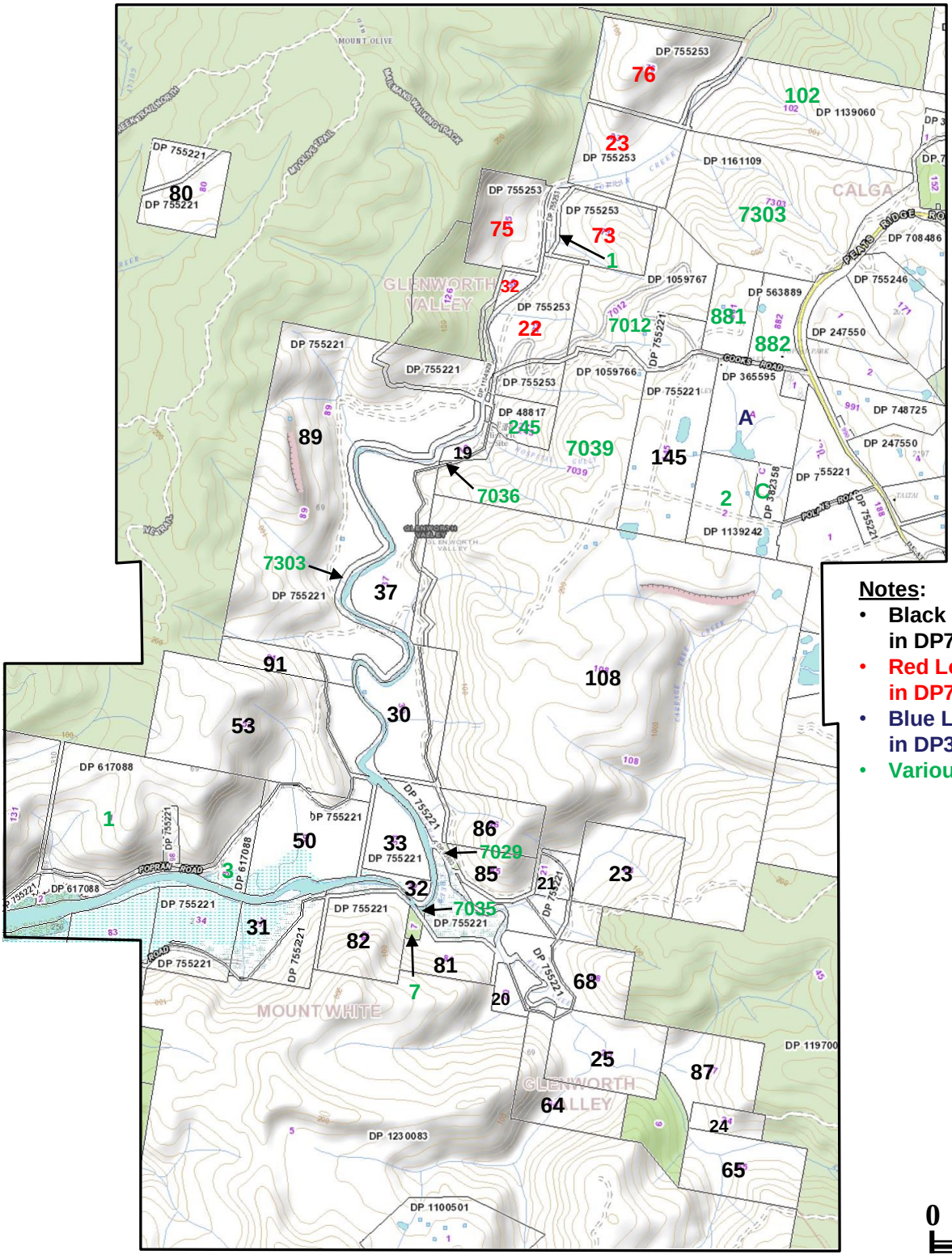
NSW Office of Environment and Heritage (OEH) (2011) Guidelines for Consultants Reporting on Contaminated Sites. ISBN 0 7310 3892 4.

FIGURES



Notes:

- Black Lot Nos. in DP755221
- Red Lot Nos. in DP755253
- Blue Lot A in DP365595
- Various

N

0 m 500

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Note: Subject Land Parcel outlined in Red
(After Central Coast council, 2019)

0 m 1

N

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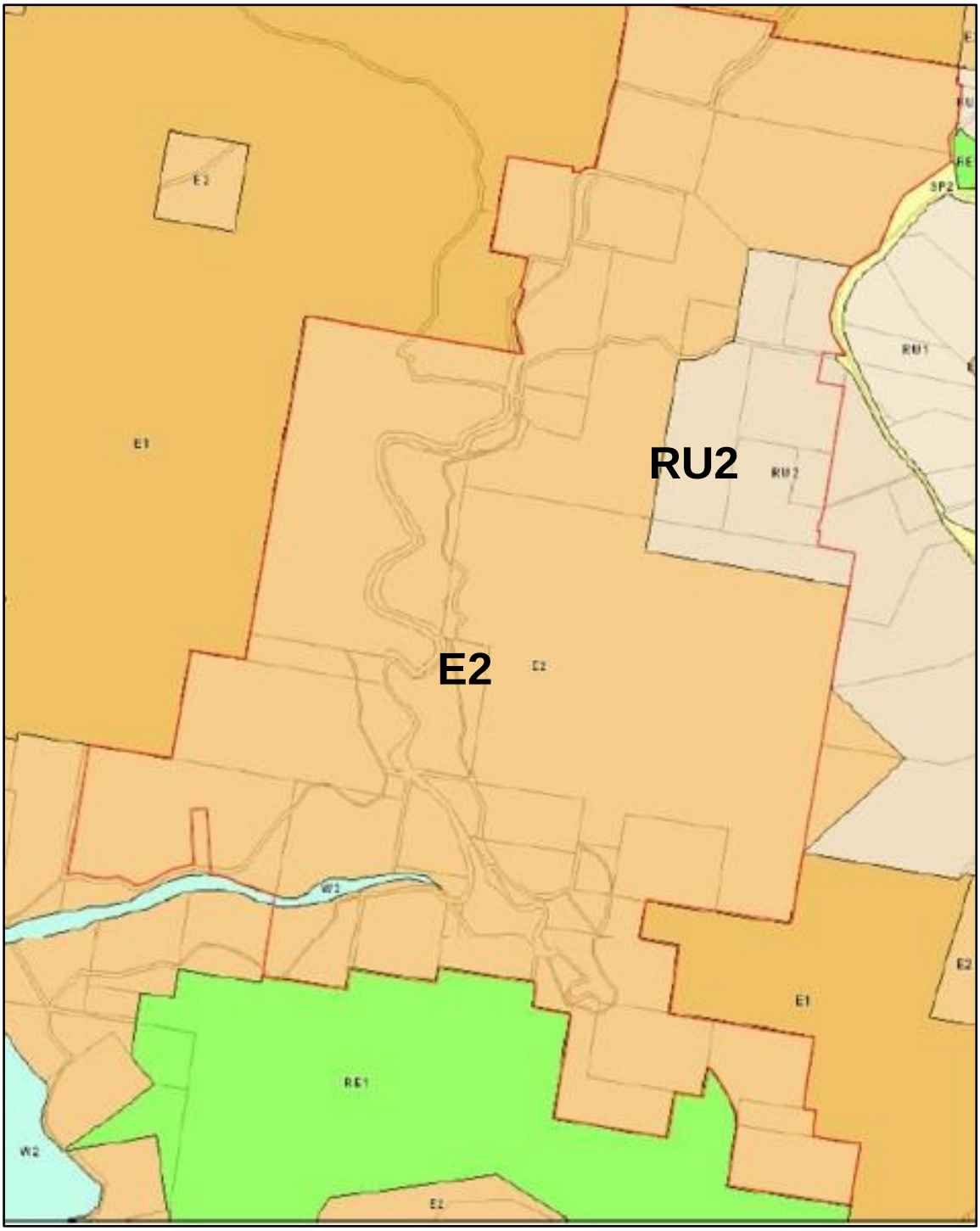
Phase I Environmental Site Assessment

Scale: As shown

Glenworth Valley Outdoor Adventures
Aerial Photo Showing Location of Land Parcels

FIGURE 2



Note: Subject Land Parcel outlined in Red
(After Central Coast council, 2019)

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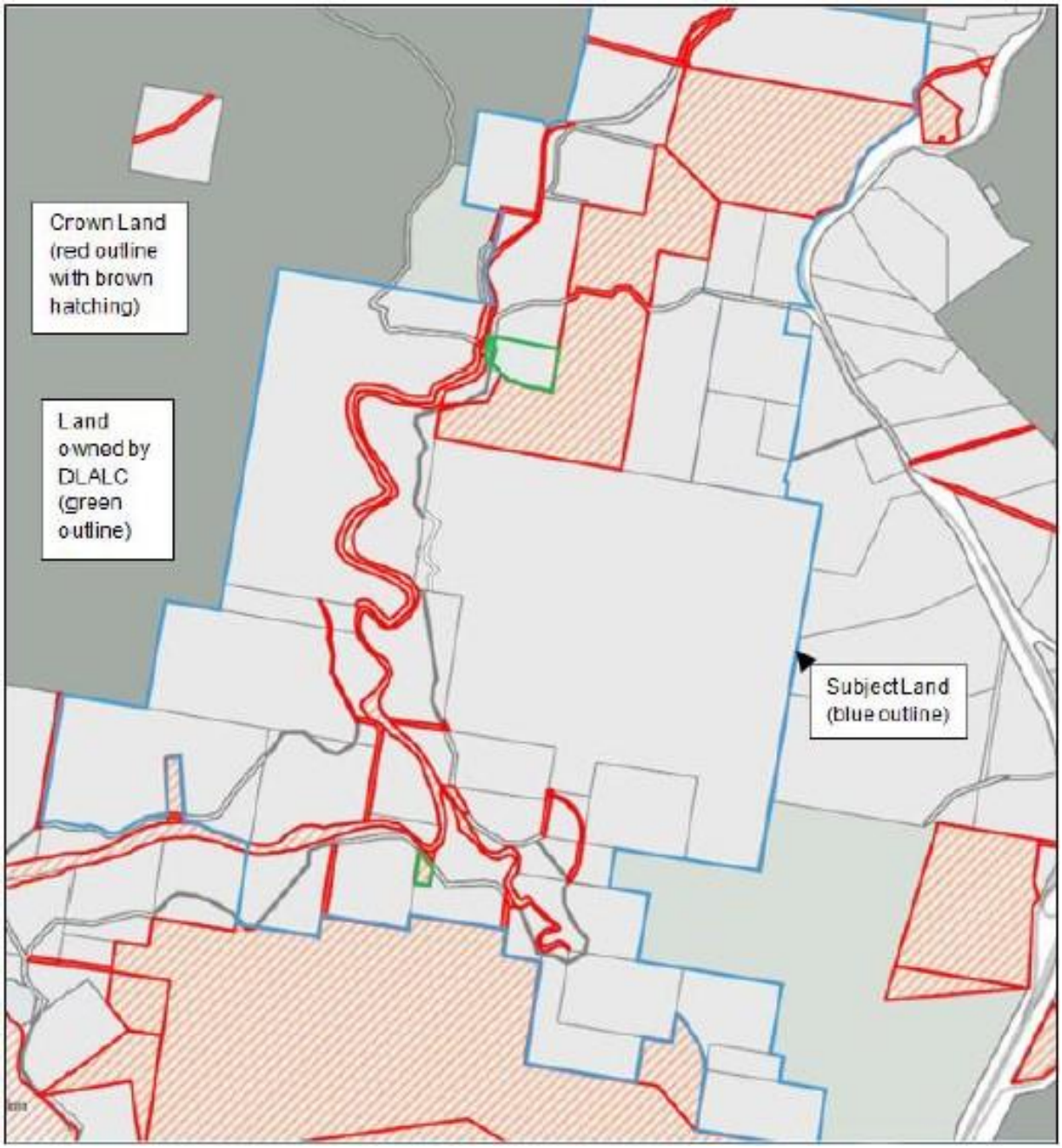
	Glenworth Valley Outdoor Adventures Current Zoning	**FIGURE 3**



(After Central Coast council, 2019)

0 m 1 ***N***

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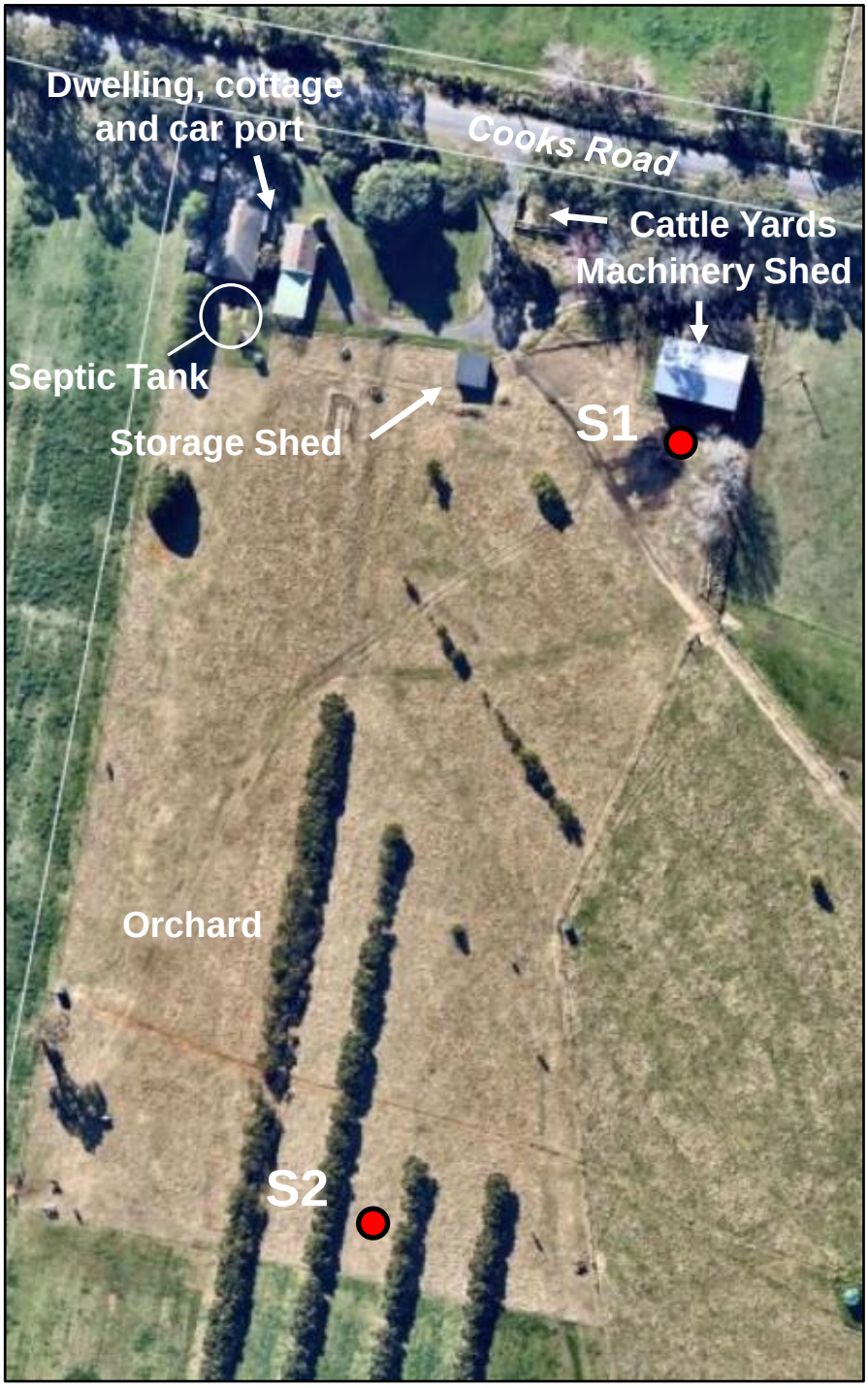
	Glenworth Valley Outdoor Adventures Land Owned by the Crown and Darkinjung LALC	**FIGURE 4**



S1 Soil Sample

0 m 50

N

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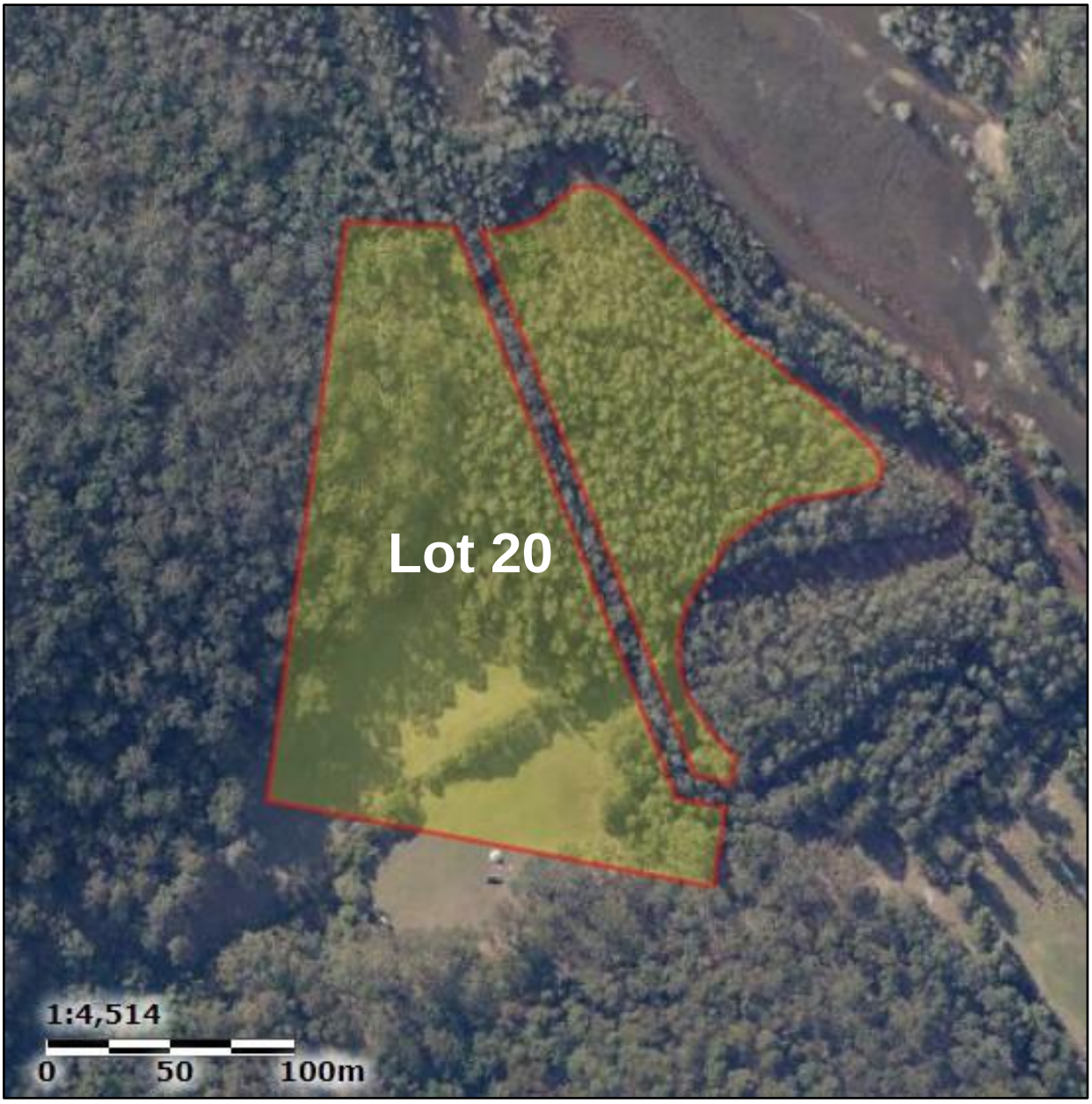
	Glenworth Valley Outdoor Adventures Locations of Soil Samples Lot A in DP365595	**FIGURE 5**

APPENDICES

APPENDIX A

AERIAL PHOTO GALLERY



N

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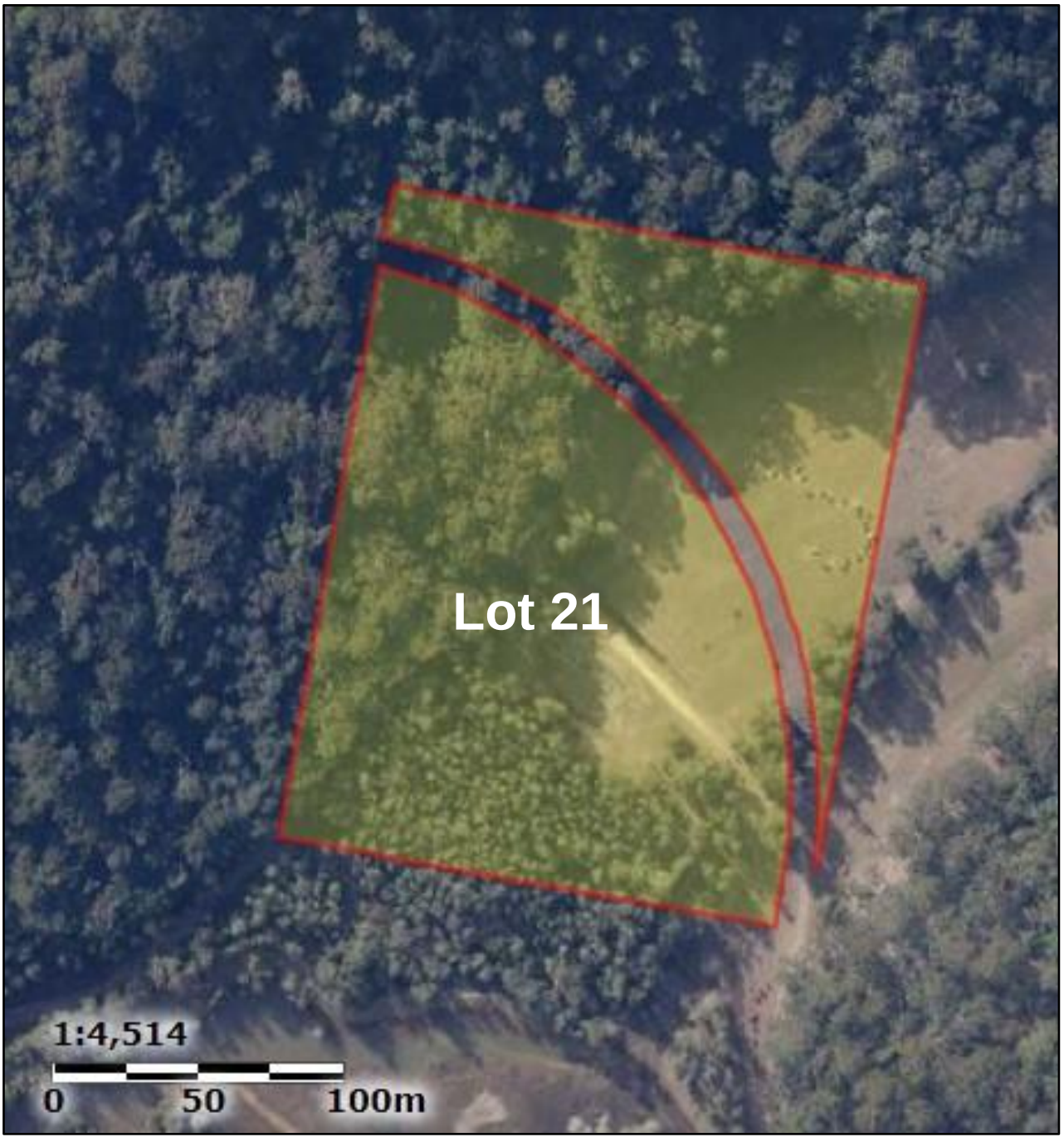
	Lot 20 in DP755221	**FIGURE A2**



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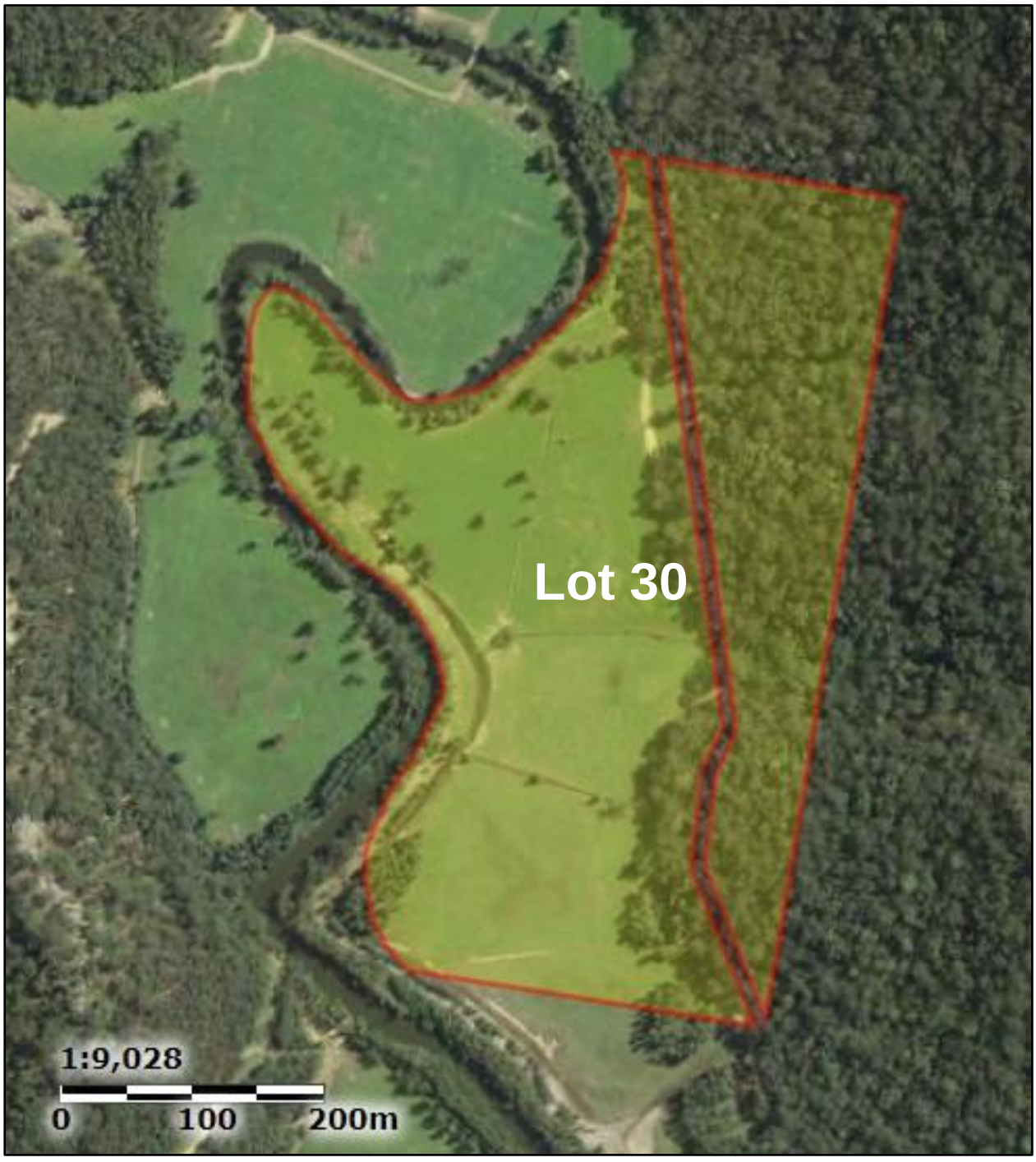
	Lot 21 in DP755221	**FIGURE A3**



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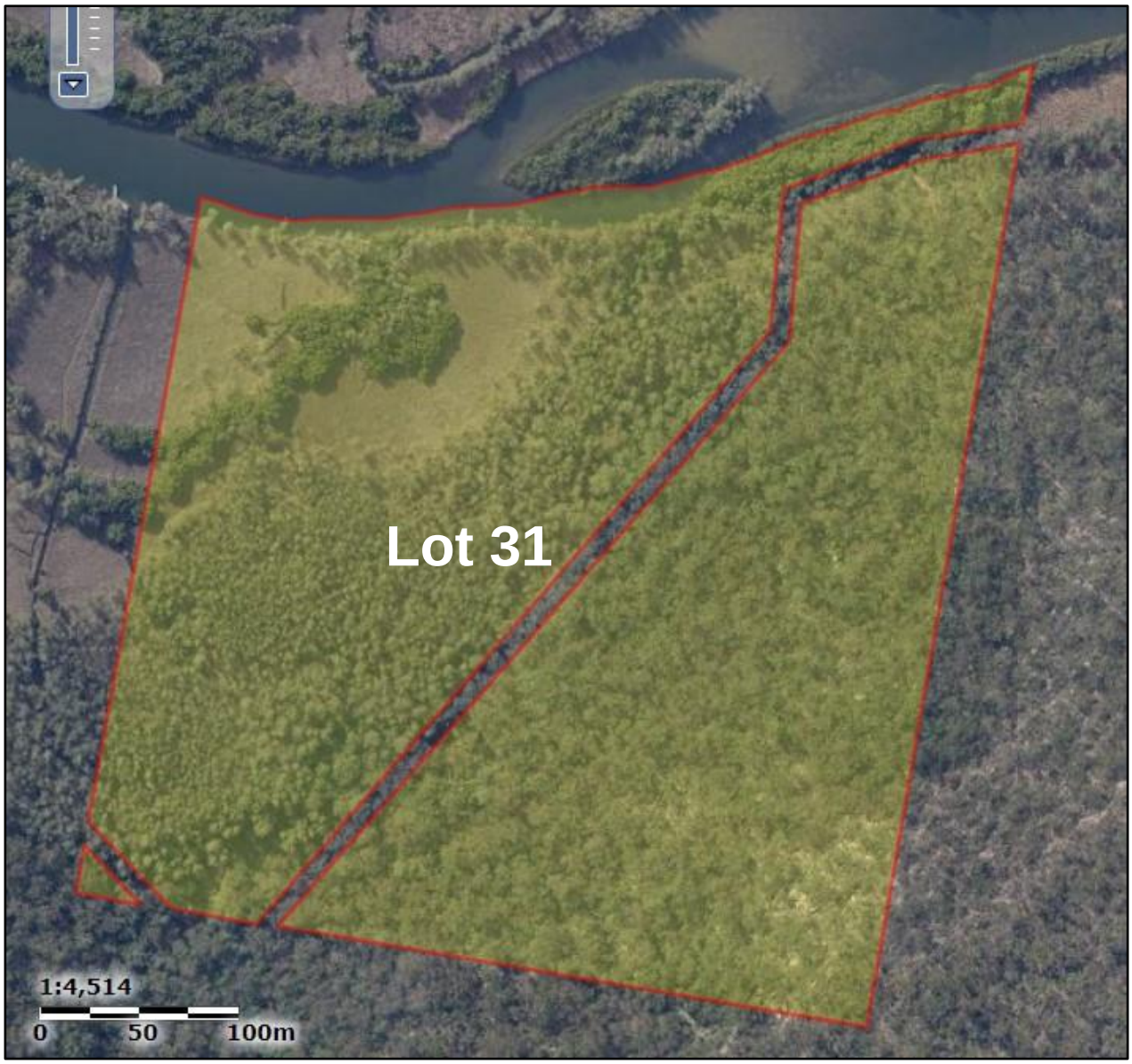
	Lot 30 in DP755221	**FIGURE A7**



N

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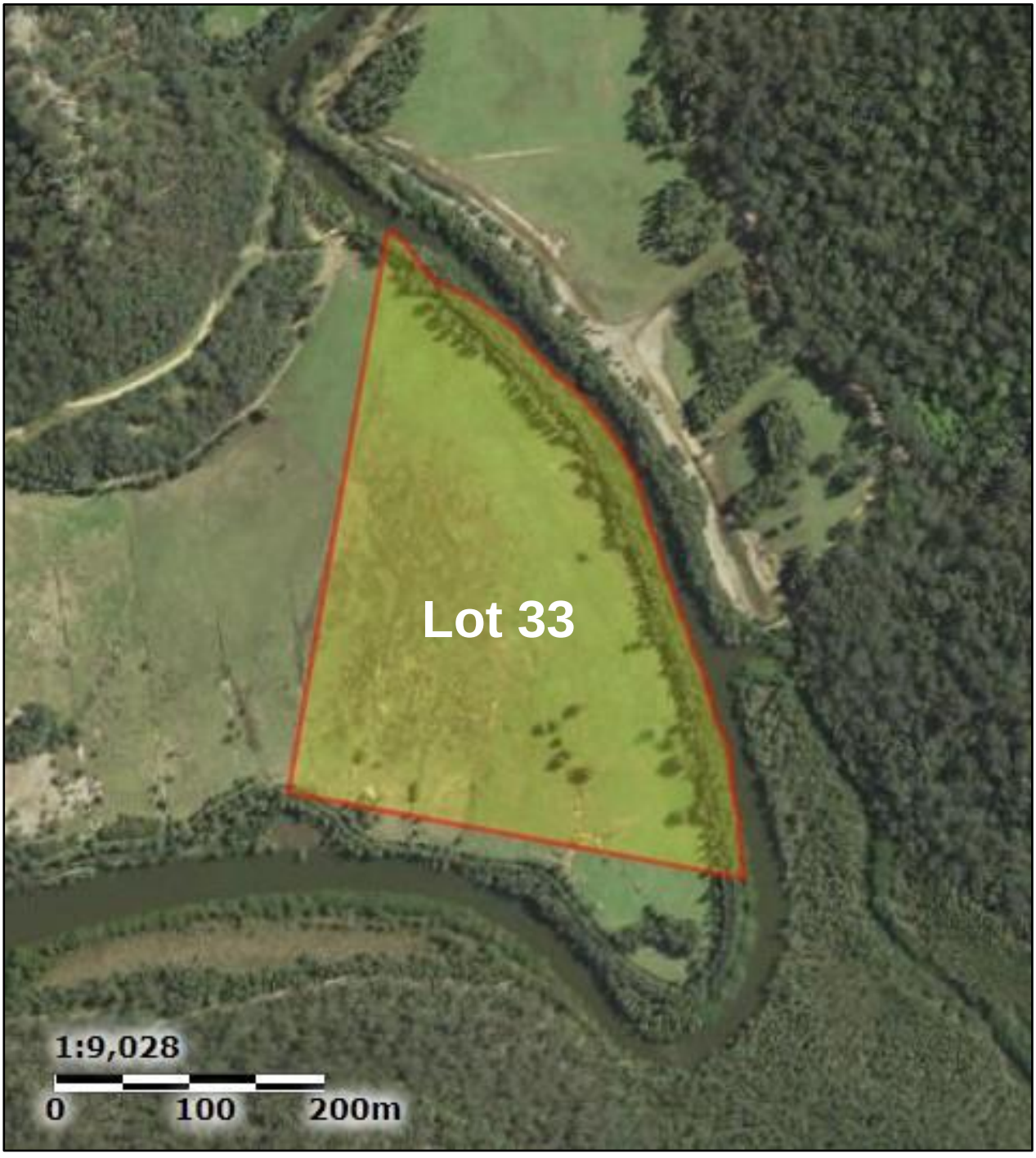
	Lot 31 in DP755221	**FIGURE A8**



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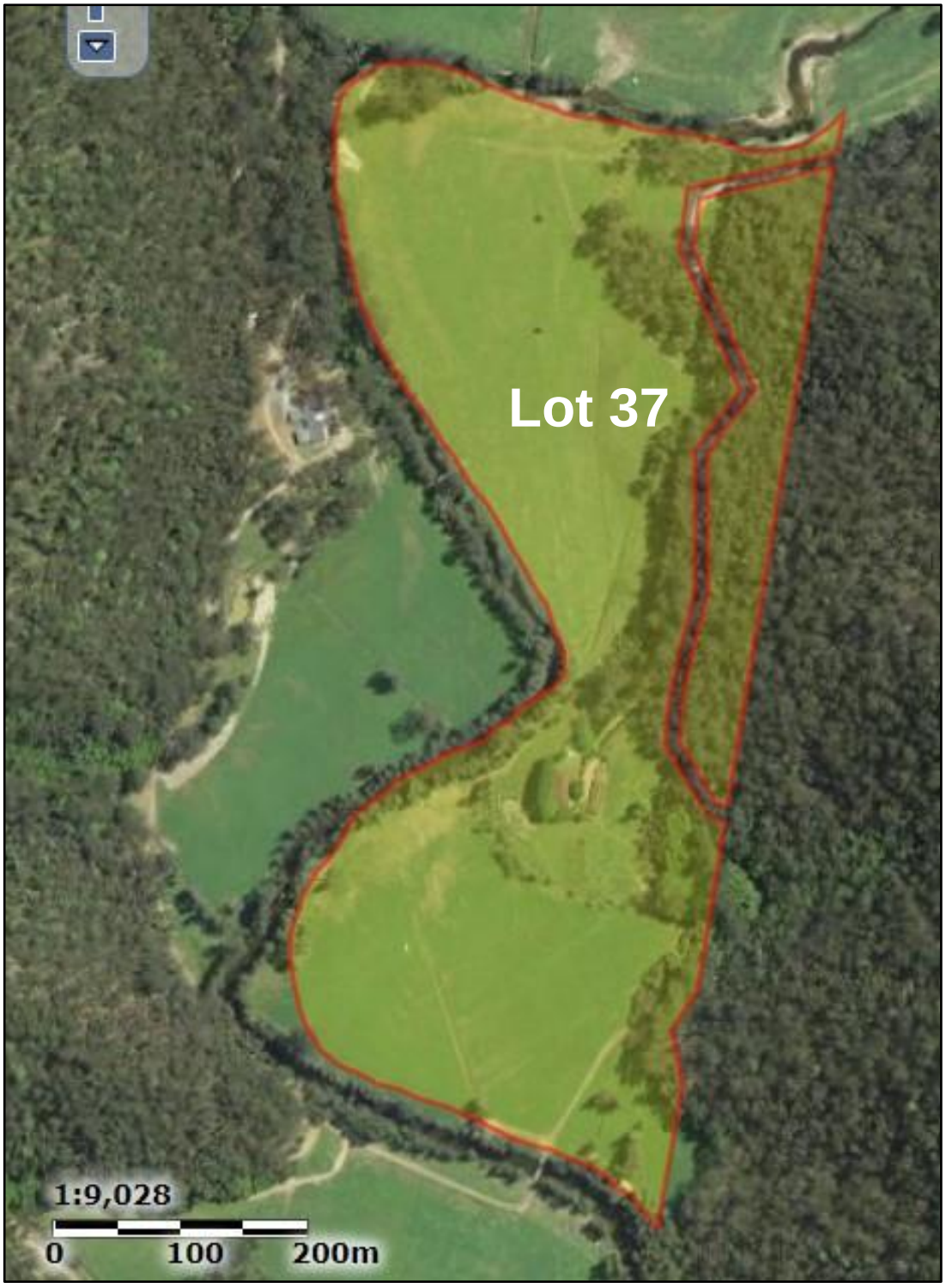
	Lot 33 in DP755221	**FIGURE A10**



N

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	Lot 37 in DP755221	**FIGURE A11**

N

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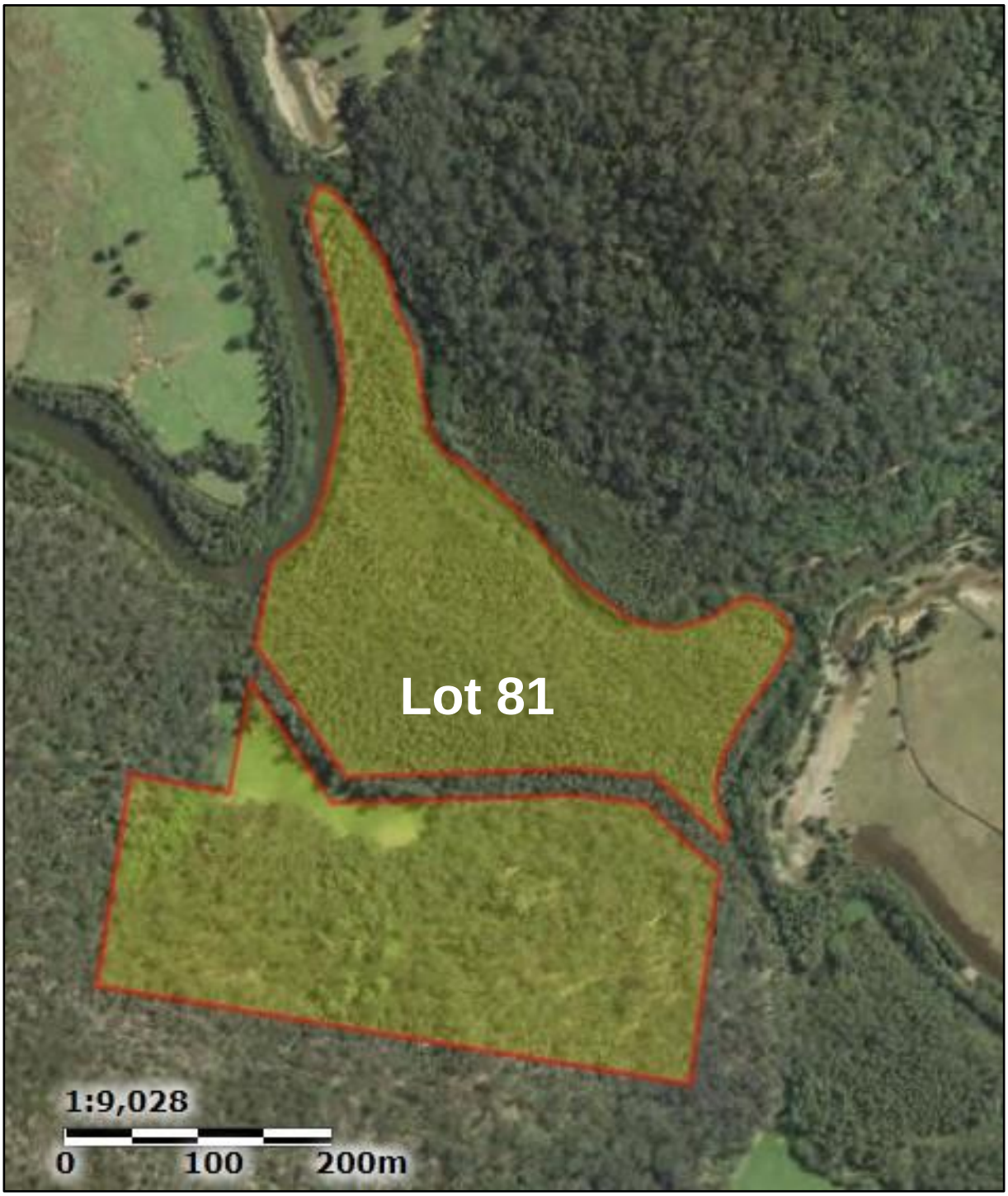
	Lot 64 in DP755221	**FIGURE A14**



N

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	Lot 81 in DP755221	**FIGURE A17**

N

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	Lot 82 in DP755221	**FIGURE A18**

N

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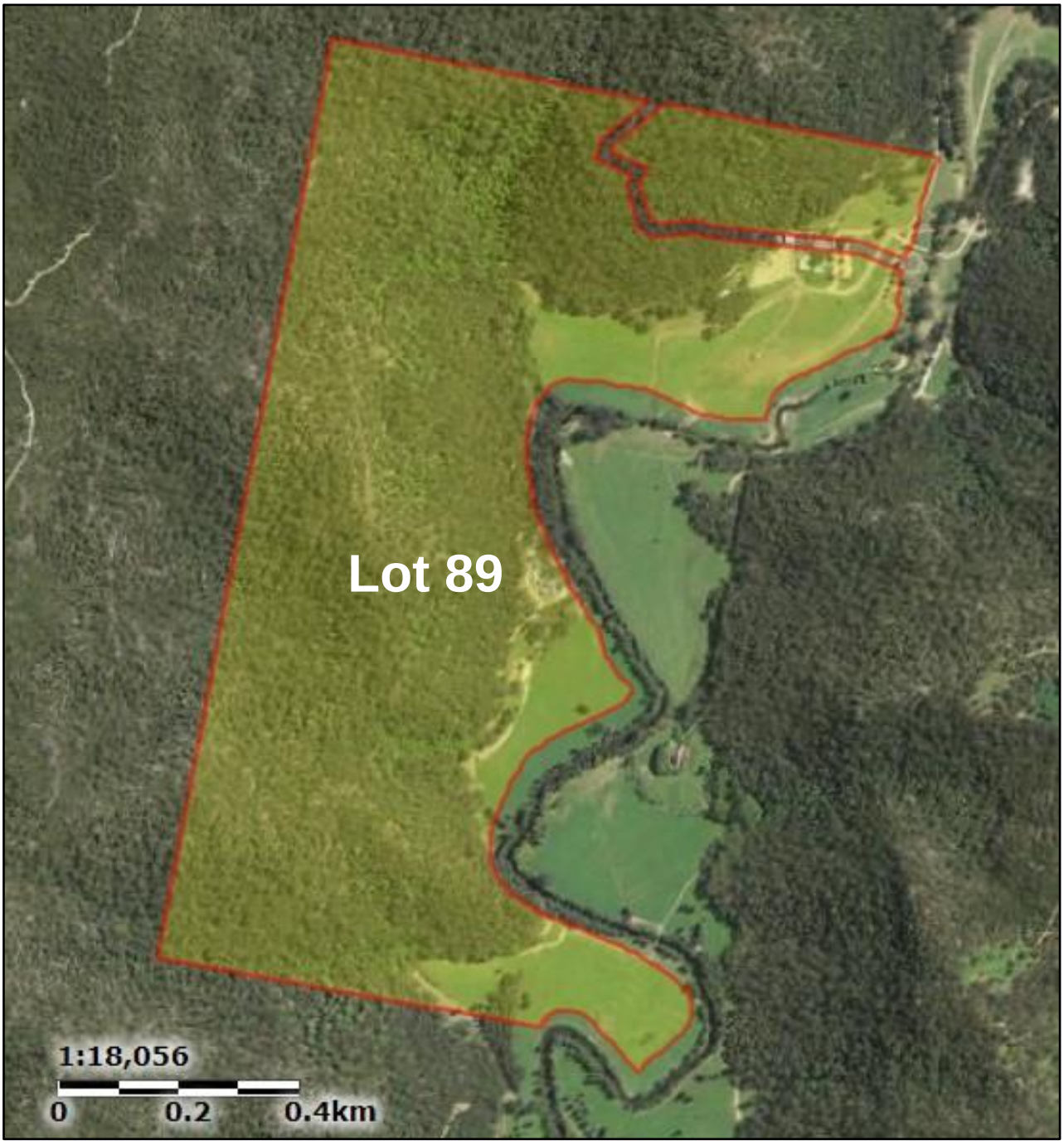
	Lot 87 in DP755221	**FIGURE A21**



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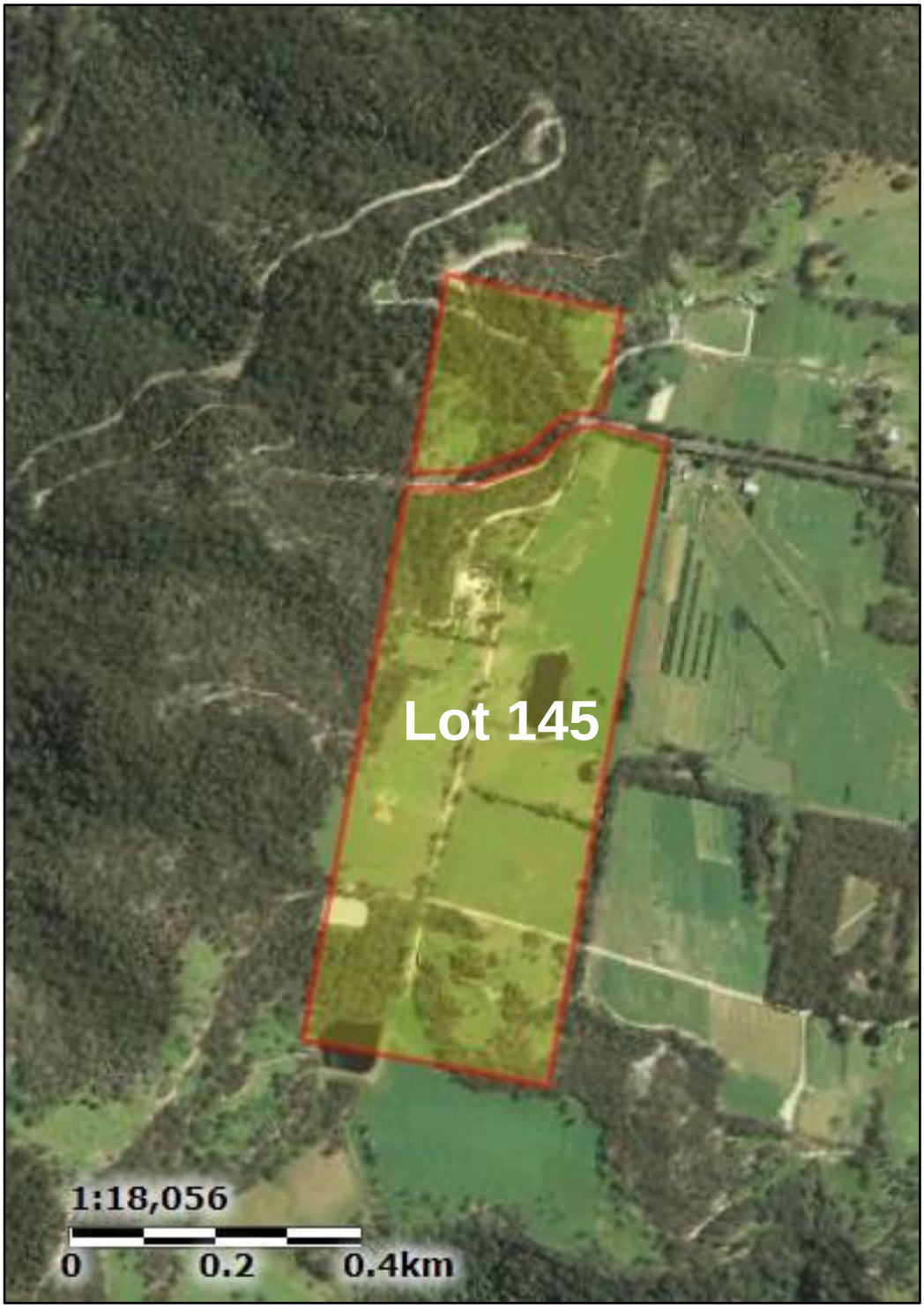
	Lot 89 in DP755221	**FIGURE A22**



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	Lot 145 in DP755221	**FIGURE A25**

N

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	Lot 22 in DP755253	**FIGURE A26**

N

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	Lot 23 in DP755253	**FIGURE A27**

N

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	Lot 75 in DP755253	**FIGURE A30**

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	Lot A in DP365595	**FIGURE A32**

N

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	Lot 3 in DP617088	**FIGURE A34**

N

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	Lot 881 in DP563889	**FIGURE A35**

N

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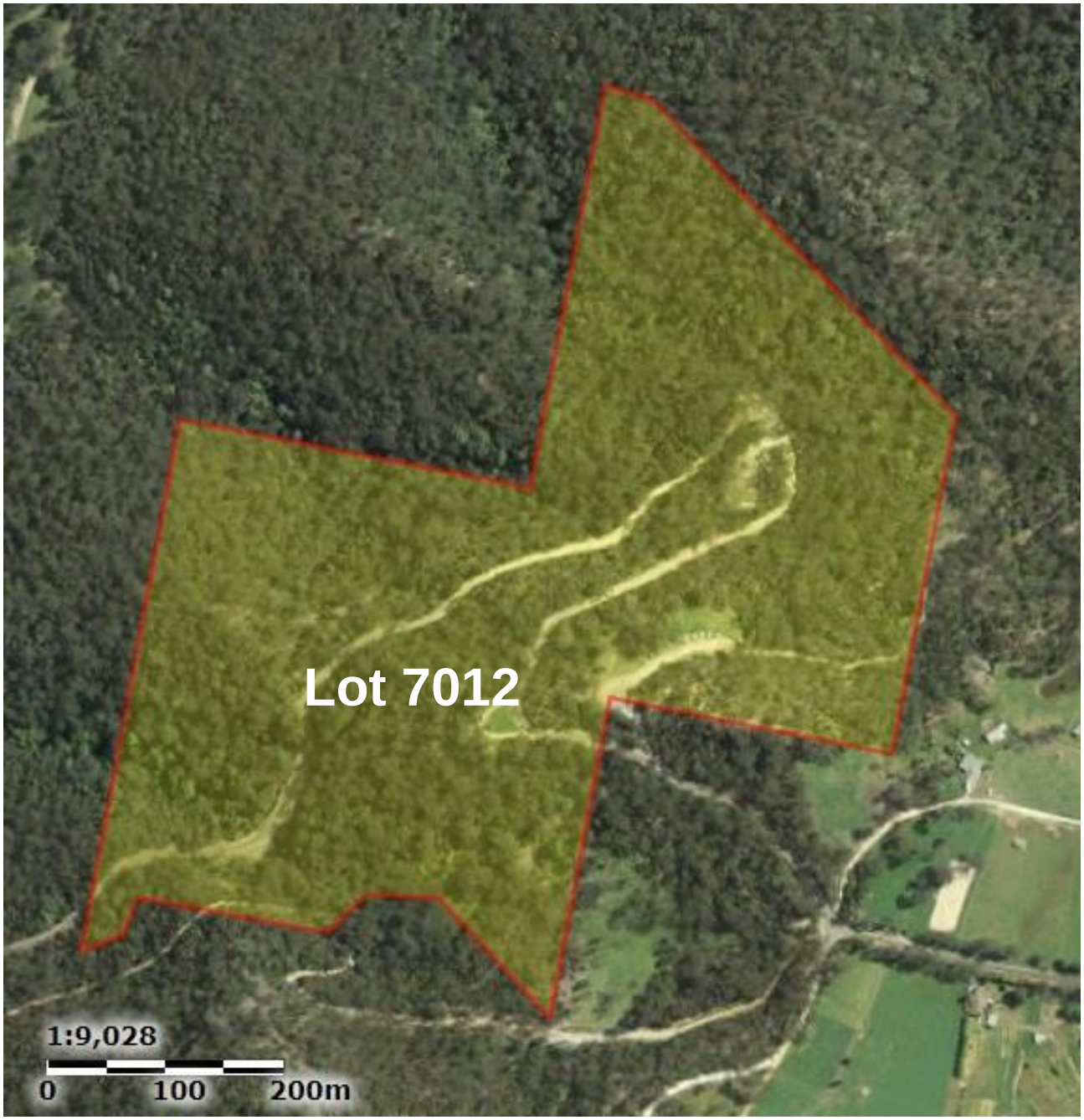
	Lot 7 in DP1230083	**FIGURE A37**



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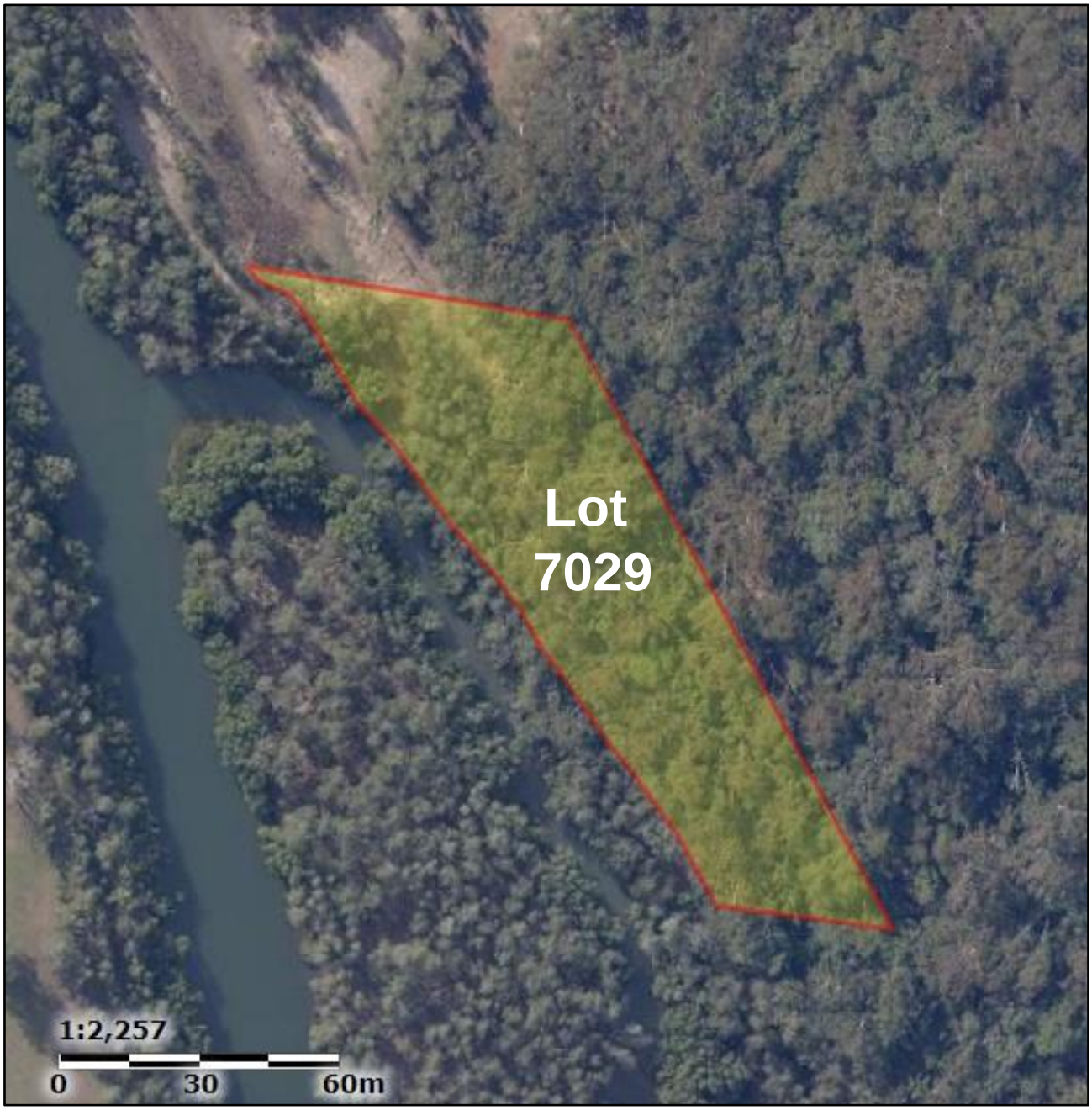
	Lot 7012 in DP1059767	**FIGURE A39**



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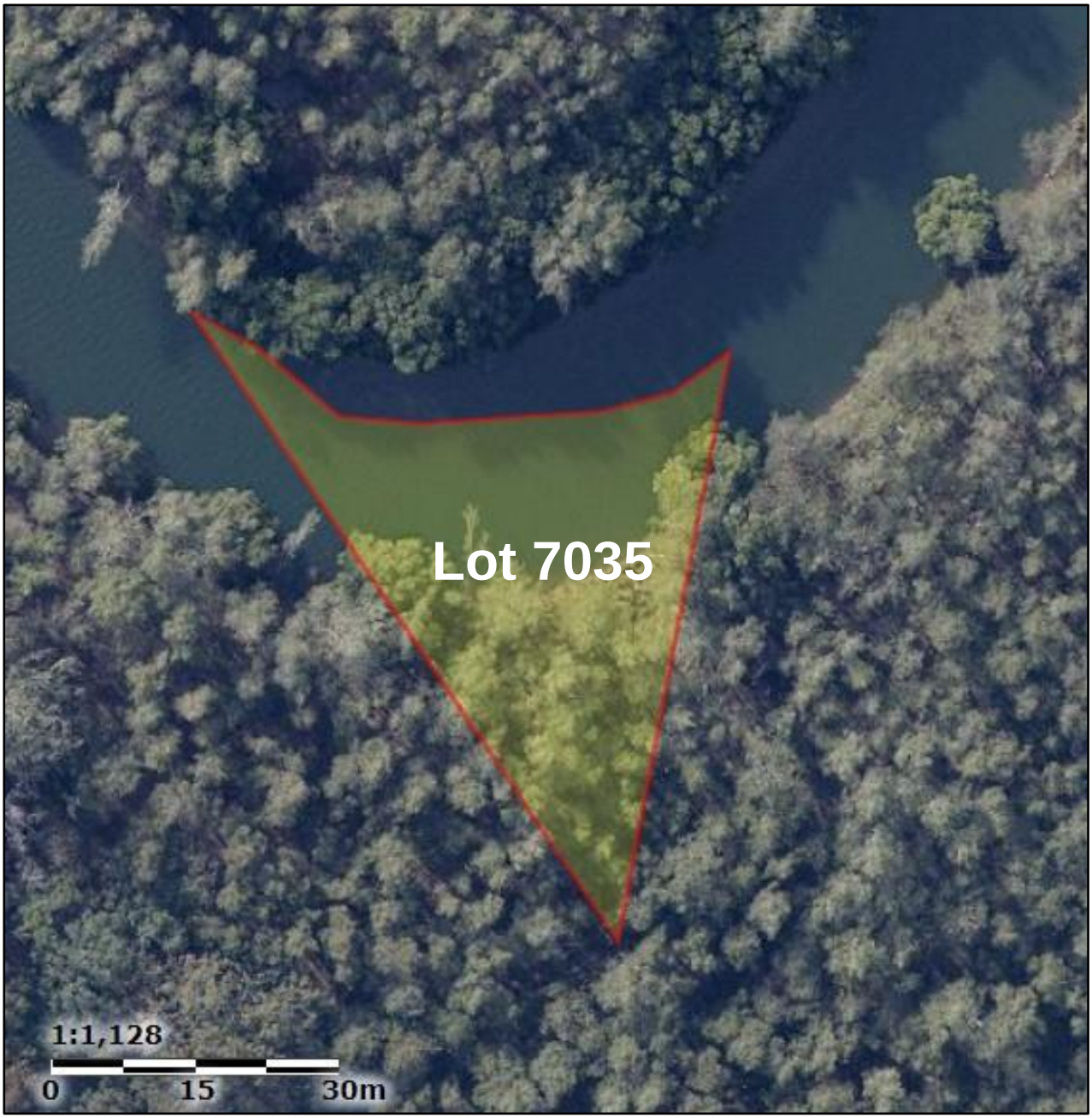
	Lot 7029 in DP93603	**FIGURE A40**



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	Lot 7035 in DP1051932	**FIGURE A41**

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	Lot 7303 in DP1154929	**FIGURE A43**

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	Lot C in DP382358	**FIGURE A44**

N

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	Lot 2 in DP1139242	**FIGURE A45**

N

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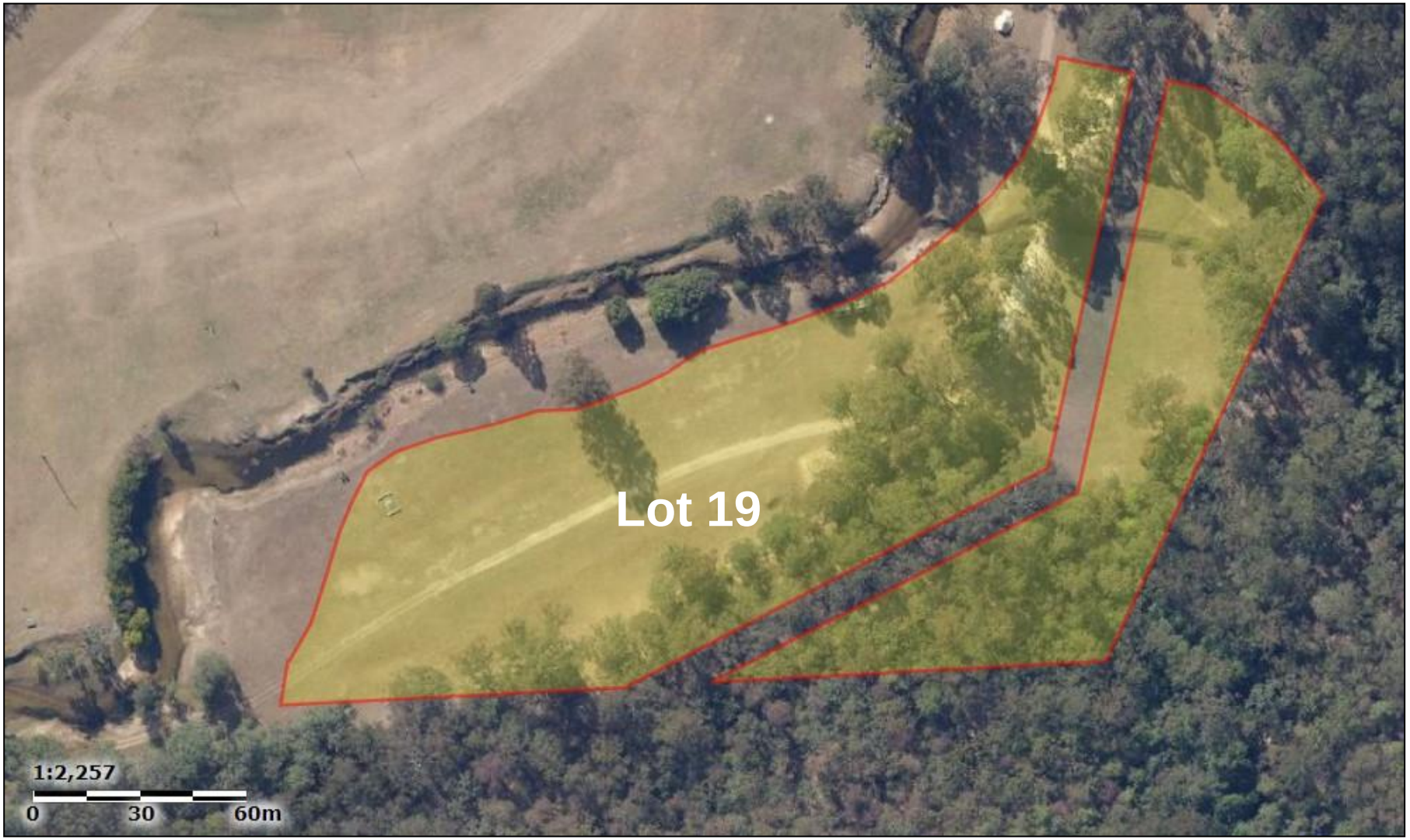
	Lot 882 in DP563889	**FIGURE A46**



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Phase I Environmental Site Assessment

Lot 19 in DP755221

N

Scale: As shown

FIGURE A1

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Phase I Environmental Site Assessment

Lot 23 in DP755221

N

Scale: As shown

FIGURE A4

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Ph 02 4340 0193

Phase I Environmental Site Assessment

Lot 24 in DP755221

N

Scale: As shown

FIGURE A5

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Phase I Environmental Site Assessment

Lot 25 in DP755221

N

Scale: As shown

FIGURE A6

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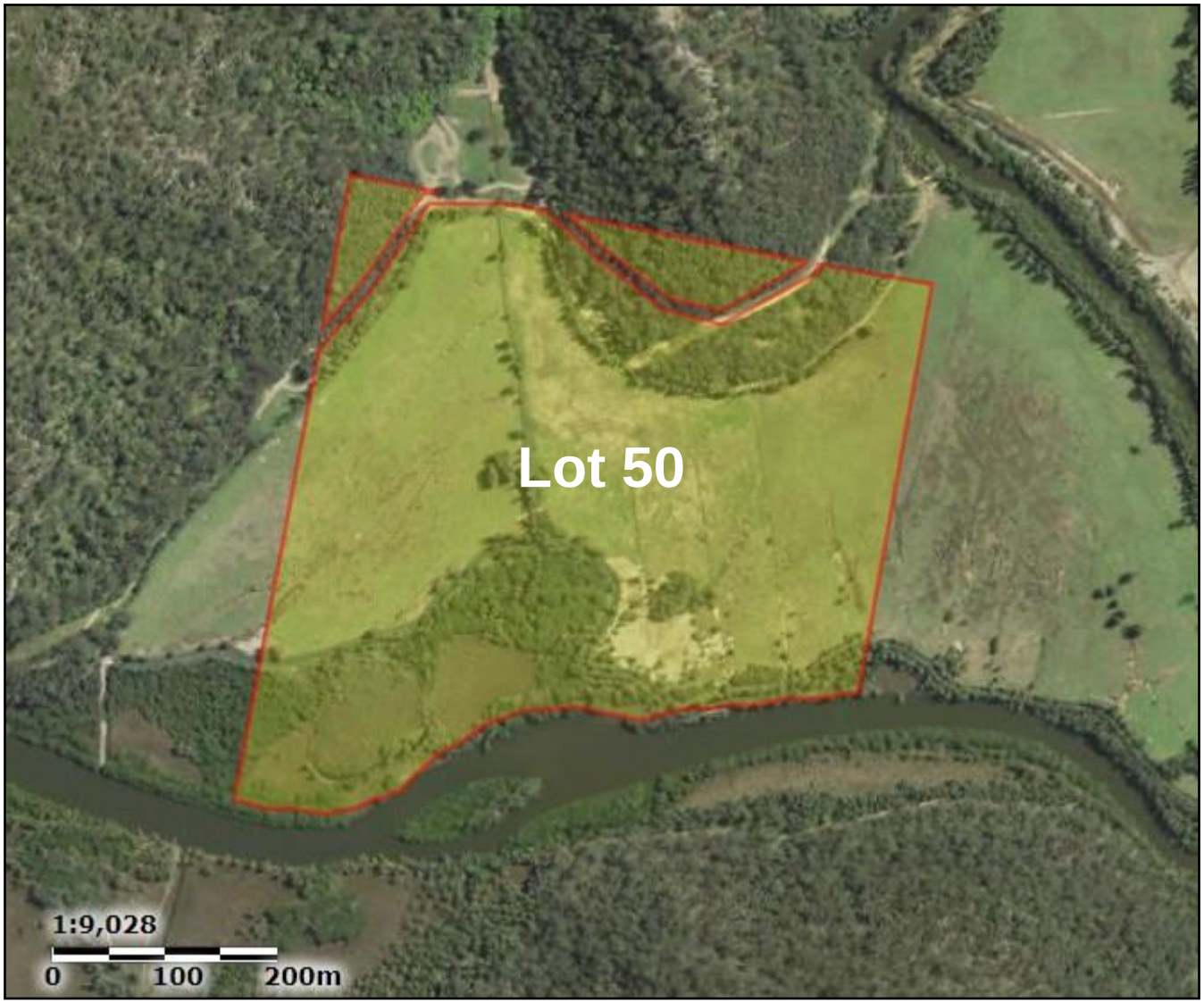
Phase I Environmental Site Assessment

Lot 32 in DP755221

N

Scale: As shown

FIGURE A9



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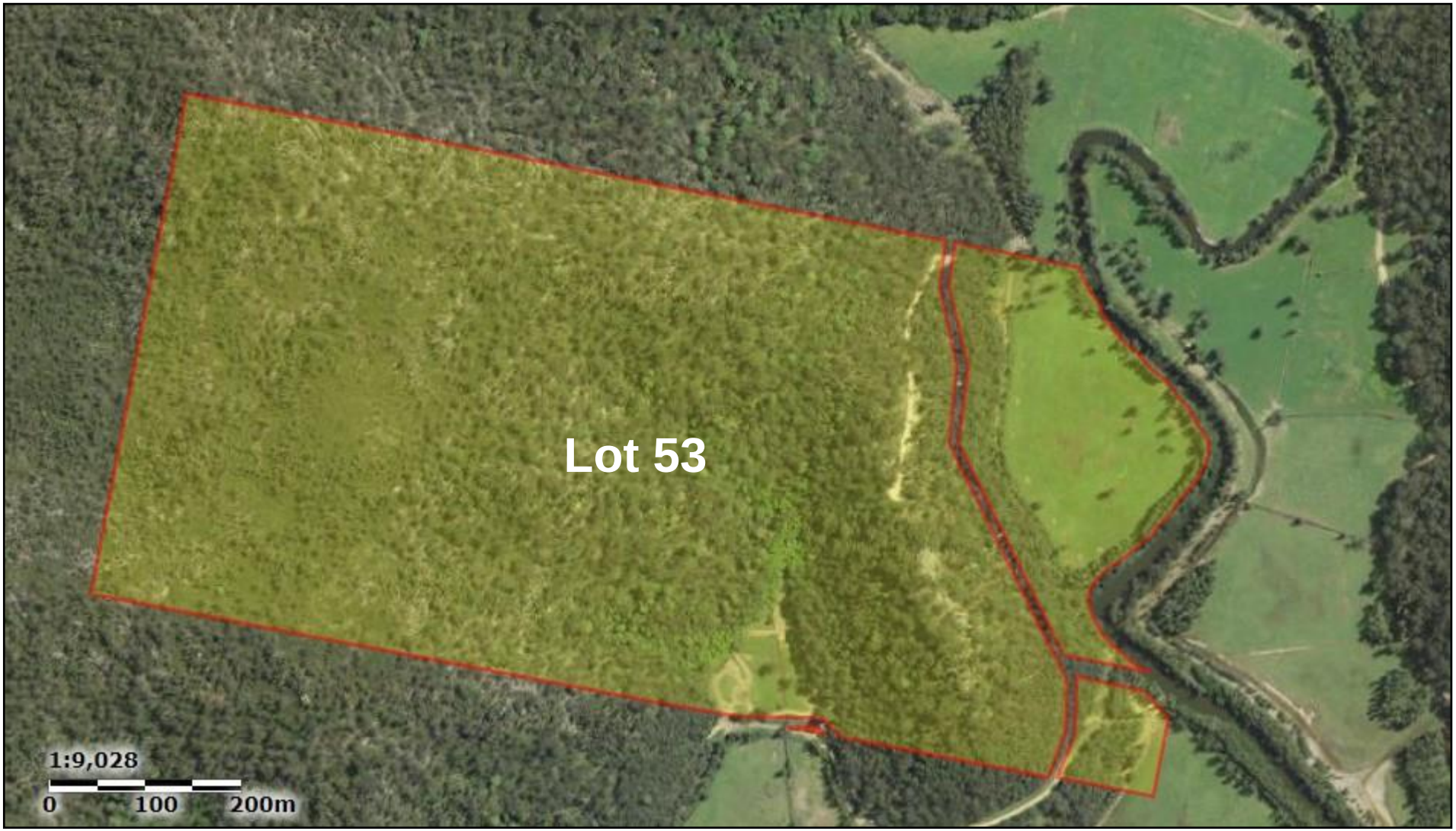
Phase I Environmental Site Assessment

Lot 50 in DP755221

N

Scale: As shown

FIGURE A12



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Phase I Environmental Site Assessment

Lot 53 in DP755221

N

Scale: As shown

FIGURE A13

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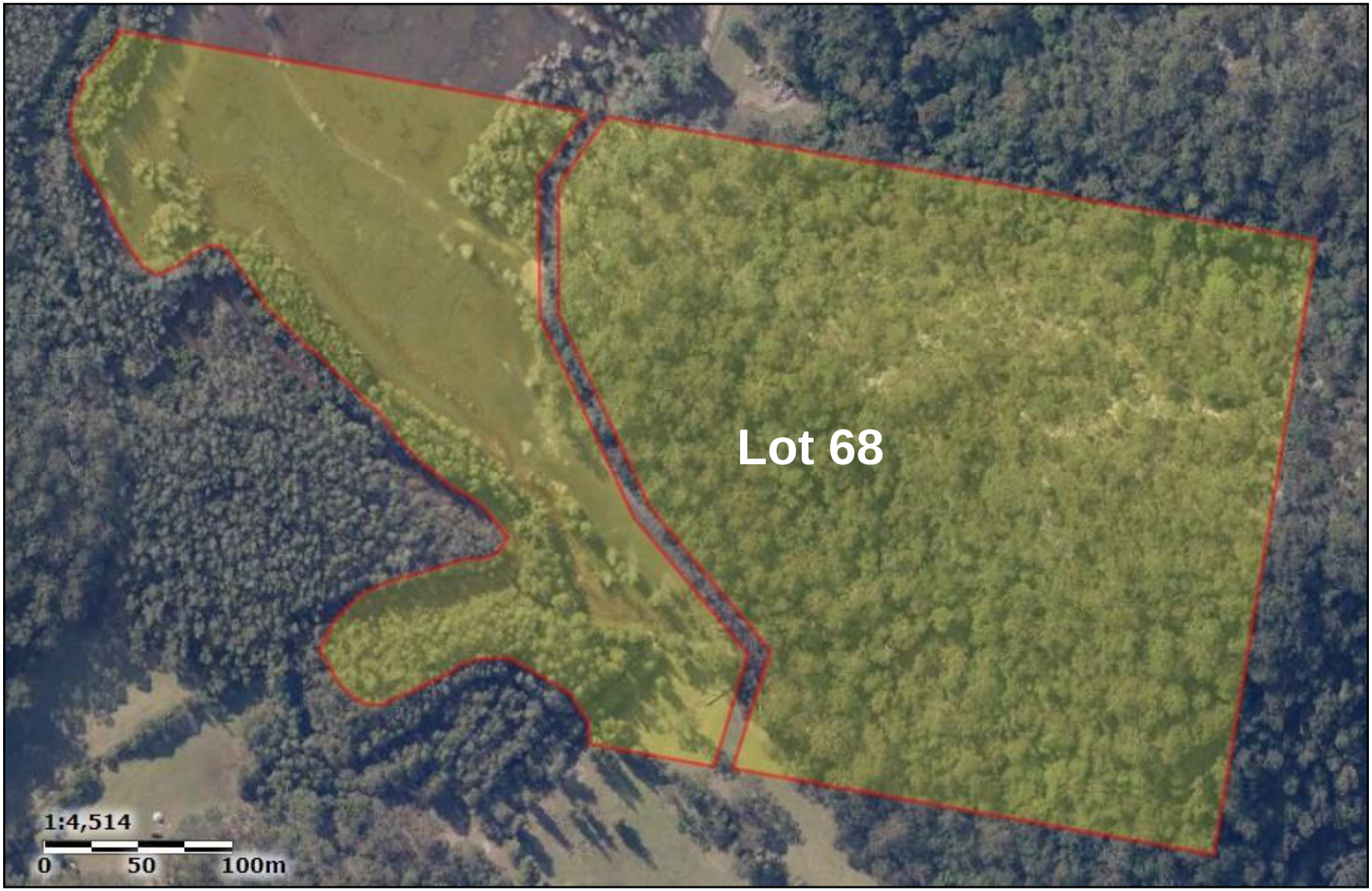
Phase I Environmental Site Assessment

Lot 65 in DP755221

N

Scale: As shown

FIGURE A15



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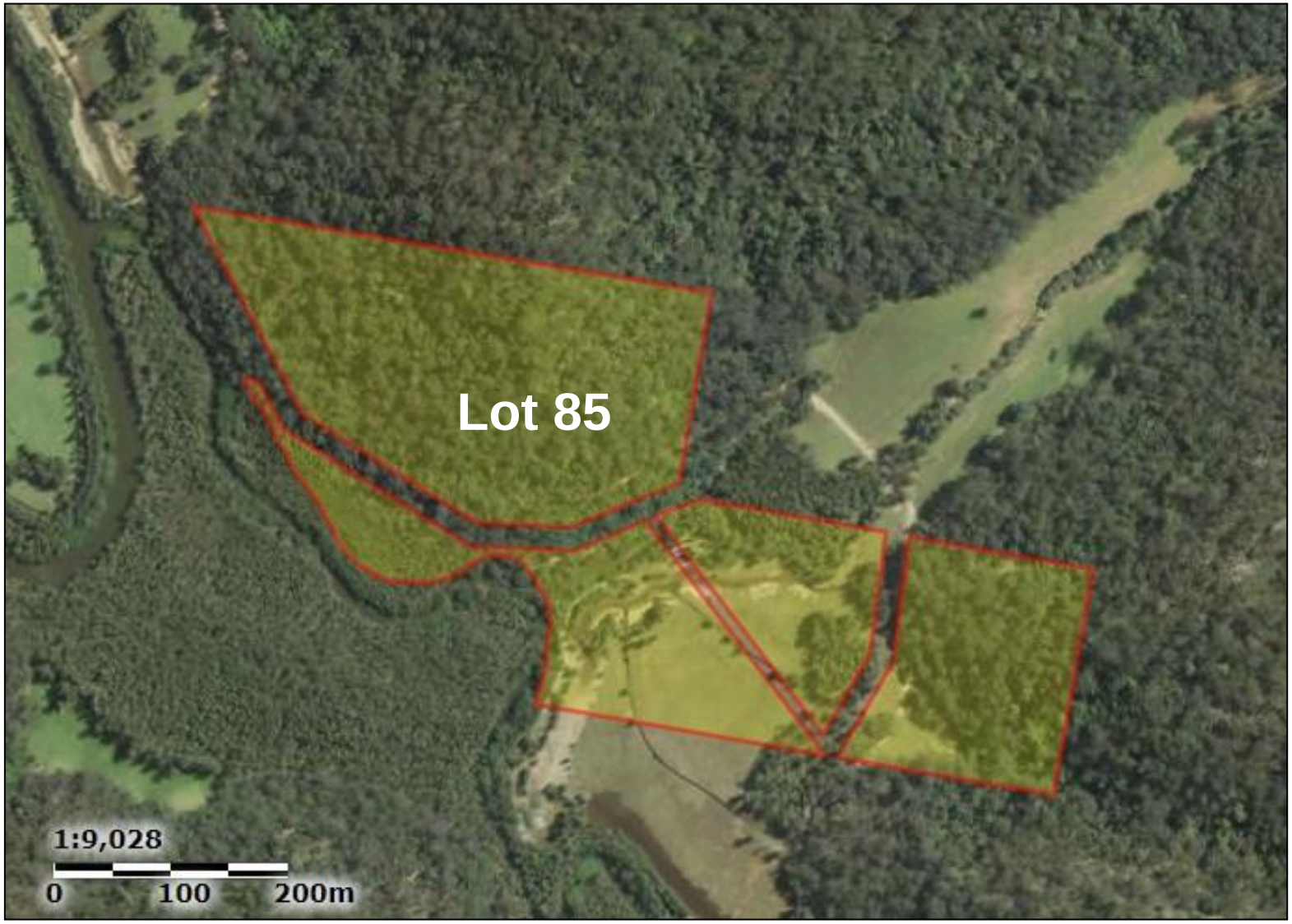
Phase I Environmental Site Assessment

Lot 68 in DP755221

N

Scale: As shown

FIGURE A16



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Phase I Environmental Site Assessment

Lot 85 in DP 755221

N

Scale: As shown

FIGURE A19

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Ph 02 4340 0193

Phase I Environmental Site Assessment

Lot 86 in DP755221

N

Scale: As shown

FIGURE A20

Larry Cook Consulting
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Tumbi Umbi NSW 2261
Ph 02 4340 0193

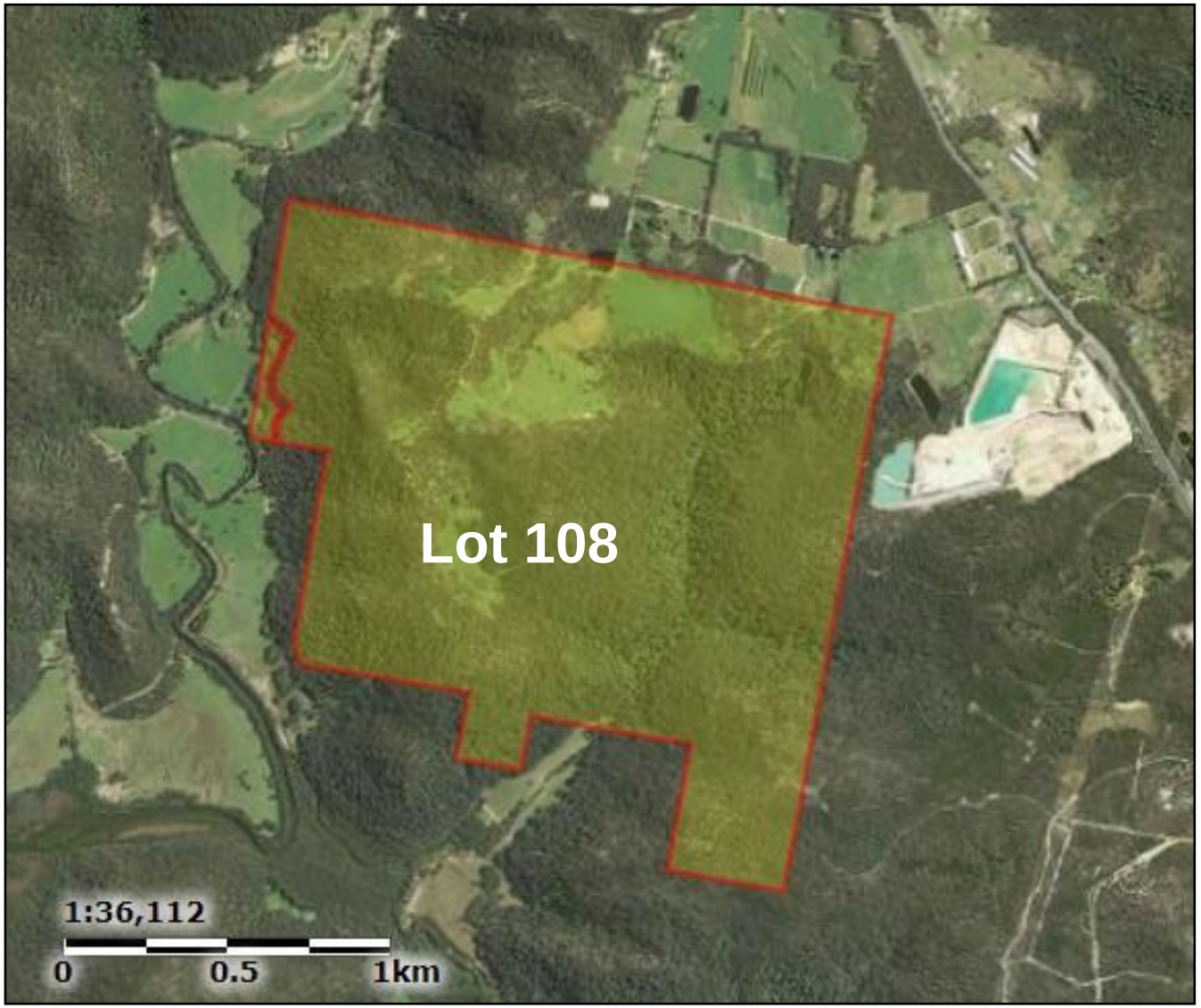
Phase I Environmental Site Assessment

Lot 91 in DP755221

N

Scale: As shown

FIGURE A23



Larry Cook Consulting
PO Box 8146
Tumbi Umbi NSW 2261
Ph 02 4340 0193

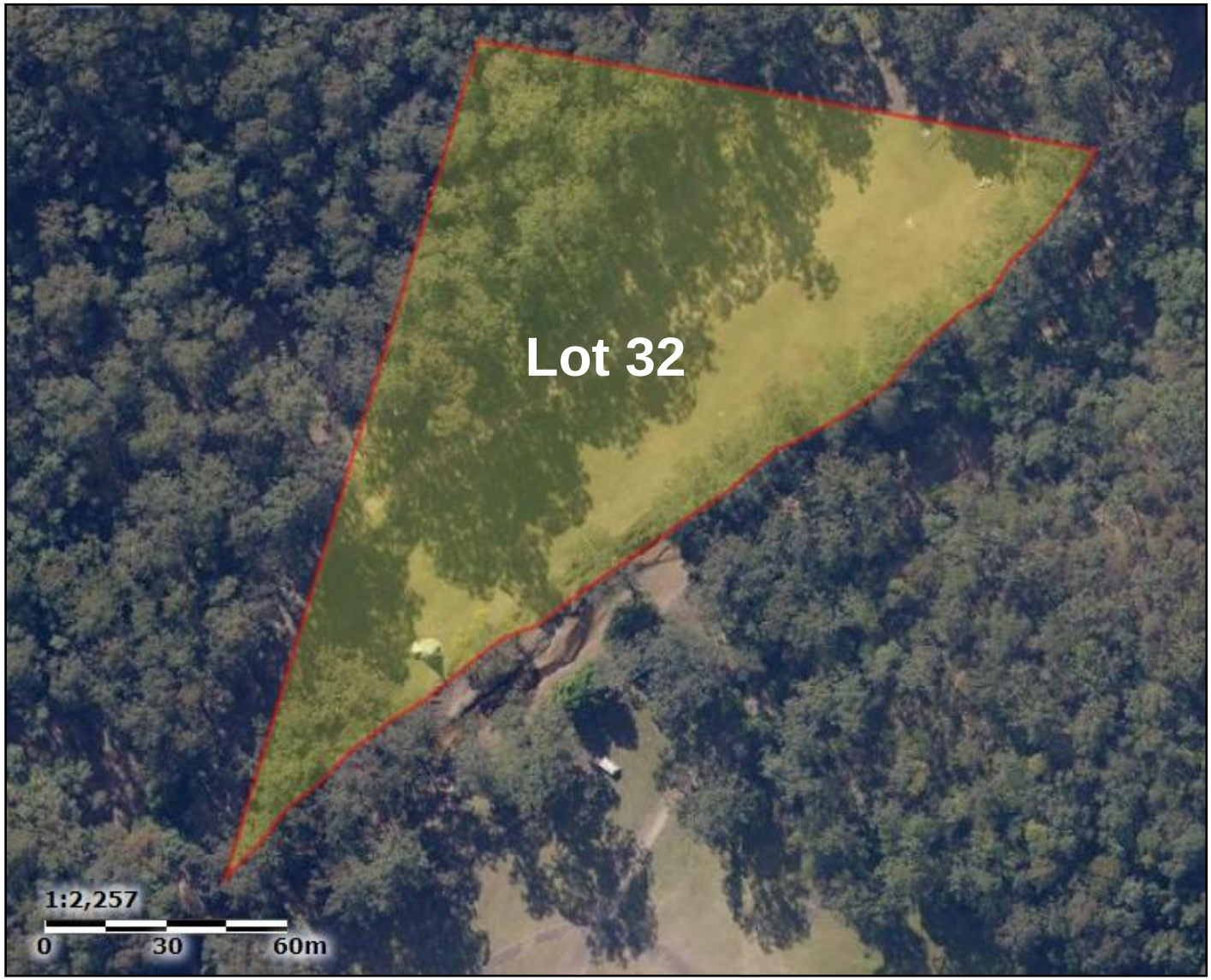
Phase I Environmental Site Assessment

Lot 108 in DP755221

N

Scale: As shown

FIGURE A24



Larry Cook Consulting
PO Box 8146
Tumbi Umbi NSW 2261
Ph 02 4340 0193

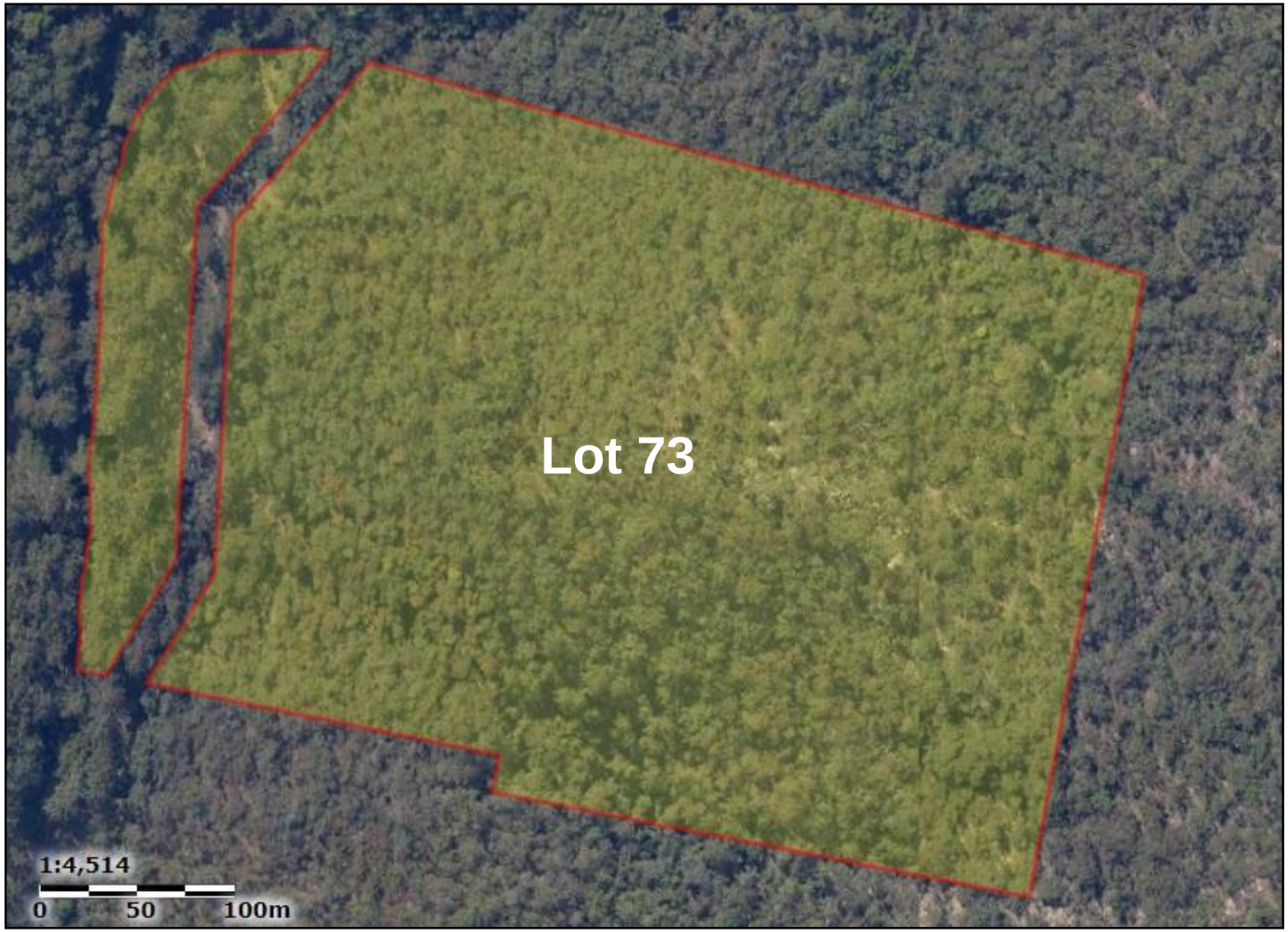
Phase I Environmental Site Assessment

Lot 32 in DP755253

N

Scale: As shown

FIGURE A28



Larry Cook Consulting
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Tumbi Umbi NSW 2261
Ph 02 4340 0193

Phase I Environmental Site Assessment

Lot 73 in DP755253

N

Scale: As shown

FIGURE A29

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Tumbi Umbi NSW 2261
Ph 02 4340 0193

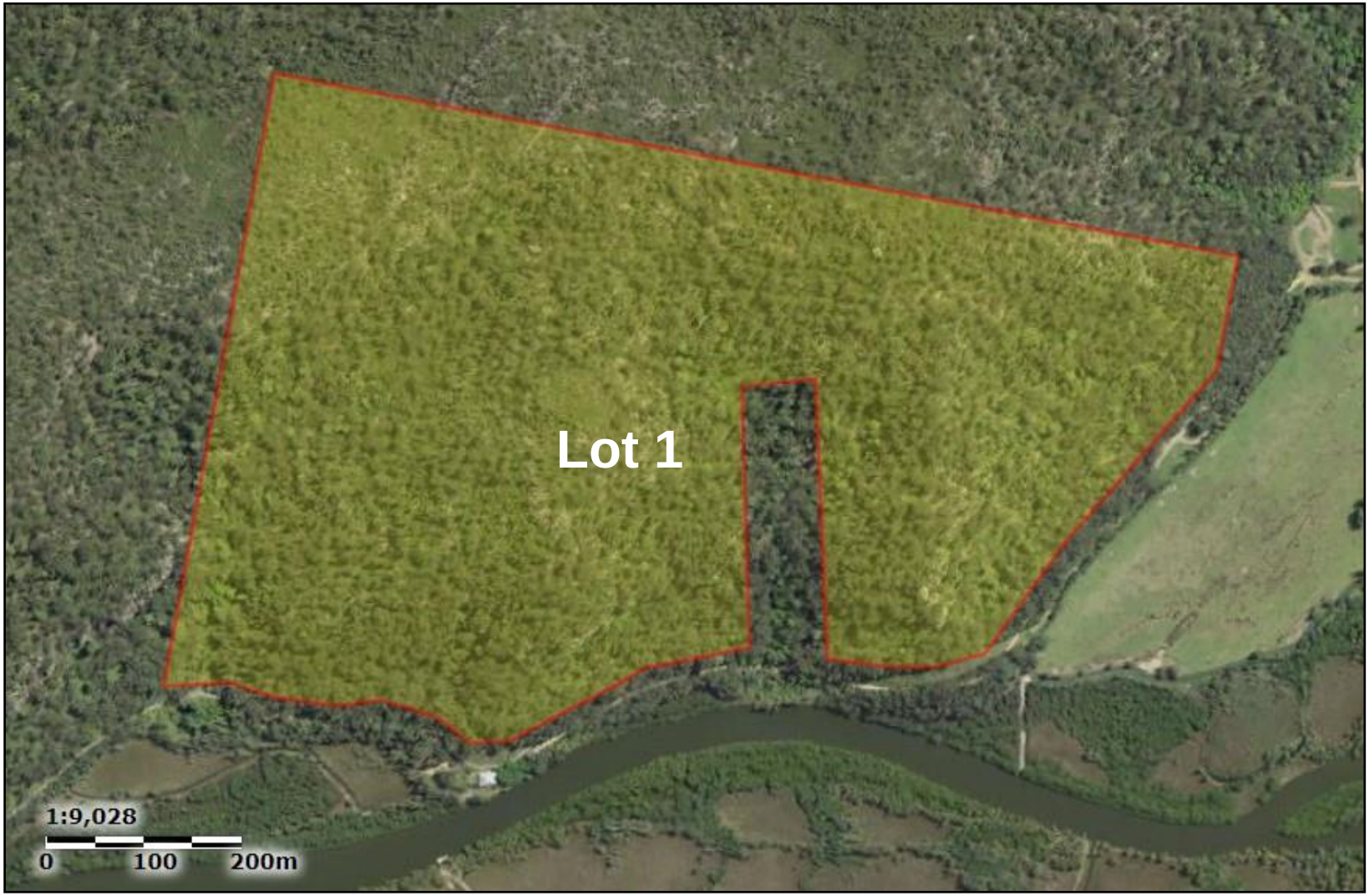
Phase I Environmental Site Assessment

Lot 76 in DP755253

N

Scale: As shown

FIGURE A31



Larry Cook Consulting
PO Box 8146
Tumbi Umbi NSW 2261
Ph 02 4340 0193

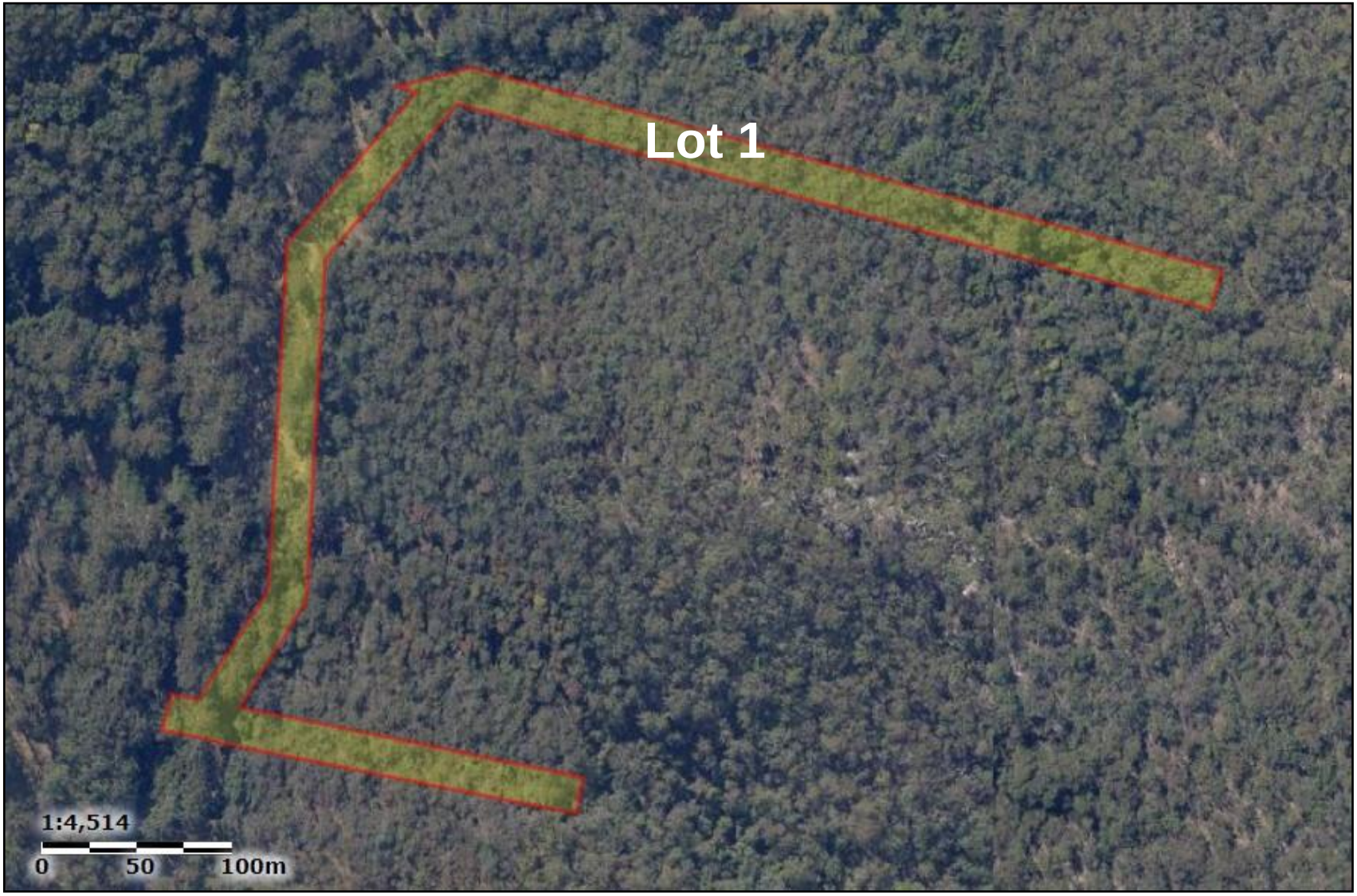
Phase I Environmental Site Assessment

Lot 1 in DP617088

N

Scale: As shown

FIGURE A33



Larry Cook Consulting
PO Box 8146
Tumbi Umbi NSW 2261
Ph 02 4340 0193

Phase I Environmental Site Assessment

Lot 1 in DP1222754

N

Scale: As shown

FIGURE A36

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Tumbi Umbi NSW 2261
Ph 02 4340 0193

Phase I Environmental Site Assessment

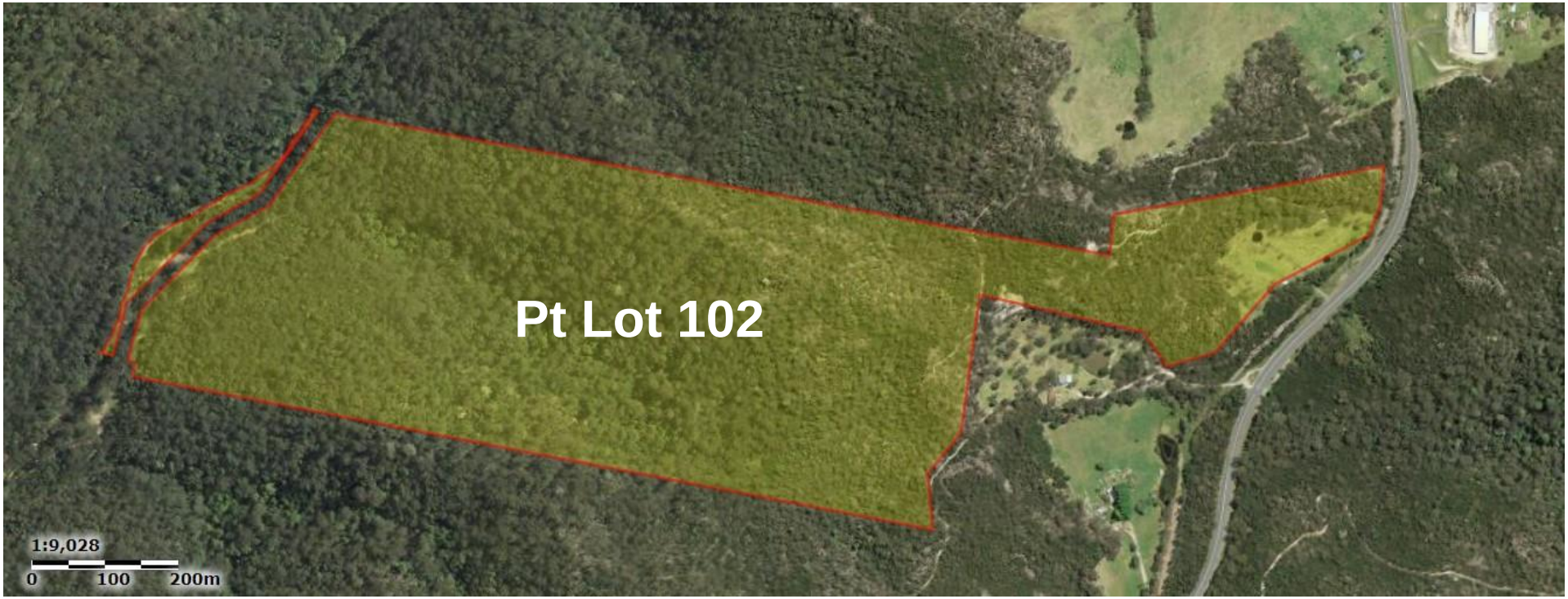
Lot 245 in DP48817

N

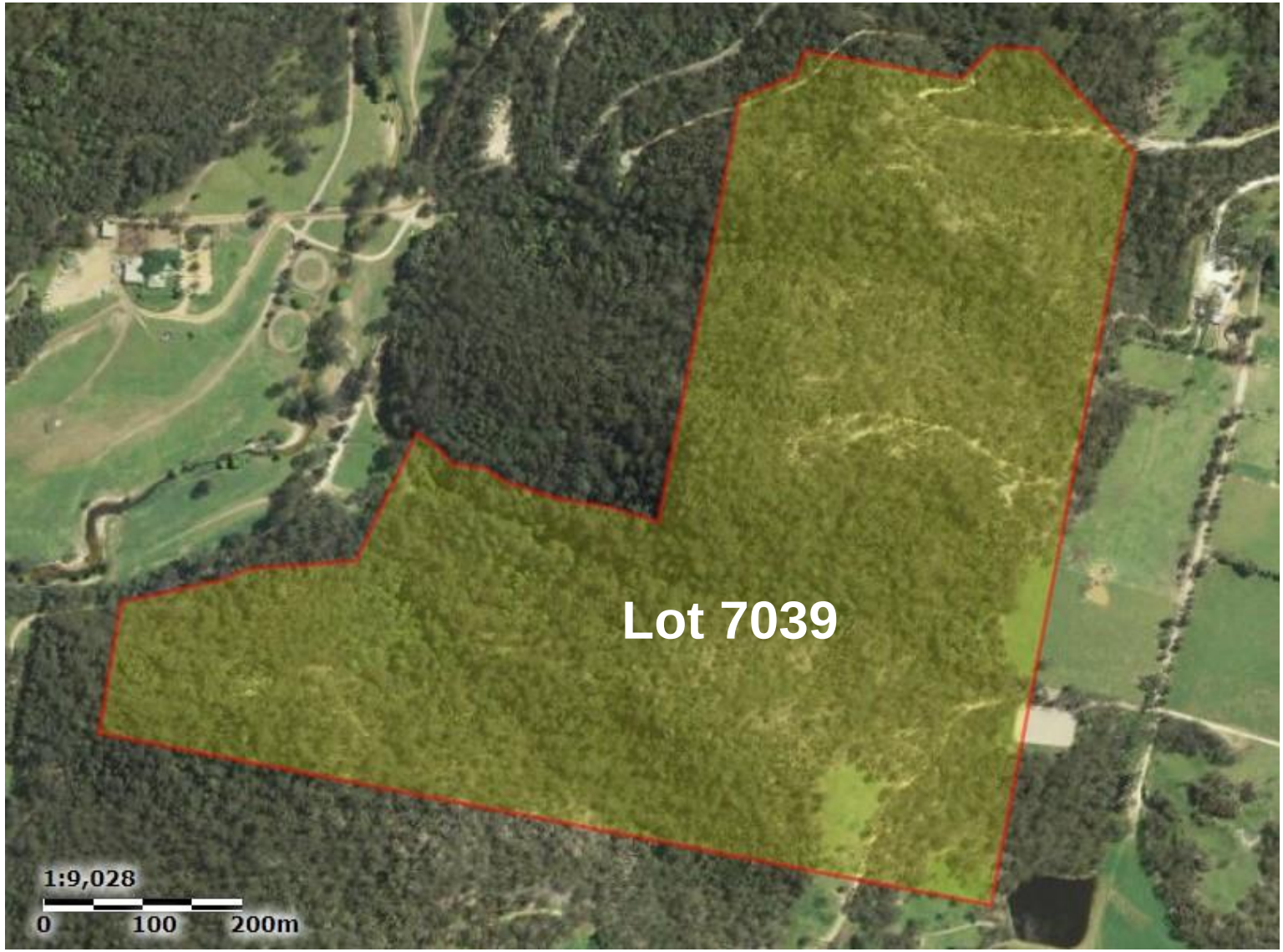
Scale: As shown

FIGURE A38

Larry Cook Consulting **PO Box 8146** **Tumbi Umbi NSW 2261** **Ph 02 4340 0193**	**Phase I Environmental Site Assessment** Lot 7036 in DP1059768	*N*	Scale: As shown **FIGURE A42**



Larry Cook Consulting **PO Box 8146** **Tumbi Umbi NSW 2261** **Ph 02 4340 0193**	**Phase I Environmental Site Assessment** Pt Lot 102 in DP1139060	*N*	Scale: As shown **FIGURE A47**



Larry Cook Consulting
PO Box 8146
Tumbi Umbi NSW 2261
Ph 02 4340 0193

Phase I Environmental Site Assessment

Lot 7039 in DP1059766

N

Scale: As shown

FIGURE A48

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Tumbi Umbi NSW 2261
Ph 02 4340 0193

Phase I Environmental Site Assessment

Lot 7303 in DP1161109

N

Scale: As shown

FIGURE A49

APPENDIX B

HISTORICAL AERIAL PHOTOS

Larry Cook Consulting **PO Box 8146** **Tumbi Umbi NSW 2261** **Phone 02 4340 0193**	**Phase I Environmental Site Assessment**	Scale: As shown
	North-Eastern Part of Lot 89 in DP755221 **Glenworth Valley** Aerial Photo - 1961	**FIGURE B1**

Larry Cook Consulting **PO Box 8146** **Tumbi Umbi NSW 2261** **Phone 02 4340 0193**	**Phase I Environmental Site Assessment**	Scale: As shown
	North-Eastern Part of Lot 89 in DP755221 **Glenworth Valley** Aerial Photo - 1976	**FIGURE B2**

Larry Cook Consulting **PO Box 8146** **Tumbi Umbi NSW 2261** **Phone 02 4340 0193**	**Phase I Environmental Site Assessment**	Scale: As shown
	North-Eastern Part of Lot 89 in DP755221 **Glenworth Valley** Aerial Photo - 1991	**FIGURE B3**

Larry Cook Consulting **PO Box 8146** **Tumbi Umbi NSW 2261** **Phone 02 4340 0193**	**Phase I Environmental Site Assessment**	Scale: As shown
	North-Eastern Part of Lot 89 in DP755221 **Glenworth Valley** Aerial Photo - 1994	**FIGURE B4**

Larry Cook Consulting **PO Box 8146** **Tumbi Umbi NSW 2261** **Phone 02 4340 0193**	**Phase I Environmental Site Assessment**	Scale: As shown
	North-Eastern Part of Lot 89 in DP755221 **Glenworth Valley** Aerial Photo - 2006	**FIGURE B5**

Larry Cook Consulting **PO Box 8146** **Tumbi Umbi NSW 2261** **Phone 02 4340 0193**	**Phase I Environmental Site Assessment**	Scale: As shown
	Lot A in DP365595 **Aerial Photo - 1961**	**FIGURE B6**

Larry Cook Consulting **PO Box 8146** **Tumbi Umbi NSW 2261** **Phone 02 4340 0193**	**Phase I Environmental Site Assessment**	Scale: As shown
	Lot A in DP365595 **Aerial Photo - 1976**	**FIGURE B7**

Larry Cook Consulting **PO Box 8146** **Tumbi Umbi NSW 2261** **Phone 02 4340 0193**	**Phase I Environmental Site Assessment**	Scale: As shown
	Lot A in DP365595 **Aerial Photo - 1991**	**FIGURE B8**

Larry Cook Consulting **PO Box 8146** **Tumbi Umbi NSW 2261** **Phone 02 4340 0193**	**Phase I Environmental Site Assessment**	Scale: As shown
	Lot A in DP365595 **Aerial Photo - 1994**	**FIGURE B9**

Larry Cook Consulting **PO Box 8146** **Tumbi Umbi NSW 2261** **Phone 02 4340 0193**	**Phase I Environmental Site Assessment**	Scale: As shown
	Lot A in DP365595 **Aerial Photo - 2006**	**FIGURE B10**

APPENDIX C

LABORATORY CERTIFICATE AND COC

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 276378

Client Details

Client	Larry Cook Consulting
Attention	Larry Cook
Address	PO Box 8146, Tumbi Umbi, NSW, 2261

Sample Details

Your Reference	**Larry Cook - Glenworth**
Number of Samples	2 soil
Date samples received	23/08/2021
Date completed instructions received	23/08/2021

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

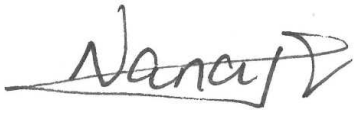
Date results requested by	25/08/2021
Date of Issue	26/08/2021

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Diego Bigolin, Inorganics Supervisor
Jaimie Loa-Kum-Cheung, Senior Chemist
Manju Dewendrage, Prep Team Leader
Steven Luong, Organics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		276378-1
Your Reference	UNITS	S1 Shed
Date Sampled		17/08/2021
Type of sample		soil
Date extracted	-	24/08/2021
Date analysed	-	24/08/2021
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	96

svTRH (C10-C40) in Soil		
Our Reference		276378-1
Your Reference	UNITS	S1 Shed
Date Sampled		17/08/2021
Type of sample		soil
Date extracted	-	24/08/2021
Date analysed	-	24/08/2021
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
Total +ve TRH (C10-C36)	mg/kg	<50
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	84

Organochlorine Pesticides in soil		
Our Reference		276378-2
Your Reference	UNITS	S2 Orchard
Date Sampled		17/08/2021
Type of sample		soil
Date extracted	-	24/08/2021
Date analysed	-	24/08/2021
alpha-BHC	mg/kg	<0.1
HCB	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	81

Organophosphorus Pesticides in Soil		
Our Reference		276378-2
Your Reference	UNITS	S2 Orchard
Date Sampled		17/08/2021
Type of sample		soil
Date extracted	-	24/08/2021
Date analysed	-	24/08/2021
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Parathion	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Ethion	mg/kg	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1
Surrogate TCMX	%	81

Acid Extractable metals in soil			
Our Reference	UNITS	276378-1	276378-2
Your Reference		S1 Shed	S2 Orchard
Date Sampled		17/08/2021	17/08/2021
Type of sample		soil	soil
Date prepared	-	24/08/2021	24/08/2021
Date analysed	-	24/08/2021	24/08/2021
Arsenic	mg/kg	<4	<4
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	23	38
Copper	mg/kg	2	79
Lead	mg/kg	4	6
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	<1	3
Zinc	mg/kg	9	74

Misc Inorg - Soil			
Our Reference		276378-1	276378-2
Your Reference	UNITS	S1 Shed	S2 Orchard
Date Sampled		17/08/2021	17/08/2021
Type of sample		soil	soil
Date prepared	-	25/08/2021	25/08/2021
Date analysed	-	25/08/2021	25/08/2021
pH 1:5 soil:water	pH Units	5.6	6.0
Electrical Conductivity 1:5 soil:water	µS/cm	66	64

Moisture			
Our Reference		276378-1	276378-2
Your Reference	UNITS	S1 Shed	S2 Orchard
Date Sampled		17/08/2021	17/08/2021
Type of sample		soil	soil
Date prepared	-	24/08/2021	24/08/2021
Date analysed	-	25/08/2021	25/08/2021
Moisture	%	12	16

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-022	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			24/08/2021	[NT]	[NT]	[NT]	[NT]	24/08/2021	[NT]
Date analysed	-			24/08/2021	[NT]	[NT]	[NT]	[NT]	24/08/2021	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	84	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	84	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	[NT]	[NT]	[NT]	[NT]	95	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	[NT]	[NT]	[NT]	[NT]	79	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	80	[NT]
m+p-xylene	mg/kg	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	82	[NT]
o-Xylene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	81	[NT]
naphthalene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	103	[NT]	[NT]	[NT]	[NT]	89	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			24/08/2021	[NT]	[NT]	[NT]	[NT]	24/08/2021	[NT]
Date analysed	-			24/08/2021	[NT]	[NT]	[NT]	[NT]	24/08/2021	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	88	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	71	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	88	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	71	[NT]
Surrogate o-Terphenyl	%		Org-020	82	[NT]	[NT]	[NT]	[NT]	108	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			24/08/2021	[NT]	[NT]	[NT]	[NT]	24/08/2021	[NT]
Date analysed	-			24/08/2021	[NT]	[NT]	[NT]	[NT]	24/08/2021	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	75	[NT]
HCB	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	79	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Endrin	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	79	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	84	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	82	[NT]	[NT]	[NT]	[NT]	82	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			24/08/2021	[NT]	[NT]	[NT]	[NT]	24/08/2021	[NT]
Date analysed	-			24/08/2021	[NT]	[NT]	[NT]	[NT]	24/08/2021	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	72	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	81	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	65	[NT]
Malathion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Parathion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	78	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	82	[NT]	[NT]	[NT]	[NT]	82	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			24/08/2021	[NT]	[NT]	[NT]	[NT]	24/08/2021	[NT]
Date analysed	-			24/08/2021	[NT]	[NT]	[NT]	[NT]	24/08/2021	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	88	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	96	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	85	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			25/08/2021	[NT]	[NT]	[NT]	[NT]	25/08/2021	[NT]
Date analysed	-			25/08/2021	[NT]	[NT]	[NT]	[NT]	25/08/2021	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

To: Envirolab Services Pty Ltd
12 Ashley Street
Chatswood NSW 2147

CHAIN OF CUSTODY

Date: 18.8.21 Page: 1 of 1

REPORT TO:	Larry Cook
COMPANY:	Larry Cook Consulting
ADDRESS:	PO Box 8146 TUMBI UMBI NSW 2261
INVOICE TO:	Larry Cook
COMPANY:	Larry Cook Consulting
ADDRESS:	PO Box 8146 TUMBI UMBI NSW 2261
Telephone:	0428 884645
Email:	larrycookconsulting@gmail.com

ANALYSIS REQUIRED

Client Sample ID	Sample Date	Matrix	pH	EC	OCP Screen	OPP Screen	TRH BTEX	Suite Metals
S1 SHED (1)	17.8.21	SOIL	✓	✓			✓	✓
S2 ORCHARD (1)	17.8.21	SOIL	✓	✓	✓	✓		✓
* 2 DAY TURNAROUND PLEASE								

ENVIROLAB Envirolab Services 12 Ashley St Chatswood NSW 2067 Ph: (02) 9910 6200
Job No: 276378
Date Received: 25/8/21
Time Received: 12:10
Received By: KK
Temp: Cool/Ambient
Cooling: Ice/Icepack 23°C
Security: Intact/Broken/None

Project ID	Relinquished By:	Date/Time	Received By:	Date/Time
GLENWORTH	L. COOK L Cook	18/8/21 1500	KK	12:10
	Relinquished By:	Date/Time	Received By:	Date/Time
	Relinquished By:	Date/Time	Received By:	Date/Time

Comments:
* TWO DAY TURNAROUND PLEASE